UNIVERSITI TEKNOLOGI MARA

# GRAMMAR-BASED PROSODY MODIFICATION FOR EXPLICIT CONTROL MALAY LANGUAGE STORYTELLING SPEECH SYNTHESIS

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PhD

May 2018

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# GRAMMAR-BASED PROSODY MODIFICATION FOR EXPLICIT CONTROL MALAY LANGUAGE STORYTELLING SPEECH SYNTHESIS

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Thesis submitted in fulfillment
of the requirements for the degree of
**Doctor of Philosophy**

**Faculty of Computer and Mathematical Sciences**

**May 2018**

# CONFIRMATION BY PANEL OF EXAMINERS

I certify that a panel of examiners has met on 23th January 2018 to conduct the final examination of Muhammad Izzad bin Ramli on his Doctor of Philosophy thesis entitled "Grammar-Based Prosody Modification for Explicit Control Malay Language Storytelling Speech Synthesis" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student is awarded the relevant degree. The panel of Examiners was as follows:

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# ABSTRACT

Storytelling speech synthesis is a process of converting written text to the spoken speech in storytelling speaking style. It has gained much interest in the area of digital storytelling and storytelling humanoid robot for children in learning environment. Reviews have shown that storytelling speech synthesis can be developed using implicit control, explicit control or playback approach. The literatures stated that each approach has its own drawbacks and needs to be tackled for a better quality synthesized speech. In this thesis, explicit control is selected because it is commonly used in the storytelling speech synthesis and has shown to produce good intelligibility and reasonably natural speech. However, modification of prosody in explicit control approach remains a problem as it may lead to speech quality degeneration due to extreme over-exaggeration of speech. Furthermore, perception evaluation showed that the similarity score between the natural and synthesized speech can also be improved for a more satisfactory result. Therefore, this research aims to introduce a new prosody modification technique to reduce over-exaggeration and simultaneously improve the similarity between the natural and synthesized speech. Three narrative children short stories in neutral and storytelling styles are recorded by nine storytellers. A total of 522 speech sentences, 5,238 words and 12,294 syllables are collected to be utilized as experimental datasets and prosody analysis. Based on the prosody analysis, a grammar-based prosody modification rules are proposed by integrating grammatical structure. Consequently, new rules and algorithm that is *MustFront* rule, *limitation* rule, and *two-steps pitch contour* algorithm are introduced to increase the synthesized speech quality. Using Harmonic Noise Model (HNM) as the synthesizer, the grammar-based prosody modification rules are used to produce the synthesized storytelling speech. The synthesized storytelling speech is then compared to baseline methods of synthesized storytelling speech that are global and local prosody modification rules. The evaluation of the synthesized storytelling speech was conducted using objective test (Perceptual Evaluation of Speech Quality (PESQ) test, and aspects or components test) and perceptive test (naturalness, intelligibility, similarity test, and recognition test). The result of PESQ test showed that grammar-based prosody modification with limitation rule produced the highest Mean Opinion Score (MOS) of 3.35 based on five-point scale. The prosody parameters test also demonstrated that the synthesized storytelling speech using grammar-based with limitation rule is much closer to the natural storytelling speech. As for the perception test evaluated by nine native speakers, results showed that grammar-based rule with limitation rule is able to outperform local and global rules by achieving the naturalness, intelligibility and similarity Mean Opinion Score (MOS) of 4.11, 4.47 and 4.06, respectively using a five-point scale. The proposed rule also managed a high accuracy rate of 92% for the recognition test. As conclusion, the performance of the synthesized storytelling speech using grammar-based with limitation rule is better than local and global rules.

# ACKNOWLEDGEMENTS

Alhamdulillah, in the name of Allah S.W.T. The Most Beneficent and Most Merciful. I am using this opportunity to express my gratitude to Allah S.W.T for blessing and mercy, my beloved wife, family and friends who supported me throughout the journey of my PhD.

I really want to express my biggest appreciations to Prof. Madya Dr. Nursuriati Jamil and Dr. Noraini Seman for their full support, precious advice and guidance at Universiti Teknologi MARA Shah Alam. I am thankful for their aspiring guidance, invaluable constructive criticism and friendly advice during the study. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the study.

Thank you also to the Universiti Teknologi MARA Shah Alam and Ministry of Education for supporting this study under the *Tenaga Pengajar Muda UiTM* and *Skim Latihan Akademik Bumiputera* scholarship.

I would also like to thank my virtual friends on Doctorate Support Group Malaysian postgraduate community.

This thesis will not be completed without all of these supports.

Thank You.

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**Abbreviations**

| | |
|---|---|
| DMF | Duration Modification Factor |
| ESNOLA | Epoch Synchronous Non-Overlap Add |
| F0 | Fundamental Frequency |
| FFT | Fast Fourier Transforms |
| FSt5 | Female Storyteller 5 |
| GMM | Gaussian Mixture Model |
| HMM | Hidden Markov Model |
| HNM | Harmonic Noise Model |
| IMF | Intensity Modification Factor |
| MI | Mean Intensity |
| MOS | Mean Opinion Score |
| MP | Mean Pitch |
| MSt3 | Male Storyteller 3 |
| MRI | Magnetic Resonance Imaging |
| PESQ | Perceptual Evaluation Of Speech Quality |
| PMF | Pitch Modification Factor |
| POC | Percentage Of Change |
| PSM | Pitch Scale Modification |
| PSTS | Pitch Synchronous Time Scaling |
| ROS | Rate-Of-Speech |
| SPS | Syllables Per Seconds |
| SUS | Semantically Unpredictable Sentence |
| TD-PSOLA | Time Domain Pitch Synchronous Overlap Add |
| TSM | Time-Scale Modification |
| TTS | Text-To-Speech |
| WER | Word Error Rate |

# CHAPTER ONE
# INTRODUCTION

## 1.1 Background

Synthesis is a combination of simpler components to produce something complex. In speech synthesis, it means the production of artificial human speech using simpler speech units. It is also known as a process of converting written text to spoken audio and also known as text-to-speech (TTS) (Govind & Mahadeva, 2013). For example, the text "*selamat hari lahir"* (happy birthday) can be synthesized to spoken words as in Figure 1.1.

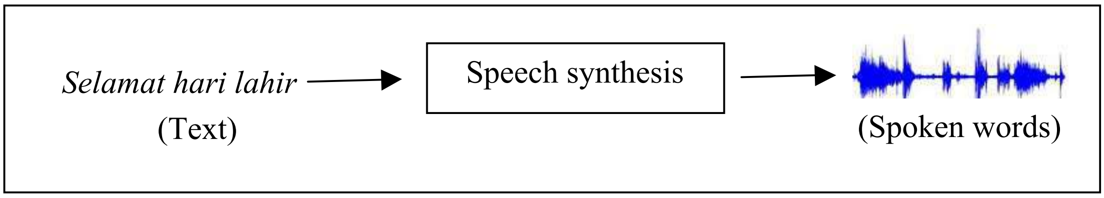



Figure 1.1 Process of converting from text to spoken words

The earliest stage of speech synthesis is synthesizing text to neutral speech output. Neutral speech output is a monotonous synthesized speech with flat intonation (Lutfi, 2007). The major flaw of neutral speech output is its lack of expressiveness (Roekhaut, Goldman, & Simon, 2010), thus limits its domain applications (Sorin, Shechtman, & Pollet, 2015). People often become bored, annoyed and uninterested with unnatural and monotonous speech output (Tatham, Lewis, & Morton, 1999). In contrast, the level of understanding and attention will increase when a machine can communicate using human-like sound (Lutfi, 2007). Literatures stated that neutral speech output needs to have an expression (Sarkar, Haque, Dutta, Gurunath, Harikrishna, Dhara, Verma, Narendra, Sunil, Yadav, & Rao, 2014; Roekhaut et al., 2010). The expression is referring to the ways of expressing the speech by using different pronunciation and tone (Govind & Mahadeva, 2013). This type of speech is known as expressive speech and is widely studied to improve the naturalness of neutral speech output (Verma, Sarkar, & Rao, 2015; Govind & Mahadeva, 2013). The categories of synthesized speech produced by speech synthesis are shown in Figure 1.2.

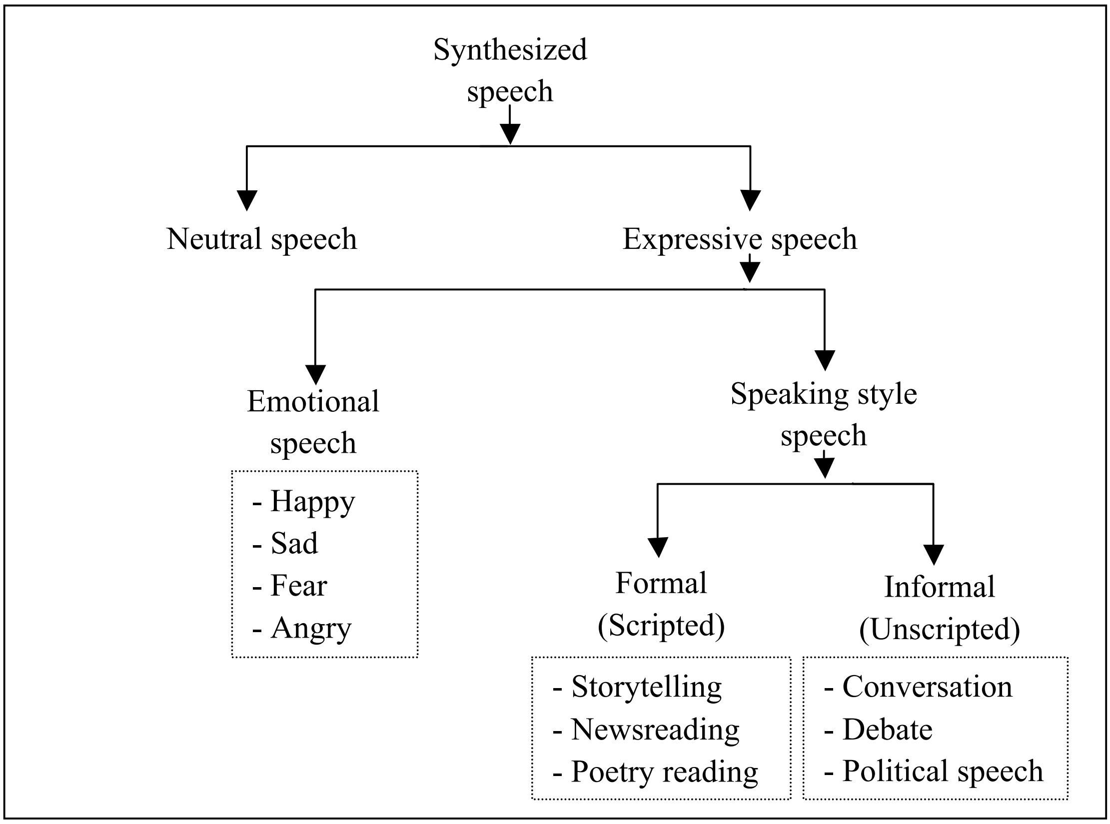



Figure 1.2 Categories of synthesized speech

Expressive speech contains emotional speech and speaking style speech (Tachibana, Yamagishi, Masuko, & Kobayashi, 2005). Emotional speech is greatly affected by our emotional reactions (Nakayama, Oshima, Higashihara, & Machishima, 2015). Emotions such as angry, happy, sad and fear are related to health conditions, feelings and social communications (Azmy, Abdou, & Shoman, 2013). Current research on emotional speech synthesis in various languages such as Malay language (Mustafa & Ainon, 2013), Japanese language (Boku, Asada, Yoshitomi, & Tabuse, 2014), German language (He, Huang, & Lech, 2013), Hindi language (Yadav & Rao, 2015), Arabic language (Azmy et al., 2013) and English language (Montaño, Alías, & Ferrer, 2013). Meanwhile, speaking style is the act of varying speech from one situation to the next situation depending on the context and speakers intention (Bjursäter, 2004). The speaking style previously developed is such as storytelling (Verma et al., 2015; Sarkar et al., 2014; Montaño et al., 2013; Gelin, D'Alessandro, & Le, 2010; Theune, Meijs, Heylen, & Ordelman, 2006), conversation (Roekhaut et al., 2010), political speeches (Lorenzo-Trueba & Barra-Chicote, 2013; Roekhaut et al., 2010) and newsreading (Lorenzo-Trueba & Barra-Chicote, 2013; Roekhaut et al., 2010). Emotion can exist in speaking style speeches (Miller, 2011). As an example, storytelling speaking style can be demonstrated using happy and sad emotion depending on the storyline moods.

Llisterri and Espanyola (1992) further categorized speaking style speech into two categories that are formal (scripted) speech and informal (unscripted) speech. In Joaquim (1992), formal speaking style is defined as planned speech with prepared text that produced precise articulations as compared to informal speaking style with unprepared situation. When a formal speaking style is used, the manner of pronunciation is clear and the speaker makes an effort for the speech to be easily understood by modifying the articulation (Bjursäter, 2004). Meanwhile, the informal speaking style is spontaneous and unplanned such as people having a conversation with others in an informal environment, and the syntax is simpler with a slower tempo, and the intonation is standardized (Bjursäter, 2004). This research focuses only on the storytelling speaking style which falls under the category of formal (scripted) speech.

In order to produce natural (human-like) synthesized speech with emotion and speaking style, expressive speech synthesis approaches are introduced (Aylett et al., 2013). According to Schröder (2009), the expressive speech synthesis approaches can be classified into the following three categories.

i. Explicit control
ii. Playback approach
iii. Implicit control

This research aims to develop storytelling speech synthesis using explicit control. Explicit control is chosen because it is commonly used nowadays (Verma et al., 2015; Sarkar et al., 2014; Govind & Mahadeva, 2013) and does not need large speech corpus. Since this research focus on Malay language storytelling speaking style, explicit control is the best option as Malay language is declared as one of the under-resourced language due to lack of speech resources (Besacier et al., 2014). In addition, the recording of large speech corpus is very challenging to maintain the expression especially for expressive speech (Govind & Mahadeva, 2013).

The current development of expressive speech synthesis in the Malay language is based on emotional speech (Mustafa, Ainon, Zainuddin, Don, & Knowles, 2011; Mustafa, Don, Ainon, Zainuddin, & Knowles, 2014; Mustafa & Ainon, 2013). Research in speaking style speech such as storytelling in the Malay language is still under-explored (Besacier et al., 2014). Therefore, it serves as a motivation for this research and hope that more digital speech resources of Malay language are developed.

## 1.2 Problem Statements

As mentioned earlier, explicit control is used to develop storytelling speech synthesis in this research. In explicit control, prosody modification rule using modification factor is commonly used to modify the speech prosody (Verma et al., 2015; Sarkar et al., 2014; Montaño et al., 2013). However, the modification factor suffers with over-exaggeration which reduce the natural quality of the speech (Govind & Mahadeva, 2013; He et al., 2013; Lorenzo-Trueba & Barra-Chicote, 2013; Theune et al., 2006).

Over-exaggeration occurs due to over modification of prosody. It tends to occur more when dealing with speech that has many prominent syllables that is syllables stressed with a higher pitch and longer duration than the surrounding syllables (Roekhaut et al., 2010). Therefore, the prosody features that are commonly related to over modification are pitch and duration (Theune et al., 2006). The pitch and duration which are over modified can lead to over-exaggeration and affect the speech quality (Schröder, 2009). Theune et al. (2006) used Duration Modification Factor (DMF) of 1.4 to 1.8 times from the average duration and found that over-exaggeration occurred at certain syllables. However, Sarkar et al. (2014) used Duration Modification Factor (DMF) of 0.78 to 1.25 from their average duration and over-exaggeration cease in their research. The review implies that identification of prosody modification factor is non-trivial to overcome the over-exaggeration of synthesized speech using explicit control.

Based on the review, a preliminary experiment is conducted to validate the problem of over-exaggeration in Malay language speech synthesis. Therefore, one Malay folklore storytelling speech spoken by a female and male storyteller is recorded to investigate the effect of using various prosody modification factors towards over-exaggeration. For duration feature, a modification factor of no change (NC) to 2.0 times from the average duration is used. Meanwhile, the modification factor of 1.38 to 2.63 is used for pitch feature. A perception test done by five subjects to evaluate the quality based on the naturalness of the synthesized speech is conducted and the Mean

Opinion Score (MOS) of the test is presented in Table 1.1. The Mean Opinion Score (MOS) is calculated using a five-point scale (1: very poor, 2: poor, 3: fair, 4: good and 5: excellent). The results showed that the MOS achieved for both storytellers are below 3: fair scale level indicating the occurrence of over-exaggeration thus reducing the naturalness of the synthesized speech. It can be concluded that over-exaggeration such as extreme duration and pitch modification is the main problem to compromise the naturalness of synthesized speech (Sorin et al., 2015).

Table 1.1
Preliminary experiment of prosody modification factor

| Experiment | Storyteller | MOS |
|---|---|---|
| Perception test | Male storyteller | 2.96 |
| | Female storyteller | 2.85 |

Another important criterion to determine the quality of the synthesized speech is the similarity between the natural and the synthesized storytelling speech. The similarity is important to show that the synthesized storytelling speech is in storytelling style and has similar intonation with the natural storytelling speech. The similarity is evaluated based on the similarity criteria of the perception test using Mean Opinion Score (MOS) of the synthesized speech. A synthesized storytelling speech is considered resembling the natural storytelling speech if the intonation produced is the same (Huang, 2011).

The problem in similarity criteria is the intonation of synthesized storytelling speech produced is dissimilar with the natural storytelling speech. Thus, the similarity score is low. A study done by Lorenzo-Trueba & Barra-Chicote (2013) showed that the similarity score using MOS scale for speaking style is only fair with less than 4. To achieve better similarity score to the natural storytelling speech, the prosody modification rules that responsible in storytelling speech development should be improved (Verma et al., 2015; Sarkar et al., 2014).

Therefore, this study intends to enhance the prosody modification rule by reducing the over-exaggeration and improve the similarity between the natural and the synthesized speech.

## 1.3 Research Questions

The research questions highlighted in the earlier mentioned research gap can be described as follows:

1. How to modify the modification factor of pitch and duration to reduce over-exaggeration?
2. How to improve the prosody modification rules to increase the similarity between natural and synthesized speech?
3. How to evaluate the performance of the synthesized storytelling speech?

## 1.4 Objectives

The main aim of this research is to construct a storytelling speech synthesis for Malay language using explicit control. In order to accomplish this, several specific objectives are derived:

Objective 1: To identify the suitable prosody modification factor of Malay language storytelling speech synthesis.

Objective 2: To construct an improved prosody modification rules of Malay language storytelling speech synthesis.

Objective 3: To recommend a comprehensive evaluations of the synthesized storytelling speech.

## 1.5 Research Scope

This study is done on speaking style speech which is mainly focusing on storytelling speech. Storytelling speech is chosen because the storytelling speech synthesizer can be applied in wide application domain such as education and therapy. Generally, the presentation of storytelling speech consists of descriptive mode, dialogue mode, narrative mode, emotion, suspense, and climax (Montaño et al., 2013). However, this research only focuses on the narration discourse mode because most storytelling researches used this mode as the basic delivery method for storytelling

(Theune et al., 2006). Furthermore, over-exaggeration reported was occurred in this discourse mode. Literature review shows that the number of storytellers varies with one storyteller being the commonly used (Sarkar et al., 2014; Montaño et al., 2013; Doukhan, Rilliard, Rosset, Adda-Decker, & D'Alessandro, 2011; Alm & Sproat, 2005). Other work such as Theune et al. (2006) used three storytellers and (Gelin et al., 2010) hired up to seven storytellers. Most work (Sarkar et al., 2014; Theune et al., 2006) focused on one type of discourse mode, while few work (Montaño et al., 2013) investigated three types of discourse modes. In this research, the speech corpus is collected from the recorded speech of nine speakers ranging from non-professional and professional speakers. Nine speakers from different experiences are used to analyze the variation of storytelling speaking style presented by different speakers and for understanding of Malay language story reading. The non-professional speakers are also selected as testing datasets. From this point onwards, the term storyteller is used to refer to all nine professional and non-professional speakers.

The recording was done using an open source audio editor called Audacity 2.1.1. Three tales were recorded from the children traditional folktales. Those three stories are selected out of 200 stories from a classic Malaysia's collections of short folktales entitled "*200 kisah teladan haiwan"* because they are in narrative discourse mode. The script of the stories is available in Appendix A. Since the target audience of this research is children, the length of selected stories is kept short in the range of 8 to 12 sentences. Despite the small datasets, the stories are recorded in neutral and the storytelling speaking from nine storytellers producing a total of 522 speech sentences, 5,238 words and 12,294 syllables. As Malay language is an under-resourced language due to the lack of digital resources, the collection of the Malay language spoken datasets is valuable for further research and reference of expressive speech synthesis.

In the evaluation phase, only one story is used for the evaluation that is *si angsa yang bertelur emas* which has the most sentences. The story contains 12 sentences. When considering the test used is perceptive test or listening test, the number of synthesized speech for evaluation should be minimized because of human concentration will fade over time. The quality of the perceptive test is more important because the subject needs to keep repeating listening to the synthesized speech for making a decisive choice. Ten subjects including one professional linguistic are involved for the evaluation. The selection of using ten numbers of subjects is after considering our resource constraints such as equipment, time allocation and budget.

## 1.6 Significance Of Study

The output of storytelling speech synthesizer in audio (.wav) file has a potential to be applied and played in many domains such as:

i. Digital storytelling

   Digital storytelling is one of the education tools for children and can be as a therapy for autism children. In digital storytelling application, synthesized storytelling speech is played by a computer (Lunce, 2007). It is usually supported by the animation or picture while the synthesized storytelling speech is played. Ideally, a digital storytelling application should deliver a listening experience that is equally engaging as that provided by a human storyteller. To achieve this purpose, emotion and storytelling speech is studied to enhance previous speech synthesis systems. Digital storytelling conveys best practices in teaching (Duveskog, Tedre, Sedano, & Sutinen, 2012). It can also be used to help students organize their thoughts and use reflection in their critical thinking. It offers many potential learning benefits, including increased student motivation, makes it an ideal strategy to consider utilizing for the telling of personal stories (Erin Miller, 2009). It is also important for students because it can reinforce their skills in research, organization, writing, presentation, and problem-solving (Lunce, 2007).

ii. Storytelling humanoid robot

   Another application is storytelling humanoid robot. The aim of storytelling humanoid robot is to enable a robot the ability to tell tales to children (Gelin et al., 2010). The humanoid robot would be able to play the synthesized storytelling speech and the children as the target audience. When the synthesized storytelling speech is played, the robot will do some movement to support the stories. It will attract the children to listen to the stories until the end. Storytelling humanoid robot can also be used for children in rehabilitation (Plaisant et al., 2000). Those children can write stories and play by the remote controlled robot. Many benefits have been claimed for it, and many researchers stress that it can be a tremendous source of energy that can be used to motivate children in learning (Ribeiro et al., 2009). The example of a humanoid robot is shown in Figure 1.3.


Figure 1.3: Storytelling humanoid robot

Based on Figure 1.3, the humanoid robot is called Nao. It can automatically narrate a short story to children (Gelin et al., 2010). Nao robot platform is constructed in (Bremner, Leonards, & Bremner, 2005) to allow direct transmission of speech and gestures produced by a human operator. Storytelling using Nao robot has also shown to be capable in improving language learning to improve children's oral language, learning new vocabulary words and increased the amount of diversity of the language (Kory, 2014).

## 1.7 Organization Of The Thesis

This thesis comprises seven chapters, it begins with Chapter 1 by providing the introduction and overview of the thesis that includes the research background, problem determination, research objectives, research scope, significance and contributions of the research.

Chapter 2 reviews the previous work on the development of speech synthesis including expressive speech synthesis, speech corpus collection, text processing in Malay language, related work on storytelling speech synthesis and evaluation. The background of Malay language speech synthesis is also reviewed.

Chapter 3 describes the methodology of storytelling speech synthesis system. There are four main phases (dataset collection and pre-processing phase, text processing phase, synthesis phase and evaluation phase). Dataset collection and pre-processing phase and text processing phase are elaborated in Chapter 3. The topics described in dataset collection and pre-processing phase including the selection of storyteller, stories, recording equipment, and recording session. It follows with the pre-processing of the speech corpus based on the spectral analysis, speech annotation, segmentation, and labelling. Text processing phase describes the syllabification technique to segment word to syllable. At the end, the new datasets and improved syllabification rule that is *MustFront* rule are the contributions in Chapter 3.

Further, the prosody features analysis is explained in Chapter 4. It describes the comparison of prosody features of neutral and storytelling speech. The prosody features in word level are also discussed and a unique phenomenon in storytelling speech is discovered. The analysis results are used for designing the improved prosody modification rule.

Chapter 5 further described the development of improved prosody modification rule to convert neutral speech to storytelling speech. The previous prosody modification rule (global and local rule) is also developed as baseline methods. Chapter 5 contains three contributions that are *limitation* rule to reduce over-exaggeration and then *grammar-based* rule and *two-step pitch contour* formulation to increase the similarity result of the synthesized speech.

The evaluation and results are presented in Chapter 6 describing the research findings and contains two contributions that are recommend a comprehensive evaluation of synthesized storytelling speech and produced a first storytelling speech synthesis in the Malay language. In the end, Chapter 7 concluded the research work and described the future works that can be considered for extending the work.

## 1.8 Summary

As a summary, this chapter presented the research background, problems statement, objectives, scope, and significance. The development of storytelling speech synthesis for the Malay language is still new and need to be explored to enhance the standard of Malay language speech synthesis. The approach of concatenative speech synthesis and explicit control with enhanced prosody modification rule is selected for constructing Malay language storytelling speech synthesis. The literature reviews for all the related topics that are crucial in this research are discussed in Chapter 2.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

In this chapter, reviews of all the related topics about speech synthesis are presented. The topics discussed are the review of approaches to develop neutral speech synthesis and expressive speech synthesis. Review of speech corpus, analysis of expressive parameters and standard evaluation are also discussed in this chapter. Lastly, the background of the Malay language speech synthesis is discussed.

## 2.2 Speech Synthesis

The main objective of speech synthesis is to synthesize speech waveform from written text. In general, the schematic block diagram of speech synthesis (Govind & Mahadeva, 2013) is shown in Figure 2.1.

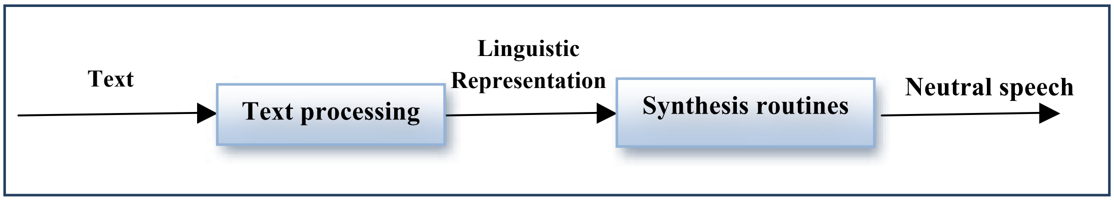



Figure 2.1 Schematic diagram of speech synthesis (Govind & Mahadeva, 2013)

Based on Figure 2.1, the text input is converted into abstract linguistic representation in text processing stage. Text processing stage includes text normalization, phrasification, and syllabification (Tan & Ranaivo-Malançon, 2009). Text normalization is to convert all numbers, dates, acronyms, abbreviations and non-standard words that are pronounced differently depending on context into alphabetic words (Sproat et al., 2001). As an example, number ‘2’ is converted into the alphabetic word *dua* (two). Phrasification is to segment the text based on phrase and sentence. As an example the text of *pada suatu masa dahulu, tinggal seorang petani yang memelihara seekor angsa* will be segmented to two phrases that are *pada suatu* *masa dahulu* and *tinggal seorang petani yang memelihara seekor angsa*. Then, syllabification segments the words in the phrase into syllables (Hafiz et al., 2011).

Syllabification is a language-dependent process (El-Imam, 2004) of dividing words into syllables. Each language can have its own set of syllable structure. Therefore, syllabification techniques may vary from one language to another. Previous work on Malay language syllabification showed usage of two techniques: 1) Syllabification based on the database (Tan & Ranaivo-Malançon, 2009; Zeki & Azizah, 2001), and 2) Segmentation based on syllable structure (Sugiura et al., 2014). Syllabification based on syllable database requires large storage capacity to store the entire syllable in a language. On the other hand, segmentation based on syllable structure used knowledge rules and phonetics devised by linguists. One of the earliest work of syllabification was done by Zeki & Azizah, (2001) by selecting the longest characters sequence in a word and comparing the sequence to a syllable database. The sequence of characters comprised four characters beginning from the leftmost character that is the first character of a word.

In other words, the selection of characters is in left to right direction. If the characters sequence matches with a syllable in the database, the sequence of 4-characters is segmented and considered as a syllable unit. Otherwise, the last character in the sequence is dropped leaving a 3-characters sequence as a syllable unit. The revised syllable unit is again compared against the syllable database for a match. The dropped-and-matched process is continued until a syllable unit match is found in the syllable database. The word is then segmented based on the matched syllable unit. This syllabification technique is simple as only characters are used instead of phonemes. However, incorrect syllabifications still occurs. Few incorrect examples are shown in Table 2.1.

Table 2.1
Incorrect syllabification using Zeti & Azizah (2001) technique

| Words | Segmented incorrectly | Correct segmentation |
|---|---|---|
| [cabaran] | [ca]+[bar]+[an] | [ca]+[ba]+[ran] |
| [sekarang] | [sek]+[a]+[rang] | [se]+[ka]+[rang] |
| [perak] | [per]+[ak] | [pe]+[rak] |
| [mama] | [mam]+[a] | [ma]+[ma] |

Samsudin et al. (2004) adopted a different strategy for Malay words syllabification to develop Malay speech synthesis. In their syllabification technique, each normalized word is converted to a consonant (C) and vowel (V) forms and extracted based on four syllable structure rules in Malay sound system. The structures are CV, VC, CVC, and V. Syllabification is also done from left to right. Their proposed technique can segment words which end with Malay diphthong such as <ai>, <au> and <oi>. Such words are [pant***ai***] and [pul***au***]. Samsudin et al.'s syllabification is also capable of segmenting an unspecified number of English and Arabic loan words which are stored in a database.

Tan & Ranaivo-Malançon (2009) introduced another syllabification based on syllable database for an Automatic Speech Recognition (ASR) in 2009. Their method is later adopted by Samsudin et al. (2004) for syllabification intended for a Malay language speech synthesis. The first steps of syllabification converted grapheme of a word into a different sound class such as vowel, diphthong, fricative, affricate, plosive, nasal and glides. Then, the word is segmented by determining the largest possible syllable that can be formed from right to left. A summary of the above mentioned three syllabification techniques is illustrated in Figure 2.2.

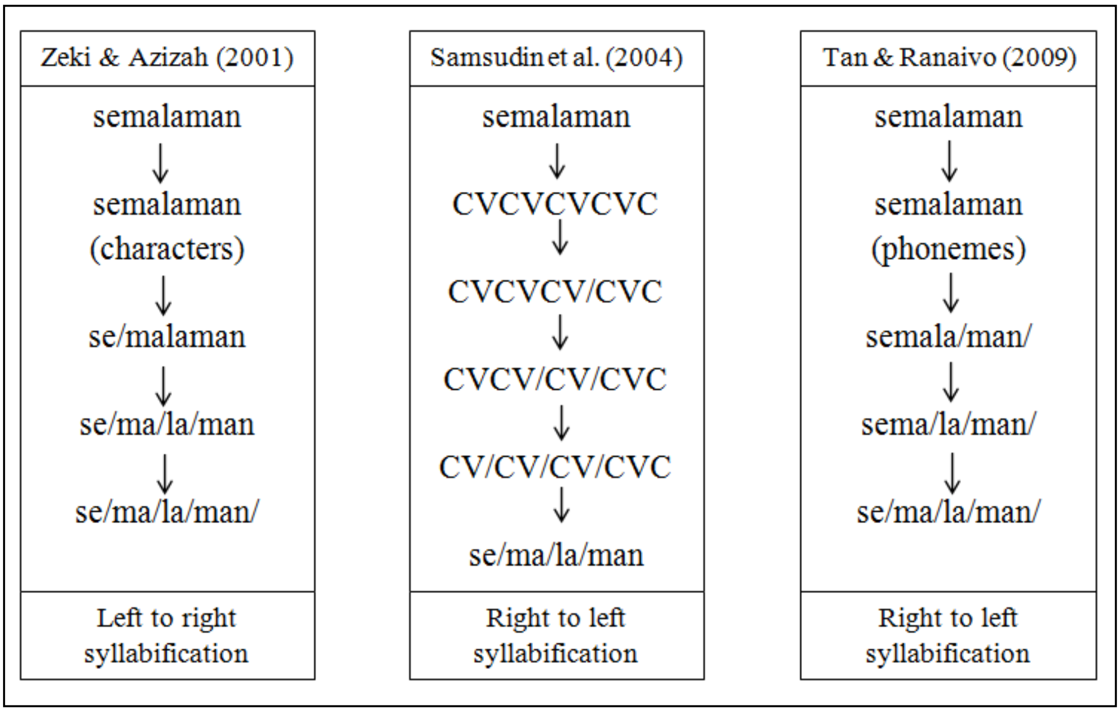



Figure 2.2 Syllabification for different source of technique

Linguistic representation contains sequence of syllables with the prosodic information (Klatt, 1987; Clark et al., 2007; King, 2011). Then, linguistic representation drives the synthesis routines to synthesize the speech. In synthesis routines, there are four approaches that can be adapted (Govind & Mahadeva, 2013), that are:

i. Articulatory speech synthesis
ii. Formant speech synthesis
iii. Concatenative speech synthesis
iv. Statistical parametric speech synthesis

A summary of these four approaches is tabulated in Table 2.2. Despite the development in articulatory (Liu, 2017; Fels & Gick, 2016; Sorensen et al., 2016) and formant speech synthesis (Wang et al., 2015; Carlson et al., 2002; Burkhardt & Sendilmeier, 2000) in the recent years, the concatenative and statictical speech synthesis are the most used approaches in the area of speech synthesis (Takaki, Sawada, & Hashimoto, 2012; Rashad & El-Bakry, 2010). It is because articulatory speech synthesis is computationally complex and difficult to optimize (Fels & Gick, 2016) and formant speech synthesis is very complex in handling large number of control parameters (Govind & Mahadeva, 2013).

As can be seen in Table 2.2, more speech synthesis work adopted concatenative (Gamal et al., 2015; Kayte et al., 2015; Panda et al., 2015; Azmy et al., 2013; Bhakat et al., 2013) or statistical-based (Gugulothu, 2016; Mustafa et al., 2014; Yong & Swee, 2014a; Mustafa & Ainon, 2013; Takaki et al., 2012; Cabral, Renals, Yamagishi, & Richmond, 2011; Ling, Richmond, & Yamagishi, 2011; Zen, Tokuda, & Black, 2009) approach. Hence, concatenative or statistical-based speech synthesis approach are considered in this research. However, this research selected concatenative approach based on unit selection technique as this approach is known to produce more natural synthesized speech (Heiga, 2015; Takaki et al., 2012; Rashad & El-Bakry, 2010) as compared to statistical approach that has problem with temporal and spectral discontinuities (Govind & Mahadeva, 2013). Furthermore, concatenative approach can produce a synthesized speech that reasonably resembles the natural speech (Azmy et al., 2013).

Table 2.2

Summary of speech synthesis approach

| Speech synthesis approach | Weakness | Strength |
|---|---|---|
| Articulatory (Liu, 2017; Fels & Gick, 2016; Sorensen et al., 2016) | 1) Computationally complex and difficult to optimize (Fels & Gick, 2016; Govind & Mahadeva, 2013). | 1) Can produce synthesized speech in physical form (Liu, 2017). |
| Formant (Wang et al., 2015; Carlson et al., 2002; Burkhardt & Sendilmeier, 2000) | 1) A large number of control parameters increases the complexity of handling (Govind & Mahadeva, 2013). 2) Synthesized vowels not of high quality (No, 2011). 3) Synthesized speech is far from natural (Rashad & El-Bakry, 2010). | 1) Good intelligibility synthesized speech (Govind & Mahadeva, 2013). |
| Concatenative (Gamal et al., 2015; Kayte et al., 2015; Panda et al., 2015; Azmy et al., 2013; Bhakat et al., 2013) | 1) Temporal and spectral discontinuities (join cost) at the concatenation points. (Govind & Mahadeva, 2013). | 1) Good quality synthesized speech (Panda et al., 2015). 2) Good intelligibility and reasonably natural (Govind & Mahadeva, 2013). 3) More natural than statistical speech synthesis (Heiga, 2015; Takaki et al., 2012; Rashad & El-Bakry, 2010). 4) Resemble the natural speech (Azmy et al., 2013) |
| Statistical (Gugulothu, 2016; Mustafa et al., 2014; Yong & Swee, 2014a; Mustafa & Ainon, 2013; Takaki et al., 2012; Cabral et al., 2011; Ling et al., 2011; Zen et al., 2009) | 1) Over-smooth and lack the richness of detail presenting natural spectral and prosodic patterns. (Govind & Mahadeva, 2013; Takaki et al., 2012). | 1) Good quality synthesized speech (Yong & Swee, 2014a). 2) Good intelligibility and reasonably natural (Yong & Swee, 2014a; Govind & Mahadeva, 2013). |

## 2.3 Expressive Speech Synthesis

Expressive speech synthesis is an extension of neutral speech synthesis. The development of expressive speech is illustrated in Figure 2.3. Basically, expressive speech synthesis is derived from neutral speech synthesis. Along with the text input, the expressive information is used as an additional input. Expressive information is information of expressive parameters such as tempo, pitch, pause or duration that can change the intonation to resemble specific speaking style or emotion. In some cases, the expressive information is injected during speech synthesis at the same time using the linguistic and expressive information (Govind & Mahadeva, 2013). Meanwhile in other cases, the speech is synthesized separately without any expressive information, and then later the expression is added to neutral speech using suitable voice transformation technique to become expressive speech synthesis (Ribil, Ribilov´, & Duraˇckov´, 2015).

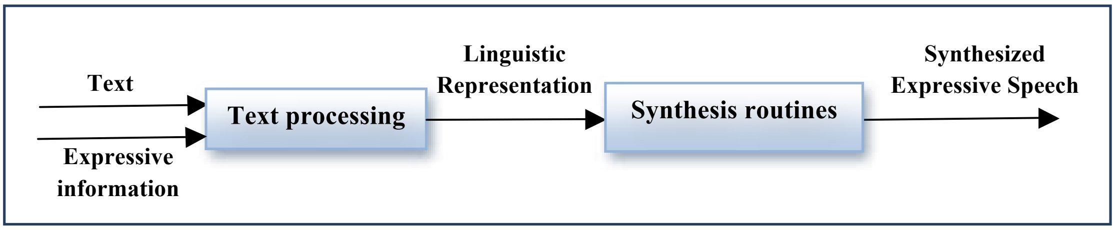



Figure 2.3 Schematic diagram of expressive speech synthesis
(Govind & Mahadeva, 2013)

According to Schröder (2009), expressive approaches can be broadly classified into the following three categories.

i. Explicit control
ii. Playback approach
iii. Implicit control

Further discussion about explicit control, playback approach and implicit control is provided in the next sub-section.

### 2.3.1 Explicit Control

In explicit control, the expressive speech is synthesized by modifying the synthesized neutral speech based on the prosodic information derived from the expressive speech analysis of the respective expressions. The earliest expressive speech synthesis was developed using formant speech synthesis (Burkhardt & Sendilmeier, 2000; Murray & Arnott, 1993; Cahn, 1990) and diphone concatenation using explicit control (Montero et al., 1999; Vroomen et al., 1993).

In recent years, many researchers convert neutral speech to expressive speech using various prosody modification rule (Sarkar & Rao, 2015a; Sarkar et al., 2014; Cabral & Oliveira, 2006a; Tao, Kang, & Li, 2006; Theune et al., 2006). Tao et al. (2006) achieved expressive speech conversion by prosody features (pitch and duration) modification of the neutral speech. Direct scaling of sentence fundamental frequency (F0) and syllable duration is done in linear modification model. Other acoustic features of F0 contour considered for modification are F0 topline, F0 baseline, F0 average and intensity. Another system, Emo Voice system incorporated different emotions into the neutral expressive speech in German language (Cabral & Oliveira, 2006b). In Emo Voice system the neutral speech is converted to expressive speech by modifying both prosody parameters (pitch, duration and intensity) and excitation source parameters (jitter, shimmer, and glottal wave parameters) by Pitch Synchronous Time Scaling (PSTS) method (Cabral & Oliveira, 2006b, 2006a)The rules for the prosody and voice quality modification are derived based on the acoustic profiles presented in (Zovato et al., 2004; Drioli et al., 2003; Whiteside, 1998).

In storytelling speech synthesis, Theune et al. (2006) modelled storytelling speaking style using global modification rule and injected suspense situations (increasing suspense and sudden suspense) in the storytelling. The synthesized speech using global rules obtained good synthetic quality. However, prosody modification lead to over-exaggeration and degradation of speech quality (He et al., 2013; Lorenzo-Trueba & Barra-Chicote, 2013; Theune et al., 2006). Then, Gelin et al., (2010) conducted research to give a robot the ability to tell tales to children. This research defines storytelling as a particular expressive turns, such as different degrees of emphasis, changes of registers and tempo and different character. In another research, basic emotions were linked to storytelling (Silva et al., 2001). The synthetic results showed that the changed emotional fragments compared to the neutral fragments were mostly noticeably different, and the emotions are such as happy, sad, fear and surprise were reasonably accepted.

In 2013, Montaño et al. (2013), developed storytelling speech synthesis using global rule by modifying mean of prosody features (pitch, intensity and tempo). The rule was developed based on discourse modes in global (narrative, descriptive and dialogue) at the sentence level. More recent researcher in explicit control for storytelling speech synthesis in Hindi language is the design of prosody rule-set called local rule for transforming the neutral speech synthesized by Text-To-Speech (TTS) system to storytelling style speech (Sarkar et al., 2014; Verma et al., 2015).

The strength of explicit control has the flexibility to synthesize various speaking styles or emotions for any speaker (Montaño et al., 2013) and produced good intelligibility and natural synthesized speech (Verma et al., 2015). The drawback of explicit control is modification of prosody may lead produced over-exaggeration or distortion which reduce naturalness of synthesized speech (Govind & Mahadeva, 2013; Theune et al., 2006).

### 2.3.2 Playback Approach

Concatenative speech synthesis using unit selection to expressive speech database is categorized as playback approach. Rather than storing neutral speech, this playback approach stores large speech units of expressive speech such as emotional speech or speaking style speech in the database (Hofer et al., 2005; Iida et al., 2000; Fernandez & Ramabhadran, 2007). This playback approach improved the naturalness of the expressive speech synthesis (Govind & Mahadeva, 2013). A highly natural synthesized emotional speech is demonstrated by Iida et al., (2000) by storing large speech database for each emotion. Not only that, Campbell, (2006) synthesized a good quality conversational speech by using unit selection based concatenation speech synthesis from a very large database.

On the other hand, blended database is used by mixing emotion databases of angry, happy and neutral speech for synthesizing speech in the target emotions (Hofer et al., 2005). To use a blended database, target cost function is designed to give more penalties to select the units other than the intended emotion. Fernandez and Ramabhadran (2007) also followed the same approach by mixing the units of other emotions to synthesize the emotional target speech.

Playback approach is using unit selection which has a problem with spectral and temporal mismatch (Govind & Mahadeva, 2013) and required high memory processing. Moreover, it needs a large database to store the entire speech unit. The strengths of playback approach is produce highly quality synthesized speech and (Azmy et al., 2013) and high accuracy of emotion identfication rates (Barra-Chicote et al., 2010).

### 2.3.3 Implicit Control

Expressive speech synthesis can also be developed using statistical parametric approach. The interpolation and adaptation in statistical parametric approach using HMM models are examples of the implicit approach. The implicit control based expressive speech synthesis controls the expressivity by interpolation between two statistical models that are trained on different expressive database. The HMM models can offer various adaptation technique to adapt the average style model to a specific style. Miyanaga et al., (2004) proposed an HMM model based style synthesis using style control vector estimated for each style.

This adaptation technique of HMM model provides flexibility to build the statistical models with a few minutes of data if an average model is available. Since the speech synthesized using speaker adaptation are found to be more robust than speaker dependent case, these adaptation techniques can also be used for synthesizing various styles (Yamagishi et al., 2007). Apart from the adaptation techniques, HMM speech synthesis systems provide flexibility to synthesize various speaking styles or emotions by HMM interpolation or multiple regression of emotion vectors (Barra-Chicote et al., 2010; Nose, Yamagishi, & Kobayashi, 2007; Tachibana et al., 2005). However, the drawback for HMM-based speech synthesis systems is the inherent over-smoothing of the spectral and excitation parameters by the HMM models (Barra-Chicote et al., 2010). This over-smoothing causes the reduced naturalness in the synthesized speech output.

### 2.3.4 Discussion On Expressive Speech Synthesis Approach

Expressive speech synthesis approaches are being studied for the last decade (Azmy et al., 2013) and each approach has its weakness and strength as shown in Table 2.3. The present work on expressive speech synthesis focuses on the development of expressive speech based on explicit control (Govind & Mahadeva, 2013). Explicit control has flexibility to synthesize various speaking styles or emotions for any speaker (Montaño et al., 2013) and produced synthesized speech with good intelligibility and reasonably natural (Verma et al., 2015). It also does not need a large database compared to playback approach and implicit control. Large database is an issue in Malay language. It is because Malay language is categorized as an under-resourced language (Besacier et al., 2014).

Table 2.3
Summary of expressive control technique

| Approach | Weakness | Strength |
|---|---|---|
| Explicit ( Sarkar & Rao, 2015a; Yadav & Rao, 2015; Montaño et al., 2013; Cabral & Oliveira, 2006a; Tao et al., 2006; Theune et al., 2006) | 1) Prosody modifications rule lead to reduce naturalness of synthesized speech (Theune et al., 2006).<br>2) Prosody modification produced over-exaggeration or distortion and speech quality slightly degenerated (Govind & Mahadeva, 2013). | 1) Flexibility to synthesize various speaking styles or emotions for any speaker (Montaño et al., 2013).<br>2) Good intelligibility and reasonably natural (Verma et al., 2015). |
| Playback (Azmy et al., 2013; Bhakat et al., 2013; Fernandez & Ramabhadran, 2007; Campbell, 2006; Pitrelli et al., 2006; Hofer et al., 2005; Yamagishi et al., 2003) | 1) Temporal and spectral mismatch (Govind & Mahadeva, 2013).<br>2) Needs large database (Govind & Mahadeva, 2013; Türk & Schröder, 2008).<br>3) High memory processing (Sebastian, 2014). | 1) Highly quality of synthesized speech (Azmy et al., 2013).<br>2) High accuracy of emotion identification rates (Barra-Chicote et al., 2010). |
| Implicit (Barra-Chicote et al., 2010; Nose et al., 2007; Tachibana et al., 2005) | 1) Inherent over-smoothing of the spectral and excitation parameters by the HMM models (Govind & Mahadeva, 2013).<br>2) Needs a large training data (Schröder, 2009). | 1) Flexibility to synthesize various speaking styles or emotions (Govind & Mahadeva, 2013). |

Recording a new and large speech corpus is very challenging to maintain the expression especially for expressive speech (Govind & Mahadeva, 2013). Because of this issue, explicit control is chosen in this research. Even though playback approach can produced a highly quality of synthesized speech (Azmy et al., 2013) and implicit control has flexibility to synthesize various speaking styles or emotions (Govind & Mahadeva, 2013), they require large databases and training data that is not easily accessible for an under-resourced language such as Malay language.

## 2.4 Expressive Speech Prosody Features

This section is discusses the prosody features that are usually used to develop expressive speech synthesis. Expressive speech parameters are categorized into vocal tract features, excitation source features, and prosodic features. Vocal tract features are analyzed at formant frequencies (F1, F2, F3, F4 and F5) and bandwidth associated with each formant form which helps in understanding the mechanisms of human speech production for speech recognition (Fattah et al., 2008). Excitation source features are analyzed at sub-segmental and segmental levels. Examples of excitation source parameters are jitter and shimmer. They are usually used for advanced speech modification to produce more natural expressions (Ruinskiy et al., 2008). Prosody features are aspect of speech which go beyond phoneme and deal with the auditory qualities of sound. The prosody features are such as pause, rate-of-speech (ROS), pitch, duration, intensity, timbre, and spectral. In this research, only prosodic features are used because based on Sarkar et al. (2014), Sarkar & Rao (2015b) and Verma et al. (2015), prosodic features are adequate in developing expressive speech synthesis while the excitation and vocal tract features are for advanced expressive speech (Govind et al., 2011) which is beyond the scope of this thesis.

Prosodic features that are usually used for expressive speech are pause, rate-of-speech (ROS), pitch, duration, and intensity. In an emotional expressive speech, the prosody features that are usually used for modification are F0, duration, and intensity (Chang et al., 2014; He et al., 2013; Takeda et al., 2013). F0 features considered are F0 average, F0 range, and F0 change to study the relationship between emotional speech (Chang et al., 2014; Fairbanks and Hoaglin 1939). F0 change refers to pitch contour that bent downward or curved upward in a syllable. Banks and Hoaglin (1941) studied on tempo and pauses vary at each expression. However, some researches such as Boku et al. (2014) and Nagaraju & Talari (2011) claimed that only F0 is sufficient to convert neutral speech to emotional speech.

For speaking style expressive speech, F0 and duration are usually used to convert neutral speech to speaking style speech (Lorenzo-Trueba & Barra-Chicote, 2013; Roekhaut et al., 2010). The studies on prosody parameters of speaking style speech showed a variation of pause, rate-of-speech (ROS) and F0 (F0 range) for reading news, political speech and conversation (Roekhaut et al., 2010).

In storytelling expressive speech, all five prosodic features stated earlier that is pause, tempo, duration, pitch, and intensity are used to develop storytelling application (Verma et al., 2015; Sarkar et al., 2014; Theune et al., 2006). In this research, these five prosodic parameters are used for analysis and development of prosody modification rules for Malay storytelling speech synthesis.

### 2.4.1 Tempo

Rate-of-speech (ROS) is defined as tempo of the speech. It is computed based on the number of syllables per seconds (SPS) or words per minute (WPM) (Nelson & Eric, 1998). The tempo is calculated as:

$$Tempo = \frac{n}{\sum d_i} \tag{2.1}$$

where $n$ is the syllable count, and $d_i$ is the *i-th* syllable's duration. Typically, speaker who has high ROS will have short pause at the end of a sentence or phrase (Dong, Lie, & Hong-Jiang, 2003).

### 2.4.2 Pause

Pause is silence between phrases or sentences in seconds (s). There are two types of pauses that are pause between phrase, pause between sentences and they can be classified into three different categories (short, medium and long pauses) (Sarkar & Rao, 2015b). The pause is crucial in improving the naturalness and expressiveness of the synthesized speech for a complete story (Sarkar & Rao, 2015a).

### 2.4.3 Duration

For duration features, it can be categorized based on duration of the utterance, phrase, sentence, words or sound units like phones, diphone and syllables. The duration of syllables is usually used in the analysis for comparison between neutral speech and the various speaking speech (Roekhaut et al., 2010).

### 2.4.4 Intensity

The intensity features of the prosody is a measure of loudness or strength of the speech signal (Bulut & Narayanan, 2008; Hashizawa, Hamzah, & Ohyama, 2004). It is calculated in decibel (dB). By using intensity feature, Verma et al. (2015) were able to conclude that storytelling speech is louder than neutral speech for Hindi language.

### 2.4.5 Pitch

Pitch is perceived frequency of sound. It is the average rate at which vocal folds vibrate for voiced sounds. Verma et al., (2015) observed that average pitch of storyteller is higher than neutral speech which is important criteria for modelling storytelling speech synthesis. In certain research, pitch is used interchangeably with fundamental frequency (F0). F0 is the lowest frequency of a periodic waveform. The variation of the pitch with respect to time is called pitch contour. Vroomen et al. (1993) proved that manipulating F0 contour could accurately express emotions speech.

## 2.5 Prosody Modification Rule in Explicit Control

In explicit control, modifications of prosody can be done based on the global rules (Montaño et al., 2013; Theune et al., 2006) and the local rules (Verma et al., 2015; Sarkar et al., 2014; Montaño et al., 2013). In this section, the development of global and local rule is reviewed. This section also investigates further the causes of over-exaggeration during prosody modification.

### 2.5.1 Global Rule

Global rules are designed to change a neutral speaking style into a general storytelling speech style by uniformly modifying the prosodic parameters at sentence level. Montaño et al. (2013) uniformly modified pitch, intensity and tempo using a mean prosodic pattern from the analysis result of storytelling speech. The rule is created based on the discourse mode (narrative, descriptive and dialogue) and emotion. Table 2.4 shows the percentage of change (POC) from the neutral speech to the specific emotion in dialogue discourse mode.

Table 2.4
Percentage of change (POC) of emotions (Montaño et al., 2013)

| Emotion | Mean Pitch (MP) (Hz) | Tempo (SPS) | Mean Intensity (MI) (dB) |
|---|---|---|---|
| Neutral | 108.0 | 7.2 | 70.0 |
| Hot anger | +82.80% | -20.60% | +9.10% |
| Cold anger | +42.40% | -16.70% | +4.00% |
| Joy | +28.90% | -11.20% | +7.20% |
| Sadness | -11.50% | -21.60% | -3.30% |
| Surprise | +45.20% | -15.90% | +0.70% |
| Fear | +29.10% | -2.20% | +5.30% |

As can be seen in Table 2.4, the mean pitch (MP) in Hertz (Hz) for the neutral sentence is 108.0 Hz. The tempo (SPS) and mean intensity (MI) is 7.2 SPS and 70.0 dB, respectively. Over-exaggeration occurs when the syllable’s prosody such as pitch or duration is over-modified by the synthesizer (Theune et al., 2006). Theune et al. (2006) also reported that when the pitch is increased higher than 60 Hz, the synthesized speech suffered over-exaggeration. Therefore, based on Table 2.4, the synthesized emotional speech of type hot anger may be over-exaggerated because of the high percentage of change (POC). Pitch of the synthesized speech is increased by 82.80% from the neutral speech, equivalent to 82.42 Hz.

On the other hand, Theune et al. (2006) introduced a different version of global rules by considering prominent syllable for modifying prosodic parameters. Prominent syllables tend to have a relatively high intensity and pitch (Roekhaut et al., 2010). The research modified pitch (only of prominent syllables), intensity (only of prominent syllables), overall speech tempo (in syllables per second), overall pause duration, and syllable duration in certain adjectives and adverbs. Theune's et al. (2006) also suffer over-exaggeration in certain cases of the syllable even though the pitch modification is limited up to 60 Hz. The vowel of certain words that are stretched 1.4 to 1.8 times from their average duration is also another factor of over-exaggeration in a syllable. Theune et al. (2006) evaluated the synthesized storytelling speech using Mean Opinion Score (MOS) achieving a MOS score of 3.20 from a five point-scale.

They further claimed that the MOS can be improved by solving the over-exaggeration problems. Another criterion that needs to be considered is the similarity between natural speeches with the synthesized speech. Thus, local rule is proposed in different levels of modification to increase the similarity between these two speeches.

### 2.5.2 Local Rules

Local rule is done by modifying the prosody at syllable or word level (Verma et al., 2015; Roekhaut et al., 2010). The idea of the local rule is to modify the prosody non-uniformly based on six types of syllables in an utterance (Sarkar et al., 2014; Verma et al., 2015). The syllables are categorized based on the word's position in a sentence as shown in Figure 2.4 and described in Table 2.5.

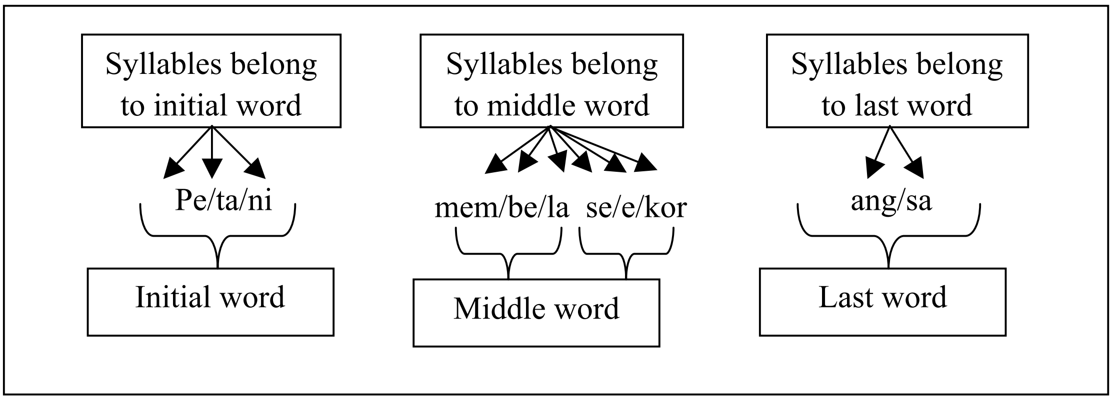



Figure 2.4 Categorized syllable based on word's position

Table 2.5
Type of syllables and its description

| No | Type of syllable | Description |
|---|---|---|
| 1. | Initial prominent | Prominent syllable is located at the first word in a sentence. |
| 2. | Middle prominent | Prominent syllable is located at the middle word in a sentence. |
| 3. | Last prominent | Prominent syllable is located at the last word in a sentence. |
| 4. | Initial non-prominent | Non-prominent syllable is located at the first word in a sentence. |
| 5. | Middle non-prominent | Non-prominent syllable is located at the middle word in a sentence. |
| 6. | Last non-prominent | Non-prominent syllable is located at the last word in a sentence. |

A prominent syllable basically has a long duration, high pitch and intensity compared to a non-prominent syllable (Roekhaut et al., 2010). There are two methods of prominence syllable detection that are auditory and automatic detection. Auditory detection is a manual detection by an expert in phoneticians or linguistic. Meanwhile, automatic detection is automatically prominent syllable detection using a tool based on some typical acoustic parameters of prosody. It is discussed further in Section 4.5. The categorized syllables are based on three position types of the syllable in sentence levels: initial-syllable, middle-syllable and end-syllable (Verma et al., 2015; Roekhaut et al., 2010). Local rule is only modified using these six types of syllable and is known to make the global parameters such as tempo, mean pitch, mean intensity come closer to that natural speech.

Local rule is being used in storytelling (Verma et al., 2015; Sarkar et al., 2014) and other expressive speech type (sports commentary, interview, news reading, political speech and conversation) (Lorenzo-Trueba & Barra-Chicote, 2013; Roekhaut et al., 2010). All the researchers used prosody modification factor that are derived from the percentage of change (POC) for modification of prosody. However, some prosody modification factor is too high causing over-exaggeration of the syllable. The same problem occurs in global rule. The similarity from the synthesized speech using local rule can also be improved further (Sarkar & Rao, 2015a; Lorenzo-Trueba & Barra-Chicote, 2013).

### 2.5.3 Limitation of Global And Local Rules

The development of global and local rule did not consider the over-exaggeration of the speech. Mostly, both rules used prosody modification factor without limit of modification, thus, causing over-exaggeration. Therefore, the prosody modification factor should be examined in order to reduce the over-exaggeration. Similarity of the synthesized speech compared to natural storytelling speech is also important to measure the performance of synthesized speech. It is crucial that the MOS of synthesized speech is higher than 4 to show that the synthesized speech produced resembles the natural speech.

## 2.6 Speech Synthesis Algorithm

Speech synthesis algorithm is needed to modify the prosody and synthesize the speech. Existing speech synthesis algorithms are Time-domain Pitch Synchronous Overlap Add (TD-PSOLA), Multi-Band Resynthesis Overlap Add (MBROLA), Epoch Synchronous Non-Overlap Add (ESNOLA) and Harmonic Noise Model (HNM). Each algorithm has its own merits and demerits and are discussed in the next section.

### 2.6.1 Time-Domain Pitch Synchromous Overlap Add (TD - PSOLA)

TD-PSOLA is a family of Pitch Synchronous Overlap Add (PSOLA) (Moulines & Charpentier, 1990). The PSOLA was developed by France Telecom CNET (Centre National d'Etudes Télécommunications) (Moulines & Charpentier, 1990). It performs a pitch-synchronous analysis and synthesis of speech by modifying the pitch and duration. The modification of duration in TD-PSOLA is done using Time-Scale Modification (TSM), and pitch using Pitch Scale Modification (PSM). The modification of pitch required to determine the pitch marks. The speech quality produced by TD-PSOLA using pitch and duration scaling is considered satisfactory (Toma et al., 2010). However, the use of TSM for repeating or deleting the speech waveform and PSM to change the position of pitch waveform sometimes affected the speech output. Edmilson Morais and Violaro (2005) mentioned that the drawback of TSM is not maintaining the pitch period due to replicated or deleted pitch waveform and it also produced periodicity noise. Furthermore, PSM produced spectral distortions in the speech output and it cannot maintain the natural spectral envelope of the signal.

### 2.6.2 Multi-Band Resynthesis Overlap Add (MBROLA)

Multi-Band Resynthesis Overlap Add (MBROLA) is a time-domain algorithm for speech synthesis as PSOLA. It tries to overcome TD-PSOLA, and it may be viewed as a modified version of TD-PSOLA. MBROLA is a speech synthesizer based on the sequence of the diphones. It used prosodic information consists of the duration and pitch for modification. The voiced parts of diphones unit in the database is re-synthesized with constant phase, constant pitch, and by linear smoothing between pitch periods at concatenation point in the time domain. A database of diphones must be specified. Without these databases, MBROLA cannot be carried out. The effect of this unnatural processing to the speech unit produced slightly buzziness synthesized speech (Syrdal et al., 1998).

### 2.6.3 Epoch Synchronous Non-Overlap Add (ESNOLA)

In 1990, ESNOLA algorithm was formally developed for concatenation and prosody manipulation of duration and pitch (Kumar et al., 2007). Epoch is a small segment about 1.5 mili-second of a pitch-period measured from a particular point in voiced regions (Chowdhury, 2006). In ESNOLA, the epoch is responsible in the perceptual phonetic load for voiced regions. Epoch is also used to modify window of pitch and duration as well as for generation of steady states. This technique preserves phonetic quality even when the pitch is modified (Chowdhury, 2006). ESNOLA algorithm clearly shows its advantage in speech synthesis with the high quality of synthesized speech, particularly for the concatenative approach.

### 2.6.4 Harmonic Noise Model (HNM)

HNM is a pitch-synchronous analysis-synthesis system similar to PSOLA, but it does not require determination of the pitch marks (Laroche et al.,1993; Stylianou et al., 1995). HNM is part of the family of sinusoidal models and based on a harmonic plus noise representation of the speech signal. The harmonic part represented by quasi-periodic of the speech signal, and noise part referring to non-periodic part including friction noise and period-to-period variations of the glottal excitation (Syrdal et al., 1998).

HNM divides the spectrum of a signal into two bands that is lower and upper band as shown in Figure 2.5. The limit between the two bands is determined using time-varying maximum voiced frequency. The signal in the upper band is represented solely by harmonically related sine waves with slowly varying amplitudes and frequencies called harmonic part. On the other hand, the lower band contains the signal of the noise part that is modeled by an autoregressive (AR) model and it's modulated by a time-domain amplitude envelope. The noise part is been obtained by filtering a white Gaussian noise by a time-varying normalized all-pole filter and multiplying the result by an energy envelope function.

In modification and synthesis process, the harmonic part directly modified the harmonics in the time-domain. For noise part, the noise signal needs to be obtained by filtering a unit-variance white Gaussian noise through a normalized all-pole filter. If the frame is voiced, the noise signal is filtered by a high-pass filter which removes frequency that is equal to the maximum voiced frequency. Then, it is modulated by a time-domain envelope synchronized with the pitch period in order to preserve the naturalness of some speech sounds, such as voiced fricatives. At the end, the fusion of synthesized harmonic part and noise part produced synthesized speech.

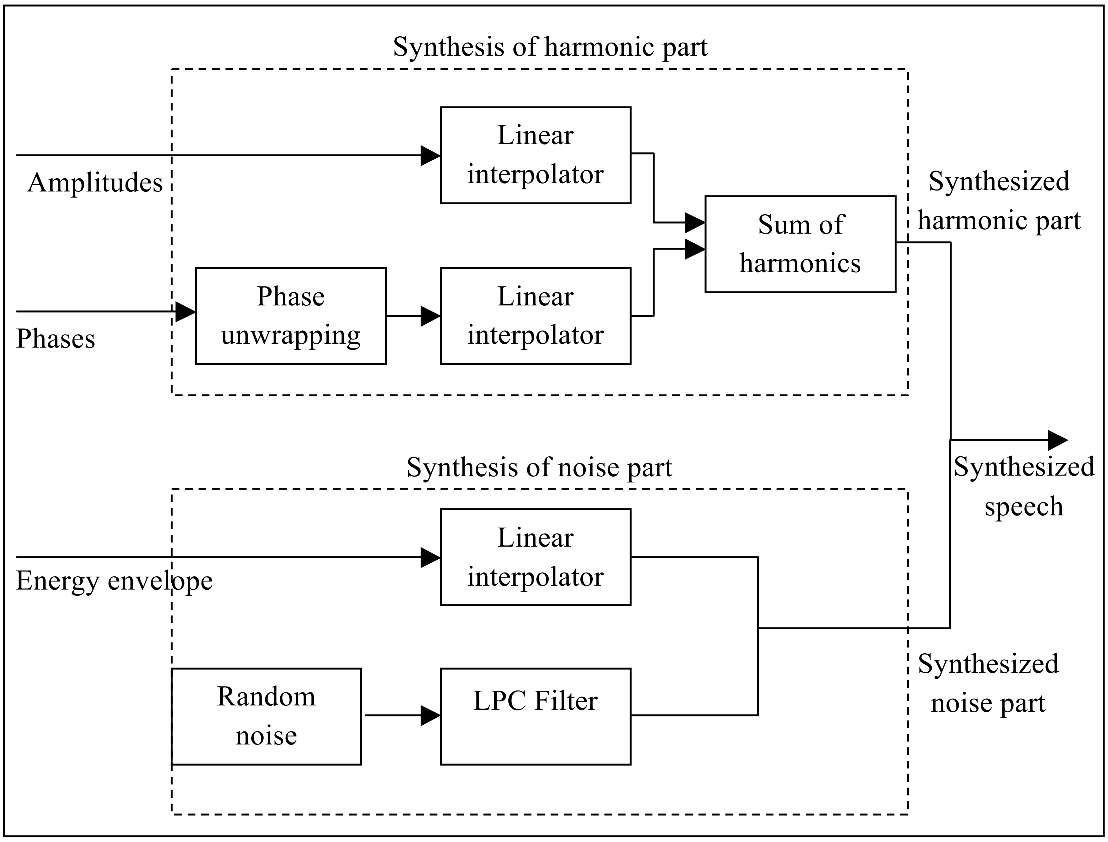



Figure 2.5 Harmonic Noise Model (HNM) (Lehana & Pandey, 2004)

HNM provides high-quality prosodic modifications without the buzziness and tonal quality encountered in previous methods (Montaño et al., 2013; Lehana & Pandey, 2004). Listening tests have shown that HNM provides high-quality speech synthesis while outperforming other models such as TD-PSOLA in terms of intelligibility, naturalness, and pleasantness (Erro el al., 2011; Lehana & Pandey, 2004; Laroche et al., 1993). In addition, HNM also performs clear voiced fricatives, breathly voiced and unvoiced frames. It has also been compared to MBROLA. HNM presented synthesized speech more natural than MBROLA and did not exhibit the slight buzziness observed with MBROLA. However, HNM has higher complexity (Erro et al., 2011) than TD-PSOLA (Syrdal et al., 1998).

### 2.6.5 Discussion of Speech Synthesis Algorithm

A summary of speech synthesis algorithms and their strengths and limitations are presented. Based on Table 2.6, HNM is selected because it can produce high quality synthesized speech (Erro et al., 2011) compared to TD-PSOLA and MBROLA. Moreover, the limitation of HNM is only its complexity (Erro et al., 2011; Stylianou & Stylianou, 2000; Syrdal et al., 1998). It can also produce high quality synthesized speech in expressive speech (Erro et al., 2011) and unit-selection method with HNM can resolve spectral mismatch (Rashad & El-Bakry, 2010).

Table 2.6
Comparisons of speech synthesis algorithms

| Speech synthesis algorithm | Limitation | Strength |
|---|---|---|
| TD-PSOLA | 1) Cannot maintain pitch period and original spectral envelope (Cabral & Oliveira, 2006a).<br>2) Quality degradable (Sharma & Prasanna, 2014). | 1) Able to modify prosody and synthesize speech (Toma et al., 2010) |
| MBROLA | 1) Produced slight buzziness (Syrdal et al., 1998). | 1) Able to modify prosody and synthesize speech (Morais et al., 2000). |
| ESNOLA | 1) Only developed for neutral speech (Kumar et al., 2007) | 1) Produced synthesized speech quite natural as spoken by human (Chettri, 2013). |
| HNM | 1) Higher complexity (Erro et al., 2011; Stylianou & Stylianou, 2000; Syrdal et al., 1998). | 1) High-quality prosody modification (Syrdal et al., 1998; Stylianou et al., 1995).<br>2) High quality of synthesized speech (Erro et al., 2011).<br>3) Unit-selection method with HNM can resolve spectral mismatch (Rashad & El-Bakry, 2010). |

### 2.7 Evaluation Of Speech Synthesis's Quality

Evaluation needs to be done to ensure the naturalness, intelligibility, similarity and overall quality of the synthesized speech with the original target speech (Huang, 2011). The evaluation of synthesized speech can be done using objective and perception tests.

#### 2.7.1 Objective Test

The objective test can be done using perceptual evaluation of speech quality (PESQ) (Huang, 2011; Hu & Loizou, 2008). PESQ is the most popular objective measurement for speech quality. The block diagram for PESQ is as shown in Figure 2.6 (Huang, 2011).

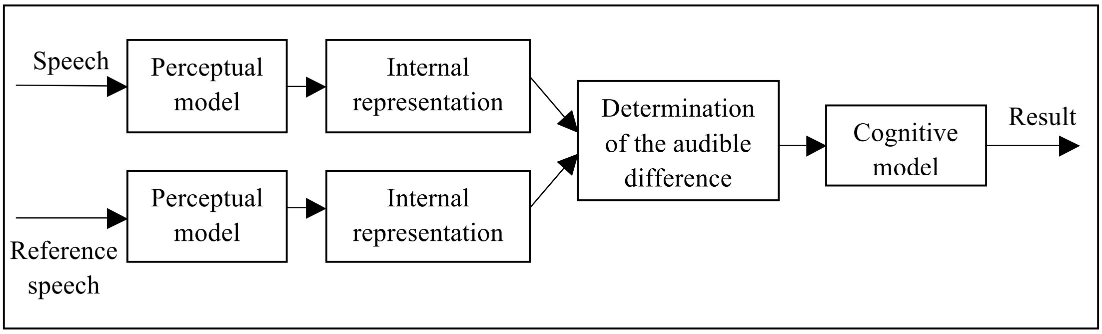



Figure 2.6 Block diagram for objective perception evaluation of speech quality (Huang, 2011)

Based on Figure 2.6, the synthetic speech and reference speech compute the power spectra, frequency and intensity warping functions based on Zwicker's loudness model (ITU-T, 2001) in the perceptual model. The synthetic speech is the synthesized speech and the reference speech is the clean speech or the natural speech. Then, frame-by-frame internal representation of synthetic speech and reference speech are computed and the audible differences are determined. Lastly, a cognitive model simulates listening tests and calculates the difference resulting in a value from 1 to 5 based on Mean Opinion Score (MOS) of five point scales. The calculation of PESQ is computed as a linear combination of the average disturbance value ($D_{ind}$) and the average asymmetrical disturbance values ($A_{ind}$ ) as in Equation (2.2) (Huang, 2011).

$$PESQ = a_0 + a_1 D_{ind} + a_2 A_{ind} \qquad (2.2)$$

Where

$a_0$ = 4.5

$a_1$ = -0.1

$a_2$= -0.0309

$D_{ind}$ = Average disturbance value

$A_{ind}$ = Average asymmetrical disturbance

On the other hand, the objective test can also be done using aspects or component test (Taylor, 2009). This test evaluates specific aspects or components of the synthesized speech. The components that can be tested are prosodic features of natural and synthesized speech named as prosodic test. The prosodic compared are such as tempo, pause, and pitch (Roekhaut et al., 2010). In general, the prosodic value which has the same value resembles each other (Mustafa & Ainon, 2013).

The other component that can be tested is pitch contour known as pitch contour test. The test is done by comparing the distance between the natural pitch contours with the synthesized pitch contours**.** The distance between each pair of pitch contours is calculated using one minus the Pearson product moment correlation (Klabbers & Santen, 2004) as in Equation (2.3).

$$\begin{aligned} D &= 1 - cor(F_{0i}, F_{0j}) \\ &= 1 - \left( \frac{1}{n-1} \sum \left( \frac{F_{0i} - \overline{F}_{0i}}{sdF_{0i}} \right) \left( \frac{F_{0j} - \overline{F}_{0j}}{sdF_{0j}} \right) \right) \end{aligned} \qquad (2.3)$$

where,

$D$ Distance value

$F_{0i}$ Neutral pitch contour

$\overline{F}_{0i}$ Mean of neutral pitch contour

$F_{0j}$ Modified pitch contour

$\overline{F}_{0j}$ Mean of modified pitch contour

$n$ Length of pitch contour

It calculates the difference in pitch height or range by subtracting pitch contour with a mean pitch and dividing it by their standard deviation. A distance value closer to 1 indicates a higher similarity. Table 2.7 shows all the previous work that used objective test to evaluate the synthesized speech.

Table 2.7

Objective test of previous research

| Authors | Type of speech | Objective test |
|---|---|---|
| Erro et al., 2011 | Neutral | PESQ test |
| Huang, 2011 | Neutral | PESQ test |
| Roekhaut et al., 2010 | Radio news<br>Political speech<br>Conversation | Prosodic features test |
| Mumtaz et al., 2010 | Emotion | Prosodic features test |
| Jiang et al., 2005 | Emotion | Pitch contour test |

PESQ test is conducted to check the quality of the synthesized speech based on speech distortion and noise distortion (Hu & Loizou, 2008). It is usually used for evaluation synthesized neutral speech (Erro et al., 2011; Huang, 2011) and can also be used for synthesized expressive speech to check its quality. The prosodic features test is used to evaluate emotion (Jiang et al., 2005) and  speaking style such as radio news, political speech and conversation (Mumtaz et al., 2010; Roekhaut et al., 2010). Only (Jiang et al., 2005) evaluate their synthesized emotional speech using pitch contour test. All the objective tests are used to evaluate the expressive synthesized speech in this work.

### 2.7.2 Perception Test

Most of the works in expressive speech synthesis reviewed in this research use perception tests for evaluating the perceptual quality and level of expressiveness in the synthesized expressive speech (Bhakat et al., 2013). The expressive speech synthesis works described in the papers (Boku et al., 2014; Raitio et al., 2013; Lorenzo-Trueba & Barra-Chicote, 2013; Roekhaut et al., 2010) generate the stimuli for the subjective test by mixing natural neutral, natural expressive speech and synthesized expressive speech together. In this evaluation, subjects (6 to 32) were asked to either categorize expressive speech based on their categories or compare their naturalness, intelligibility and similarity value. The mean opinion score (MOS) of five point scale (1: very poor, 2: poor, 3: fair, 4: good and 5: excellent) is used (Verma et al., 2015).

In storytelling speech synthesis, Theune et al. (2006) followed the perception test conducted by Johnson et al. (2002) by using comparative subjective studies for evaluating the expressive fragments synthesized for storytelling applications. Here, the subjects were presented with both natural storytelling speech and synthesized storytelling speech. The subjects were given time to judge the quality of the synthesized storytelling speech by comparing with the natural expressive speech. The higher quality synthesized speech was given a mean opinion score of five and poor quality synthesized speech were given one.

In Malay language, speech synthesis is also evaluated using subjective test (Yong & Swee, 2014b). Based on Ahmad and Khalifa, (2008), the test was conducted using ten adult correspondents. These ten subjects listened and evaluated based on intelligibility and naturalness using the standard mean opinion score (MOS). The subjective and objective test can be used to evaluate speech quality, similarity, and naturalness. Therefore, this research evaluates the synthesized speech using both. The previous researches using perceptive test are shown in Table 2.8.

Table 2.8
Perceptive test of previous research

| Authors | Expressive speech | No of subjects | Type of subject |
|---|---|---|---|
| Sorin et al., 2015 | General expressive speech | 10 | Native |
| Verma et al., 2015 | Storytelling | 20 | Native |
| Yadav & Rao, 2015 | Emotion | 20 | Native |
| Ribil et al., 2015 | Storytelling | 18 | Native |
| Gamal et al., 2015 | Emotion | 38 | Native and 10 professional |
| Boku et al., 2014 | Emotion | 18 | Native |
| Sarkar et al., 2014 | Storytelling | 10 | Native |
| Montaño et al., 2013 | Storytelling | 15 | Native and 5 professional |
| Azmy et al., 2013 | Emotion | 15 | Native |
| Lorenzo-Trueba & Barra-Chicote, 2013) | News broadcasts, live sport commentary, interviews and parliament speech | 32 | Native |
| Mustafa & Ainon, 2013 | Emotion | 36 | Native, non-professional |
| Theune et al. 2006 | Storytelling | 30 | Native, non-professional |

Based on the Table 2.8, the number of subject for expressive speech normally ranges from 10 to 38 native speakers and non-professionals. However, Montaño et al. (2013) and Gamal et al. (2015) employed native speakers and professional subjects for their work. Professional subjects refer to the speech expert and professional storyteller. In general, the minimum subject used is 10 persons and the maximum is 38 persons used to evaluate the synthesized speech. Mostly, subjects comprise native speaker and only two researches used professional subjects.

In most storytelling speech, the number of subject ranges from 10 to 30 native speakers and non-professionals (Ribil et al., 2015; Verma et al., 2015; Sarkar et al., 2014). Only Montaño et al. (2013) used five professional subjects to evaluate their synthesized storytelling speech. As a conclusion, the minimum number of subjects used to evaluate synthesized storytelling speech or other expressive speech is 10 persons and can be a mixture of native speakers and professionals. Therefore, due to time limitation, this research used a minimum number of subjects that are 10 subjects comprising 9 native speakers and one professional subject.

The literature review of synthesized speech evaluations using objective and subjective test is presented. As can be seen, the previous research only used either objective or subjective test. The selection of the test is based on their research's aim and suitability with their testing data. The objective test is done to get the result using mathematical calculation usually for a large testing data, while the subjective test is done based on human perception for small testing data. Both of them produced an acceptable result to evaluate the synthesized speech's quality. Upon completing this thesis, no research has conducted a comprehensive objective and subjective test to evaluate the synthesized speech. Thus, this research recommends to include the objective and subjective test to evaluate the synthesized storytelling speech and get a variation of results that can be compared and strengthened the final result. The next section discusses storytelling speech in details.

## 2.8 Storytelling Speech

This section aims to study further the properties of storytelling such as type of stories, methods of storytelling and existing digital storytelling corpus. This information is crucial in the development of the storytelling speech synthesis.

Storytelling can be defined as conveying a series of events while the story can be defined as a series of events. Storytelling usually combines oral speech with gestures and expressions to deliver a story. A story gathers information and gives it meaning. A story usually has a point, so after listening to a story, one tends to feel oriented and have a sense of what to believe and what to do. The experience of happy stories tends to give one feeling of comfort, warmth, and of being safe among family, friends, and community. In a story, causality is involved in such a way, situation A leads to situation B, situation B leads to situation C, and situation C leads to situation D and so on. Based on Miller (2011a), there are three kinds of stories as shown in Figure 2.7. They are documentary, traditional and creative stories.

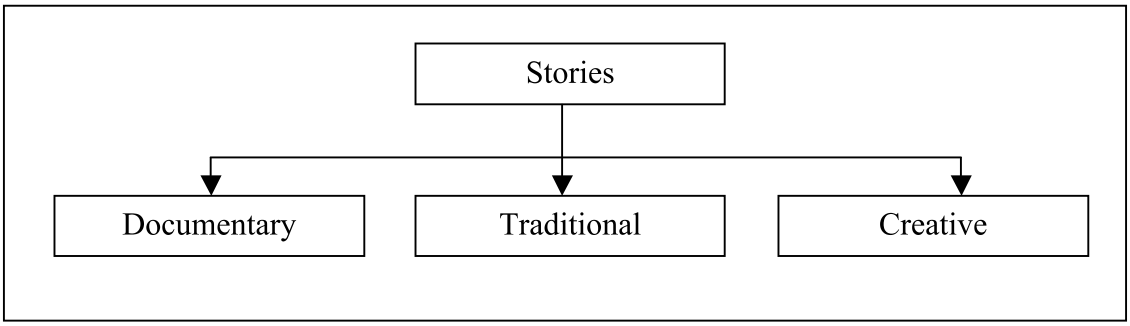



Figure 2.7 Three type of stories (Miller, 2011a)

Documentary stories include personal-experience, autobiographical, journalistic, and historical stories roughly based on individual experience to share certain useful information to other people. On the other hand, traditional stories are stories composed by communities, and passed down from generation to generation. It contains moral value and motivation to deliver especially for children. Traditional stories can be categorized into four types of stories as in Figure 2.8. The third type of story that is creative stories often involves a mix of elements from personal experience stories and traditional stories.

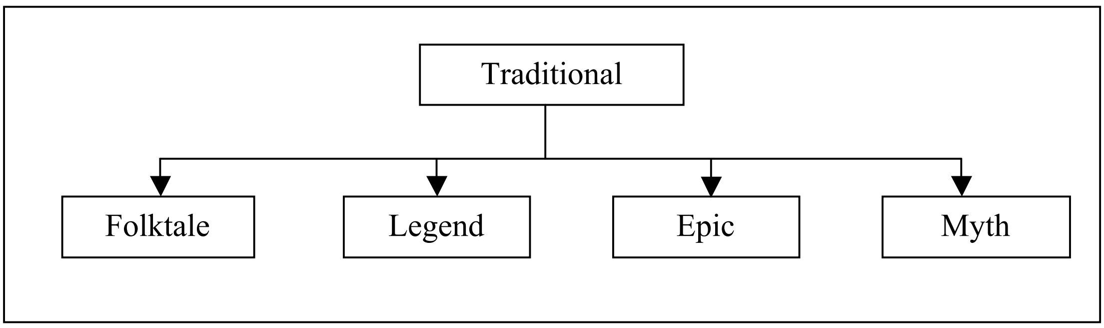



Figure 2.8 Four types of traditional stories (Miller, 2011a)

The four types of traditional stories are folktale, legend, epic and myth (Miller, 2011a). Folktales tend to be time and location independent, with characters that are well-known in a culture. The types of folktales are animal fables and fairy tales that are often being told during childhood. Legends are historical stories, which took place in a certain place, often in the distant past, with some divine element. The story set involved real people and was believed to be true by narrator and audience (Mckendry, 1869). Epics are long stories that tell of the adventures of main characters as they travel from one location to the other. Epics tend to be encyclopaedic, serving as compendiums of many aspects of culture, and often end with the main character founding a new institution (even a nation). Myths are stories about divine characters. Myths often concern the creation of the physical world and occur before human history.

Storytelling has conventional ways of signaling that a story is beginning and ending. In English, one way is using phase "once upon a time" at the beginning and "they lived happily ever after" at the end. In Malay language, the phase is such as "*pada suatu zaman dahulu*" at the beginning and phase "*mereka pun hidup bahagia"* at the end of the stories. Some storytellers like to comment upon and tell the moral value of a story. Others like to let the story speaks for itself, and permit listeners to generate their interpretations and meanings. Miller (2011) has described that storytelling can be presented in many ways as shown in Figure 2.9.

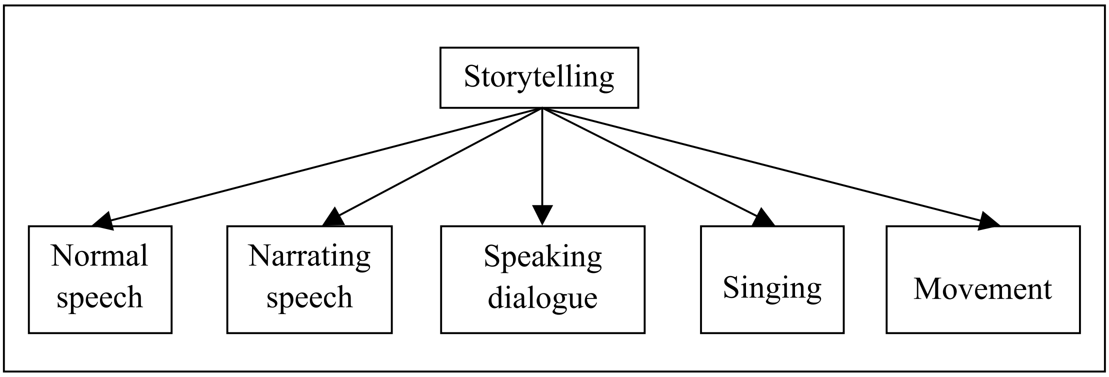



Figure 2.9 Five ways of storytelling presentation (Miller, 2011)

Storytelling is presented based on the target audience. Basically, normal speech is used for a general audience and narrating speech is specifically for children. In some part of story or tales, the storyteller needs to go into character to speak dialogue and some part needs the storyteller to sing. Physical movement with facial expression is added to attract the audience attention and appreciation to the story.

Storytelling is beneficial for children in many ways, including as a means of expression and communication (Engel, 1999; Paley, 1990). It gives meaning to life, express values, teach the young, and convey culture. It also connects elements in one's own self, experience, and life. In order to develop storytelling for children, a folktale is suitable with short stories and contains a moral value, advice, and entertaining.

Storytelling is very different with other speaking styles because it can be presented with emotion, dialogue, narration and song. Jokisch et al. (2005) described that synthetic storytelling is based on discourse modes. Specifically, the discourse modes are narrative, descriptive, argumentative, explanatory and dialogue (Adell et al., 2005). However, in fiction literature (storytelling), the linguistic expert stated that discourse mode typically contains descriptive, narrative and dialogue mode (Montaño et al., 2013).

The descriptive mode describes an object or character in the story enabling the listener to feel and imagine the object or character depicted. The storyteller describes clearly in detail the aspects of the object or character such as appearance, feelings, and constitution. An example of descriptive mode is as follows:

*"Pada suatu masa dahulu, terdapat sebuah taman yang indah dan cantik. Di dalam taman itu, terdapat berbagai-bagai jenis bunga seperti bunga raya, mawar, dahlia, kenanga dan melur. Taman itu berwarna-warni dan sangat harum. Ada banyak binatang yang tinggal di taman itu seperti angsa, ayam, rama-rama dan semut. Mereka sering bermain dan menyanyi bersama-sama*" (Source: Parker, 2014).

The example describes a beautiful garden with various types of flowers such as hibiscus, roses, dahlia and jasmine. The garden is colourful and very fragrant. There are many animals that live in the park such as goose, chicken, butterflies and ants.

Another discourse mode for storytelling is narrative mode. The narrative mode is mainly used to inform the listener about the actions that are taking place and affect the characters of the story. Therefore, this mode includes a great amount of text in the story. Example of narrative mode is as follows:

*"Seekor semut yang kehausan ingin meminum air dari air terjun yang berhampiran. Namun, nasibnya malang apabila kakinya tergelincir dan terjatuh di dalam air terjun yang deras. Apabila dia hampir-hampir lemas, seekor merpati yang bertenggek tidak jauh dari pokok itu menjatuhkan sehelai daun. Semut itu pun memanjat ke atas daun tersebut dan akhirnya tiba dengan selamat di tebing sungai"* (Source: Parker, 2014).

The example describes a thirsty ant wanted to drink water from nearby waterfalls. However, its fate was unfortunate when its feet slipped and it fells in a heavy waterfall. When it was almost drowned, a pigeon sitting on a nearby tree dropped a leaf into a water. The ant climbed on the leaf and eventually arrived safely on the banks of the river.

The last discourse mode is dialogue mode. In dialogue mode, the storyteller will become the character and typically modifies his/her voice into a more exaggerated register of expressions, where full-blown emotions may be manifested. Therefore, dialogue mode requires a bigger scope of research covering not only exaggeration caused by speech intonation but also the emotion spectrum. The emotion usually existed in dialogue mode is such as hot anger, cold anger, joy, sadness, surprise and fear. A example of emotion for cold anger is as follows:

*"Saya langsung tidak takut pada kamu. Saya lebih kuat daripada kamu dan jika kamu tidak percaya, mari kita berlawan!"* (Source: Parker, 2014).

The translation for the example above is "I am not scared of you. I am much stronger than you. Let's fight if you don't believe me".

### 2.8.1 Storytelling Characteristics

In general, the storyteller will put their effort in varying intonation when delivering a tale. Thus, the storytelling has more variation in pitch and intensity as compared to news reading speaking style (Sarkar et al., 2014; Theune et al., 2006) Storytelling is slower in tempo and has longer pauses, particularly between sentences (Theune et al., 2006). On the other hand, storytelling contains extra emphasis to a certain syllable in adjective and adverb by increasing their pitch and duration (Theune et al., 2006). A vowel is typically stretched indicating a prominent syllable in a word during storytelling. For example, in the phrase "a looong corridor..." the vowel 'o' is emphasized and stretched (Roekhaut et al., 2010; Theune et al., 2006). A syllable is detected as prominent and stands out against their local environment because of the extra-long duration, a higher pitch means or a rising pitch movement within the syllable (Roekhaut et al., 2010).

Storytelling also produced unique intonations at initial, middle and final words of a phrase whether it is prominent or non-prominent (Sarkar et al., 2014). As an example, a word at the final phrase has an increased duration by 1.5 times compared to word located at initial and middle phrase (Sarkar et al., 2014). A word's position in a phrase played an important role for manipulating the storytelling speaking style (Roekhaut et al., 2010). The prosody based on a word's position for initial, middle, and final vary (Verma, 2015) to develop storytelling speech with various emotions.

In conclusion, in order to know characteristics of storytelling, the prosody of storytelling speaking style should be analyzed. The criteria to be considered are the prosody features such as tempo, pauses pitch, duration and intensity of the syllables. The other elements such as word's position and word's category also need to be considered.

### 2.8.2 Storytelling Speech Corpus

The quality of speech corpus usually determines the quality of output of speech synthesis. This section presents the review of expressive speech corpus used in expressive speech synthesis. Only a few works related to expressive speech synthesis used the commonly available database for expressive speech synthesis. So, most of the works are based on the data collected by their own and publicly unavailable (Govind

& Mahadeva, 2013). All the expressive databases differ by language, type of expressions considered, type of text materials used and number of speakers (Schröder, 2009).

In the literature, two types of expressive data are collected. One is the expressive data simulated by actors (Pitrelli et al., 2006; Burkhardt et al., 2005; Whiteside, 1998; Banks & Hoaglin, 1941; Fairbanks & Hoaglin, 1939). The second is the spontaneous expressive data collected from a real life scenario (Campbell, 2005; Ishii & Campbell, 2002; Jhonstone & Scherer, 1999; Williams & Stevens, 1972). Most expressive speech synthesis systems from the literature used expressions simulated by actors. Angry, happy, sad, fear and disgust are the commonly used emotions for the analysis in the case of simulated emotions. An experiment conducted by Williams and Stevens (1972) compared the spontaneous fear and sorrow emotions obtained from the radio announcer recording of the Hindenburg aircraft disaster, with the same sentences simulated by professional artists. This work concluded that emotion-specific parameters estimated from simulated emotional speech data are comparable with that of the real life emotional speech data.

In storytelling, the storytelling speech corpus is collected from professional actors, artist or experienced storytellers. The related work on storytelling speech corpus in different languages such as Bengali (Sarkar et al., 2014), Hindi (Verma et al., 2015), Dutch (Theune et al., 2006), English (Gelin et al., 2010; Alm & Sproat, 2005), French (Doukhan et al., 2011), Slovak (Přibil & Přibilová, 2008) and Spanish (Montaño et al., 2013). No storytelling speech corpus in Malay language has been reported in the area of speech synthesis. Summary of the review is presented in Table 2.9 and briefly described accordingly. Storytelling is closely associated with children and in all work listed in the table used children stories and fairy tales in their corpus. However, depending on the language resources, the numbers of recorded stories varies from one story to 25 stories. The person chosen as storyteller comprised a professional speaker, artist or storyteller; the number of storytellers ranged from 1 to 3 persons for each speech corpus. A Professional speaker is a person who speaks to a public audience for his/her profession. In this thesis, the professional speaker refers to educators and professional actors.

Table 2.9
Summary of related work on storytelling speech corpus

| Authors/Year | Language | Storyteller | Corpus size |
|---|---|---|---|
| Sproat et al., 2005 | English | 1 semi-professional female speaker | 2 children stories, 128 sentences |
| Gelin et al., 2010 | English | 1 professional speaker, 6 actors | 89 short stories, 12 selected tales |
| Sarkar et al., 2014 | Bengali, Telugu | 1 professional radio artist | 125 children stories, total 3 hours |
| Theune et al., 2006 | Dutch | 3 male Dutch actors | 5 fairy tales |
| Verma et al., 2015 | Hindi | 1 male, 1 female professional artist | 25 children stories |
| Přibil & Přibilová, 2008 | Slovak | 1 male speaker | 10 children stories |
| Montaño et al., 2013 | Spanish | 1 Spanish storyteller | 1 story |
| Doukhan et al., 2011 | French | 1 professional speaker | 89 children tales, 50,000 words, 12 selected tales |

The storyteller is the person who reads the story's scripts in a storytelling manner during the recording session, either in the narrative, descriptive or dialogue discourse mode. In Gelin et al. (2010), a professional speaker was hired to read 12 tales for audio recording and the storytelling speech is later annotated into phonemes, syllables, pitch, rhythm and voice quality. Since the storytelling text-to-speech (TTS) is to be incorporated into a humanoid robot, they further videotaped 6 actors to act the emotional gestures for a more realistic storytelling. Other researchers that also employed professional speakers as their storytellers are (Doukhan et al., 2011; Sproat et al., 2005). On the contrary, (Sarkar et al., 2014; Theune et al., 2006) and (Verma et al., 2015) engaged professional artists and actors for their collections of storytelling audio speeches. In (Theune et al., 2006), three Dutch actors recorded five stories (Verma et al., 2015), while Verma et al. (2015) hired one female and one male artist as their storytellers of 25 stories. Sarkar et al. (2014) used one professional radio artist to record 125 Bengali and Telugu stories. Five different male and female speakers are further engaged by Sarkar et al. (2014) to record the same stories in a neutral style like news reading the speech. Only one work cited using a storyteller (Montaño et al., 2013) to record a story for their speech corpus and another work cited using a male speaker (Přibil & Přibilová, 2008). The selections of storyteller and corpus size are dependent on the research interest and approach used for developing storytelling speech synthesis.

In almost all storytelling speech synthesis, only one storyteller or one male and one female storyteller are used. The reason being only one storytelling model is needed to synthesize neutral speech into storytelling speech. However, Gelin et al. (2010) hired six actors in addition to the professional speaker to have more emotional gestures for a more realistic storytelling. In Sarkar et al. (2014), five male and female speakers are also added for neutral speech to get variation speaking style and as test data to be synthesized. In terms of corpus size, different researchers used different sizes of datasets depending on the availability of resources, purposes of the researcher and budget constraints. The corpus size varies from 1 story to 125 stories. For the Malay language, there is no spoken storytelling dataset that is publicly available. In this research, the priority is on acquiring variation of storytelling speaking style for better understanding of Malay language storytelling speech synthesis. Therefore, the storytelling datasets are gathered from nine storytellers reading three children folktales. The details of the selection of story and storytellers are discussed in Chapter 3.

## 2.9 Malay Language Speech Synthesis

This section is given an overview of the background and previous research on the development of speech synthesis for the Malay language. In general, the Malay language speech synthesis focused on converting Malay text to Malay spoken speech. Malay speech synthesis that has been proposed mostly is based on open source or commercial speech synthesis (Ahmad & Khalifa, 2008). The developments of Malay speech synthesis are categorized as small scale projects (Ahmad & Khalifa, 2008).

The first researcher that developed Malay speech synthesis was named SUM which stands for 'Sintesis Ucapan Melayu' (Hussain et al., 1999). This system is based on Klatt (1980) using formant approach. The second version of Klatt's formant synthesizer is used, however, the synthesized speech lacks of naturalness (Hussain et al., 1999).

A more successful Malay speech synthesis was produced by MIMOS Bhd in 2005 called FASIH. It is because FASIH is able to produce an unrestricted vocabulary of standard Malay with natural sounding speech (Ahmad & Khalifa, 2008). FASIH generates speech output by assigning prosodic information to the input text. Prosodic information is gathered from a given text using Natural Language Processing (NLP) for analysis. FASIH adapts diphone-based concatenative approach system using time domain MBROLA (Dutoit, 1997) inspired from MBR-PSOLA algorithm. This first version was commercialized in training software, e-mail reading, and voice service applications. However, the entire drawback of MBROLA algorithm such as buzziness and mismatch between two speech units during concatenation is inherited in FASIH.

Another research in developing Malay speech synthesis using MBROLA algorithm is by (Samsudin et al., 2004). Unlike FASIH which utilized diphone as speech units. Four syllable structures are developed that is consonant-vowel clusters (CV), vowel-consonant clusters (VC), consonant-vowel-consonant clusters (CVC) and vowel clusters (V). Loan words such as Arabic words are handled using their proposed sub-model. Syllable database is constructed using pre-recorded syllable segment from a native Malay speaker. As we know, this research also suffers from segment discontinuity and distortion because of weaknesses of MBROLA algorithm.

On the other hand, El-imam and Don (2000) proposed Malay speech synthesis based on unit selection methods. This research is an upgraded version of from Samsudin (1997) by using unit selection method to select the best unit in syllable database to concatenate in order to reduce discontinuity and mismatch.

Swee (2004) attempted to build Malay speech synthesis using Festival. Festival is a free software containing speech engine that enables a synthesizer to generate its database in Residual-Exited Linear Predicted Coding (RELP) format. The programming language used in developing this speech engine is C++. Letter-to-sound (LTS) rules for Malay speech synthesis are coded using Scheme programming language. However, there is some complexity in handling loan words such as <sh>, <ng> and <kh>. These loan words need to define special rule at the concatenative process of diphone because default system will read the word “tangan” (hand) as <tangan> instead of <taŋan>.

The development of Malay speech synthesis using Festival was also done by Loo et al. (2007). They claimed that unit selection speech synthesis using Festival produce more natural output compared to diphone-based MBROLA speech synthesis. Furthermore, high memory requirements, spectral discontinuity, and wrong labeling are also the drawbacks of MBROLA speech synthesis.

The other approaches in developing speech synthesis are the statistical approach used by Yong & Swee, (2014b) in developing Malay speech synthesis. This statistical approach used Hidden Markov Model (HMM) methods. Free source of recordings such as audio book and clean speech are used as training data. Perception test was conducted to test the reliability of the speech output. Naturalness test showed reasonable results and intelligibility test produce encouraging results. Other tests such as Word Error Rate (WER) scored below 15%, and Semantically Unpredictable Sentence (SUS) scored an average of 30%.

After developing Malay speech synthesis, researchers try to incorporate emotions to the Malay speech synthesis. Lutfi et al. (2005) introduce a new emotion filter that is template-driven for incorporating emotions to Fasih developed by MIMOS Berhad. They focused on four types of emotions that are anger, sad, happy and fear. Diphone-based emotional templates are developed for each type of emotions. A preliminary experiment in this research showed that recognition rate for anger and sad is over 60%.

Other than template-based, rule-based approach is used as emotions filter to incorporate emotions to the Malay speech synthesis. These emotion filters are developed by manipulating pitch and duration using a rule-based approach. The data for developing the emotion filters are collecting from a female Malay native speaker. Then, the data were extracted and analyzed and used to develop the filter. This rule-based approach is capable to be used with Fasih and other speech synthesis that used rule-based approach. Hybrid technique by integrating template-based and rule-based approach are used by Begum et al. (2008) to enhance the quality of the Malay speech synthesis. They claimed that this technique increased the intonation variability in developing emotional Malay speech synthesis.

Emotional speech synthesis for Malay was also developed using HMM by Mustafa et al. (2014). A good emotional speech acoustic model needs to be used in HMM to produce acceptable naturalness of speech output. To build an emotional speech acoustic model for Malay with minimal resources, iterative training or isolated unit training are used. Then, the target emotion is transformed using two transformation techniques that are model adaptation and context-dependent boundary refinement. Speech synthesis adapted the emotional speech acoustic model to produce emotional speech output in Malay.

In 2010, a real-time Malay emotional speech synthesis using HMM was developed by Mumtaz et al., (2010). This system can synthesize four different expressions such as neutral, anger, sad and happy. Mumtaz et al., (2010) improved the emotional speech synthesis using Neutral to Angry, Sad, and Happy generator (NASH). NASH used context-dependent duration generation method to improve the duration information. Evaluation for accuracy, intelligibility, and naturalness generated by NASH gave better result compared to the conventional method.

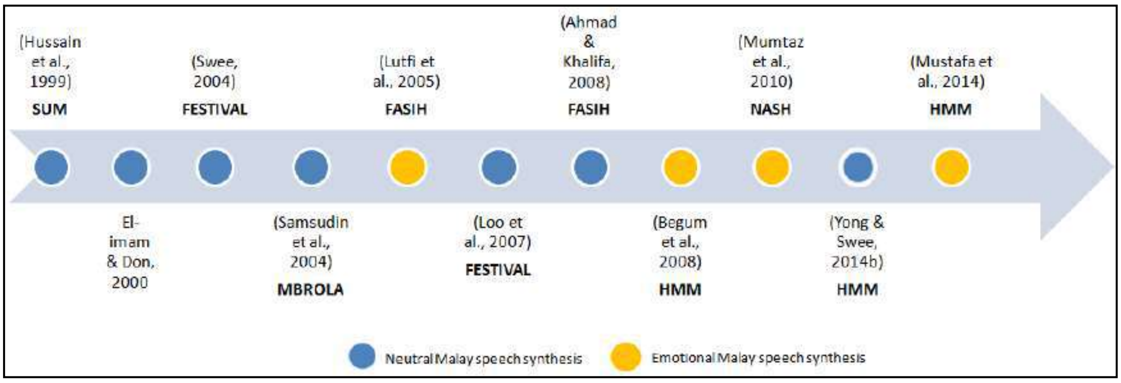



Figure 2.10 Timeline of Malay speech synthesis

All the researches in Malay language speech synthesis has evolved gradually since early 2000 and is summarized in Figure 2.10. Recent work shown that Malay speech synthesis has incorporated emotion in the synthesized speech. However, no attempt on speaking style synthesis has been done. Research in speaking style of Malay language is also important to enrich Malay language speech synthesis and to improve naturalness of the synthesized speech.

## 2.10 Malay Phonetic And Phonology

A thorough understanding of the phonetic and phonology of a selected language is necessary before developing the speech synthesis. Specifically, the need of this study is to learn the pronunciation, sentence structure, word structure and grammar of the Malay language. This information will be used in text syllabification, unit selection process and development of prosody modification rule.

In general, phonetics is the study of human sounds and phonology is the classification of the sounds within the system of a particular language or languages (Hickey, 2004). Phonetic for Malay language is the study of how the organs of speech is used when producing Malay sound. Every language has its own phonetic study to generate its own language sound. This situation is the same as a musical instrument because every key input gives different musical sound.

On the other hand, phonology for Malay is a study of the patterned interaction of Malay sound (Racha, 2012). There is a set of possible Malay sounds that can be used to create a word as described in Malay phonology system. Every language has different phonology system for their language sound. Therefore, phonology can be described as the rules of conditions on sound and sound structure that are possible in a particular language (Racha, 2012).

### 2.10.1 Phonetic

Similar to other languages, phonetics for Malay can be divided into three types:

i. Articulary (Production)
ii. Acoustic (Transmission)
iii. Auditory (Perception)

#### *2.10.1.1 Articulary*

Articulary phonetics is the study to describe how a sound is produced. In Malay language, this study involves the articulation of regional to produce Malay sound. It is coveres the articulation in the vocal tract as a tool when producing a Malay sound. Articulator can be divided into active and passive articulator (Zahid & Omar, 2012). The active articulator is the organ in the vocal tract that can move the tongue, lips, soft palate and lower teeth. While the passive articulator is the organ of the voice channel that cannot be moved, such as the upper teeth and the hard palate. Therefore, Malay phonetic articulary involved the study of how to produce Malay sounds using human speech organs in the vocal tract.

#### *2.10.1.2 Acoustic*

Acoustic phonetics refers to the study of the transmission of the sound signal from a speaker to listener. The signal that is transferred also contained other parameters such as fundamental frequency (F0), intensity and duration. The fundamental frequency is measured in Hertz (Hz), the intensity in units of decibels (dB) and duration in seconds. These three parameters are used to support the meaning of a phrase. For example, in Malay language, the meaning will be different when pronounced using different duration parameters such as:

Example 1: Awak! (You!)
Example 2: Aaaaaaaaaawak? (Youuuuuu?)

Example 1 with a shorter duration means calling someone while Example 2 with longer duration meaning disbelieved. These two examples with a different aspect of intonations are discussed more in Zahid & Omar (2012).

#### *2.10.1.3 Auditory*

Auditory phonetics is the study about receiving sound to the listener. In communications, a speaker converts the information to be presented in the form of sound from word and sentence while the listener interprets the information using human brain and makes it meaningful. This process is called encoding and decoding process. Listener's perceptions about a speech delivered involve pitch, volume and length and have emotional meaning particularly (Zahid & Omar, 2012).

### 2.10.2 Phonology

Phonology study in Malay language describes how the sound is structured. In other words, phonology focuses on function, behavior and organization of Malay sound. Therefore, phonology is one of a branch of linguistic. As an example, structure discussed in phonology is a repetitive pattern of the morpheme in the different order. For example the word *dagang* [da+gang] and *gadang* [ga+dang], the sound [d] and [g] changes position. This shows the role of phonology in repetitive sound and position where it is repeated. Phonology also describes the language of intonation for the structure of the sentence. Different pattern of intonation in a sentence make different meanings. For example, the following sentence;

Example 3
"*Pelajar Universiti Teknologi Mara merupakan pelajar teramai di Malaysia.*"
(Statements with tone decrease at the end)

Example 4
"*Pelajar Universiti Teknologi Mara merupakan pelajar teramai di Malaysia?*"
(Question sentences with a rising tone at the end)

The difference in example 3 and example 4 is the variations in intonation pattern. The tone is used to distinguish the meaning of a passage of the text. This variation of intonation patterns is adopted and structured suitable to the Malay language. Like other languages, Malay speech can be categorized based on the sentence, word, syllable, and phonemes. Example of each category is shown in Table 2.10.

Table 2.10
Example structure for a sentence

| Sentence | selamat hari raya |
|---|---|
| Word | hari |
| Syllable | ha-ri |
| Phoneme | /h/-/a/-/r/-/i/ |

### *2.10.2.1 Phoneme*

Phoneme is a basic speech sound of the language. Phonemes are also the minimal units that serve to distinguish words from each other. In Malay language, there are 34 phonemes where 24 phonemes originally from Malay language and the other ten phonemes are borrowed (Zahid & Omar, 2012). Out of 24 original phonemes, there are six phonemes vowel and 18 phonemes consonants. The six Malay vowel phonemes are /a,e,i,o,u/ and 18 consonant phonemes are /p, b, t, d, k, g, c, j, m, n, n ,s, h, r, l, w, y/. Examples of distinguishing words using phoneme is tabulated Table 2.11.

Table 2.11

Example to distinguish word using phoneme

| Phoneme | Word |
|---|---|
| /e/ | bela |
| /i/ | bila |
| /o/ | bola |

The difference between these three words is phoneme /e/, /i/ and /o/ at the center of the word. Different phonemes for each word produce a difference meaning.

The other ten consonants borrowed to Malay language are from Arabic and English consonants. The consonants borrowed from Arabic are eight consonants (/z, Ɵ, ž, Ɣ, ð, x, Ç, ʃ/) and two consonants (/v, f/) from English. Example of word created from these phonemes is shown in Table 2.12;

Table 2.12

Example of phoneme in a word

| Phoneme | Example Word |
|---|---|
| /f/ | wakaf |
| /v/ | novel |
| /Ɵ/ | hadiƟ |
| /ð/ | ðalim |
| /z/ | zaman |
| /ž/ | žat |
| /x/ | xatam |
| /Ɣ/ | Ɣaib |
| /Ç/ | tamaÇ |
| /ʃ/ | ʃabar |

#### *2.10.2.2 SYLLABLE AND WORD*

Syllable is a fundamentally important unit in both phonetics and phonology. It is usually claimed to be the most basic unit of speech. Every language has its own syllables and babies learn to produce syllables before they can manage to say a word of their native language (Roach, 2009). Syllable is a structure level of the sound system and is combines to produce a meaningful word in the certain language.

Native Malay words are agglutinative alphabetic-syllabic that are based on four distinct syllable structures that is V, VC, CV, and CVC. These basic structures can be combined in multiple ways to form a word. For example, a disyllabic word such as '*kita*' (*we*) is represented using CV+CV and a tetrasyllabic word such as '*mesyuarat*' (*meeting*) is composed of CV+CCV+V+CVC. Malay words are mostly formed by two or more distinct syllables (Karim, et al., 2004), and a few are mono-syllabic words. Examples of the word with various syllabic structures are presented in Table 2.13.

Table 2.13
Type of syllable with example of words

| Type of Syllable | Syllable structure | Example word |
|---|---|---|
| Monosyllabic | CVC | cat, pak, cik |
| | CV | di, ke, si |
| Disyllabic | CV+CV | be-li, cu-ba |
| | V+ CV | i-ni, i-tu |
| | V+ CVC | a-mat, a-kan |
| Trisyllabic | CV+ CV+CV | le-la-ki, be-ra-sa |
| | CV+V+CV | su-a-ra, su-a-tu |
| | CV+ CV+V | se-mu-a |
| Tetrasyllabic | CV+CV+CV+CV | ma-ta-ha-ri, da-ri-pa-da |
| | CV+CVC+CV+VC | pe-rem-pu-an |
| | V+ CV+ CV+ CV | a-pa-bi-la |

The word can exist in the form of primary words, derivative words, compound words and reduplicative words. A primary word is a basic root which does not contain affixes or reduplication. The example of primary words is both nouns and verbs. It can be composed with one or more syllables. Karim (1996) stated that primary words with a single syllable are about 500 words. In Malay language, the majority primary words are formed using two syllables. Combination of three and more syllables exist in a few numbers and most of primary words are taken from other languages such as Arabic, English and Portuguese (Seman, 2011).

Primary words become derivative words when an affix is added. Affixes that are located at the initial of a word are called prefixes, within a word are called infixes or at the end of word are called suffixes. Affixes can also exist at the initial and final of a word which are called confixes. The example of derivative word is *berlari* (running) with primary word *lari* (run) and prefixes *ber*. Another example of derivative word with two affixes is *kemudahan* (facility) with primary word is *mudah* (easy) and prefixes *ke* and confixes *an*.

Compound words are the words formed by combining two or more primary words. The combination words produced a new word which carries a certain meanings. The example of compound word is *kereta api* (train) from individual primary word *kereta* (car) and *api* (fire). Another example is *kapal terbang* (aeroplane), *buah tangan* (gift) and *terima kasih* (thank you). Certain combination produced a stable word such as *kerjasama* (cooperation) which is spelled as one word.

Reduplicative words are duplication of the primary word. In Malay language, it is called *kata ganda* or *kata ulang*. The purpose of reduplicative word is for forming plurals, but sometime it may change the meaning of the word. The example of a reduplicative word that produce plurals is *kereta-kereta* (cars) and the example that changes the meaning is *mata-mata* (policeman).

Malay grammar is the body of rules that describe the word structure and function in the Malay language. The basic grammar in Malay is such as nouns, verbs and adjectives (Nik Safiah et al., 2008). The description of Malay grammar as stated by Karim et al. (2004) and Nik Safiah et al. (2008) is shown in Table 2.14. The example is based on a short stories book titled "*200 kisah teladan haiwan*" (Parker, 2014).

Table 2.14
Description and example of Malay grammar

| Grammar | Descriptions | Example |
|---|---|---|
| Noun (*Kata nama*) | Word used to refer to the name of the people, objects, plants, places and so on in general. | *Petani, angsa, rumah, telur, pisau, emas* |
| Verb (*Kata kerja*) | Word used to describe an action, state, or occurrence. | *Memelihara, bergurau, mengambil, menyembelih, membuang* |
| Preposition (*Kata sendi*) | Word used to link words to other words which express a relation to another. | *Untuk, demi, pun, di, apabila* |
| Adverbs (*Kata penerangan*) | Word used to express a relation of place, time, circumstance, manner, cause and degree. | *Mula, dalam, selepas, ketika, suatu* |
| Conjunctions (*Kata hubung*) | Word used to connect clauses or sentences or to coordinate words in the same clause. | *Yang, dan, lalu, namun, apabila, dengan* |

Table 2.14
*Continued*

| | | |
|---|---|---|
| Classifiers (*Penjodoh bilangan*) | Word used to indicate the semantic class to which a noun belongs and typically used in numerals or other expressions of counting. | *Seekor, sehelai, seorang, sebiji, seketul* |
| Demonstrative pronouns (*Kata tunjuk*) | Word used to take the place of the noun phrase or point to something specific within a sentence. | *Itu, ini, situ* |
| Adjective (*Kata adjektif @ kata sifat*) | Word used to describe a noun and giving more information about it. | *Deras, jauh, berat, tamak, gembira, keemasan* |
| Auxiliary (Kata bantu) | Word used to provide supplementary or additional help and support. | *Mahu, sendiri, sebaik* |
| Negation (*Kata nafi*) | Word used to deny, opposite or contradiction of something actual or positive. | *Tidak, tiada* |
| Linking verb (*Kata pemeri*) | Word used to connect phrases in the sentence to ensure that ideas within the sentences are elegantly connected. | *Ialah, iaitu, adalah* |
| Intensifier (*Kata penguat*) | Word used to give force or emphasis to the adjective. | *Sungguh, sangat* |
| Particle (*Kata partikel @ kata penegas*) | Word used to emphasize the predicate phrase. | *Pun* |

#### *2.10.2.3 Sentence*

A sentence is the combination structure of words to convey meaningful information from a speaker to receiver. The sentence usually will end with full stop, question mark or exclamation mark. Sentence with a variation of intonation will produce different meaning as explained previously.

### 2.10.3 Phonetic And Phonology For Speech Synthesis

In developing Malay speech synthesis, phonetic and phonology for Malay language need to be considered. It is because each language has their own phonetic and phonology system. For example, Malay language has six phoneme vowels rather than English language of 15 phoneme vowels and Japan language of 5 phoneme vowels (Ohata, 1996).

Speech synthesis using concatenative approach were done by many previous researchers (Clark, Richmond, & King, 2007b; Hunt & Black, 1996; Black & Campbell, 1995; Olive, 1977). The basic units to joint in concatenative approach can be a word or sub-word like phonemes, diphone, and syllable. By using the word as a speech unit is too independent and need large speech database to cover all the words. Therefore, sub-word is introduced to produce several words from a combination of sub-word. As an example, sub-word or syllable 'ke', 're' and 'ta' are combine to become a word *kereta* (car). Smallest units like phoneme have also been used as speech unit. Labeled phonemes are clustered to phoneme class based on their sound and used for concatenation. Diphone is a stable region between two phones. Example diphone in Malay is 'sa.' It is combination of phone [s] and [a]. The stable region between that sounds is called diphone. Courbon and Emerald (1982) stored fixed size diphone units obtained from natural recording. Due to fixed size of diphone units that need to cover the entire phonetic context caused unnaturalness output of speech synthesis. Therefore, larger continuous recording speech of 4-5 hours database with labeled diphone is used to overcome that problem. In Malay language, syllable preferred to be a speech unit. It is because the Malay language used salient syllabic structures (Lee, Low, & Mohamed, 2013). Syllable is also claimed as the basic unit for a speech sound.

Phonetic and phonology for Malay language is reviewed, and it is different from other language. However, the structure level of the sentence is the same because it contains the word, syllable, and phoneme. All the sub-word such as phoneme, diphone and syllable can be used as speech unit. As a simple language like Malay, the syllable is a suitable speech unit that can be used in concatenative approach in speech synthesis.

## 2.11 Summary

The review showed that the speech synthesis developed by concatenative or statistical speech synthesis produced high quality compared to other approaches. Practically, using unit selection will increase the degree of naturalness in concatenative speech synthesis. The present work on expressive speech synthesis is focused on explicit control. The selections of storyteller can be from professional actors, artist or experienced storytellers. The corpus size and number of storytellers are dependent on the approach to develop storytelling speech synthesis and scope of this research. The prosodic parameters to convert neutral speech to storytelling speech are pause, tempo, durations, pitch and intensity. Harmonic Noise Model (HNM) is the best choice as synthesizer because it provides a high quality synthesized speech with fewer problems.

Perception test showed a popular test to evaluate speech synthesis. However, evaluation is also done using objective test such as PESQ, aspects or components test and pitch contour test. Lastly, the review on Malay speech synthesis showed that speaking style (e.g. storytelling) need to be included in expressive speech synthesis to enrich the speaking style intonation. In the next chapter, the overall methodology of the Malay language storytelling speech synthesis is described.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter presents the overall methodology of implementing storytelling speech synthesis using concatenative approach and explicit control. A new storytelling speech datasets in Malay language are also developed. Figure 3.1 illustrates the general flow of the methodology. Pre-processing and text processing are elaborated in this chapter.

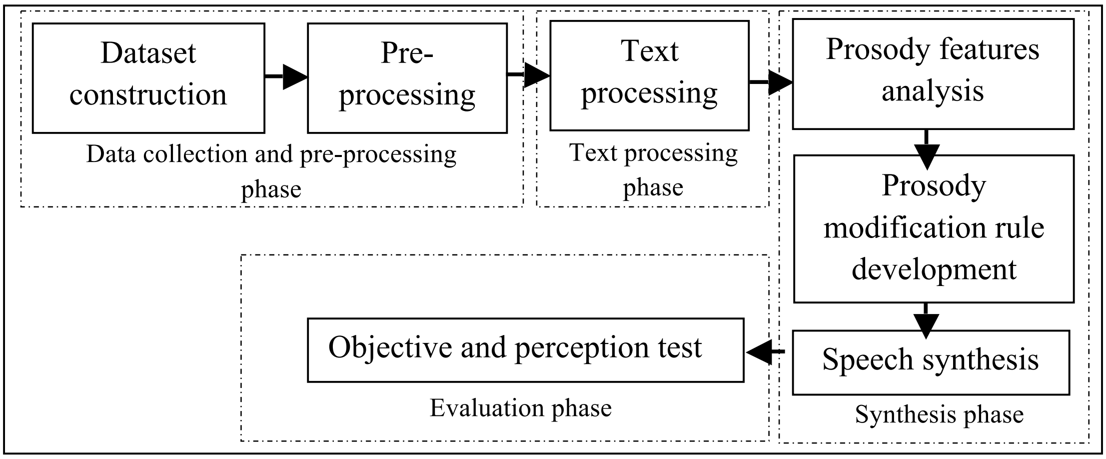



Figure 3.1 General flow of storytelling speech synthesis

The methodology contains seven main processes. The processes are grouped into four main phases that are 1) dataset collection and pre-processing phase, 2) text processing phase, 3) synthesis phase (prosody features analysis, prosody modification rule development and speech synthesis) and 4) evaluation phase (objective and perception test) as shown in Figure 3.2.

In this chapter, the first two phases (dataset collection and pre-processing, and text processing phase) are explained in detail. Chapter Four will discusses prosody feature analysis. Chapter Five elaborates the prosody modification rules and the development of storytelling speech synthesis. Objective and perception test are discussed in Chapter Six.

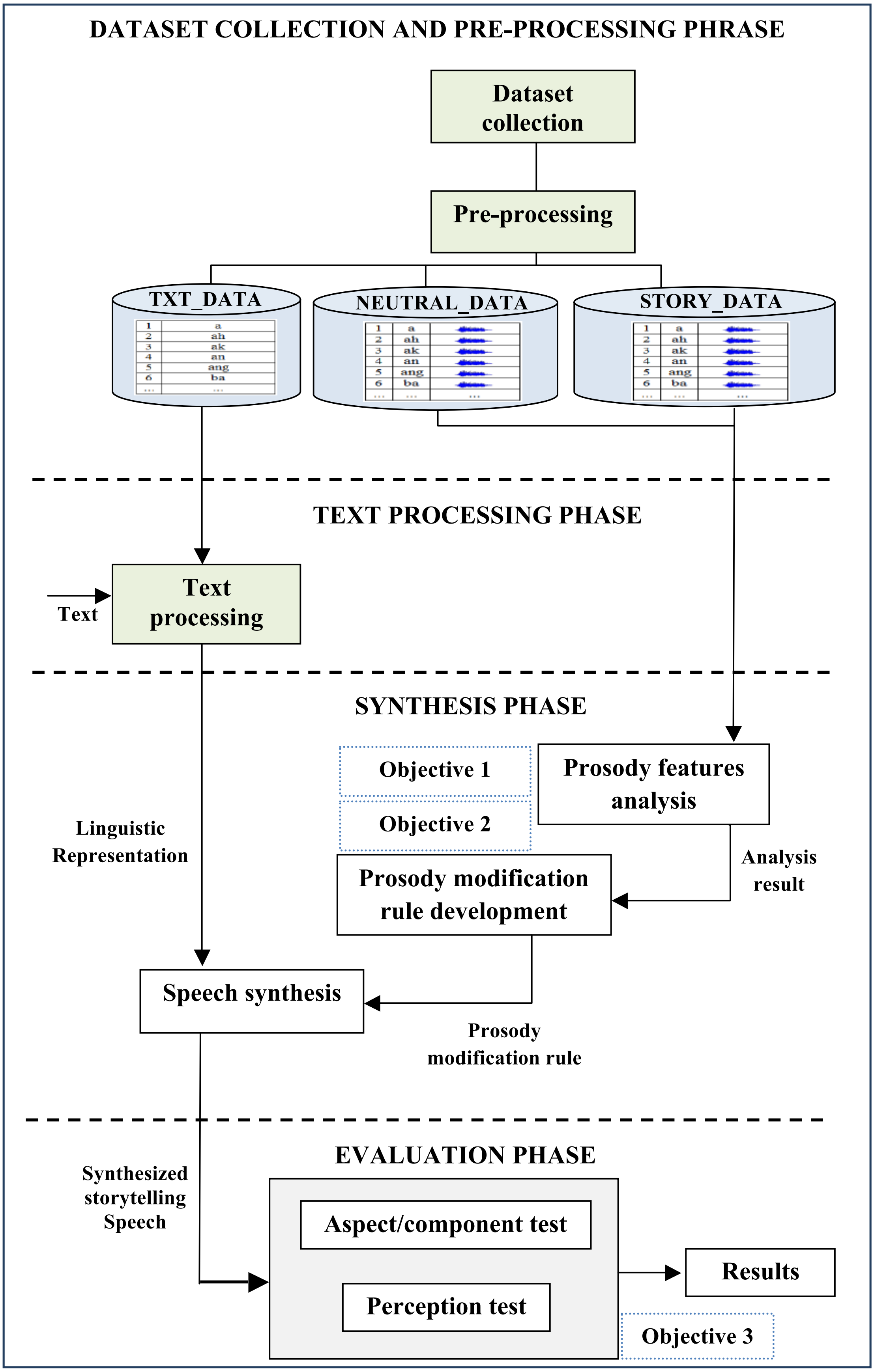



Figure 3.2 Research framework

In speech dataset collection and pre-processing phase, the Malay language storytelling speeches are collected and stored based on the storytellers. The raw data are further pre-processed by performing spectral analysis, segmentation and labelling. The outputs of this phase are three datasets (TXT_DATA, NEUTRAL_DATA, and STORY_DATA). The TXT_DATA consists of all the text syllables that collected from the story scripts. The NEUTRAL_DATA and STORY_DATA are the equivalent audio syllables collected from the spoken in neutral and storytelling speeches respectively. All the newly collected datasets is the first contribution of this research. The details of this phase are discussed in the following subsection.

### 3.2.1 Dataset Collection

The storytelling datasets comprises two storytelling speeches, that is neutral speech and storytelling speeches. The purposes of these two speeches are to collect the datasets for Malay datasets collection and to analyze the prosody before develop the neutral speech synthesis and storytelling speech rule. The collections are done by recording speeches spoken by storytellers. The selection of the storyteller, story, and recording setup are also presented in the following sections.

#### *3.2.1.1 Selection of Storyteller*

In this research, a total of nine storytellers are hired comprising six females and three males with age ranging from 25 to 58 years old. The mean and variance of the nine storytellers' age are 34.56 and 101.13, respectively. Out of the nine speakers, three female storytellers are kindergarten school teachers who have the proper training and experience in delivering storytelling. Their ages range from 30 to 45 years old. A 25-years old female professional radio broadcaster of a local radio station in Malaysia and a 58-years old male professional speaker who has more than 30 years experiences delivering lectures and public speeches are also included as storytellers. The other four speakers (2 males and 2 females) with age ranging from 25 to 30 years old are college degree students who are eloquent speakers and have 3 to 5 years experiences giving public speeches. Our selected storytellers are all native Malay speakers and speak Malay language as their first language. None of them has any speech-related problems. In this research, nine storytellers are hired to gather the neutral and storytelling speeches so that the variation of speaking style from males and females are acquired. Since this is the first initiative of Malay language storytelling synthesis, variations of speaking style are needed to get a better understanding of Malay language story reading and a good pool to select storyteller for test datasets. It is also to add more digital resources of Malay language.

#### *3.2.1.2 Selection of Stories*

Three narrative children short stories are selected from a classic Malaysia's collections of short folktales entitled "*200 kisah teladan haiwan*" (Parker, 2014). These stories were recorded by all nine storytellers with durations between five to ten minutes long. With nine storytellers, there is a good pool of storytellers to select as test datasets. Two male and two female speakers are selected as test datasets of storytelling speech synthesis. The number of sentences, words and syllables for each story are depicted in Table 3.1.

Table 3.1
Total sentences, words, and syllables for each story

| No. | Story | No. of sentences | No. of words | No. of syllables |
|---|---|---|---|---|
| 1 | *Si Angsa Yang Bertelur Emas* | 12 | 113 | 276 |
| 2 | *Anjing Dengan Bayang-Bayang* | 9 | 80 | 175 |
| 3 | *Semut Dan Merpati* | 8 | 98 | 232 |
| | Total | 29 | 291 | 683 |

The selected three stories made up a total of 29 sentences, 291 words, and 683 syllables. The complete scripts for the stories are in Appendix A. The language used in the stories fulfills the formal Malay language, with simple words easily understood by the children. For ease of recording session, the story's script is displayed using Microsoft PowerPoint slides in separate slides for each story and each sentence is placed in separate lines and is numbered as shown in Figure 3.3. This format reduced the possibility of reading mistakes by the storyteller such as sentence repetition.

**Si angsa yang bertelur emas (Story 1)**

1) *Suatu masa dahulu, tinggal seorang petani yang memelihara seekor angsa.*
2) *Pada suatu hari, ketika itu dia ingin mengambil telur angsanya.*
3) *Si petani mendapati telur itu kelihatan aneh.*
4) *Warnanya kuning keemasan dan berat!*
5) *Dia menyangka jirannya cuba bergurau lalu bercadang untuk membuang telur itu.*
6) *Namun selepas berfikir, dia membawa telur itu pulang ke rumah untuk diperiksa.*
7) *Si petani berasa terkejut apabila mendapati itu adalah telur emas!*
8) *Si petani sungguh gembira.*
9) *Hari demi hari selepas itu, si angsa terus bertelur emas.*
10) *Si petani mula menjadi tamak.*
11) *Si petani mengambil pisau dan menyembelih angsa bertuahnya.*
12) *Apabila mendapati tiada sebiji pun telur emas di dalam perut angsa itu, si petani mula menyedari kesilapannya dan berasa sangat menyesal.*

Figure 3.3 Example story script displayed to storyteller

#### *3.2.1.3 Recording Set-Up*

In this section, the recording session set-up of the storytelling is described. One head-mounted microphone, one digital camera, and two laptops are utilized. The head-mounted microphone is a Keenion KDM-E308 audio acquisition device as shown in Figure 3.4(a). The frequency response is 18-20000 Hz for the headphone and 20-16000 Hz for the microphone, respectively. The headphone is an Omni-directional headphone with a sound sensitivity of -48dBV.


Figure 3.4 Recording devices

A Canon E0S 700D Digital SLR camera (see Figure 3.4(b)) is used to capture the video. The video of the recording session is used for visual observations of the storytelling session for housekeeping purposes. The camera can capture 18-megapixel photos and full-HD (High-Definition) video acquisition. It contains an external 8 GB memory card which is adequate for a full recording session of one short story. The camera is placed behind the desk about one meter away from the storyteller. The built-in camera's microphone recorded storytelling audio at the stereo signal of 48 kHz and 16-bit resolution, while visual recording is captured at 25 frames per second with a resolution of 1920x1088. The video recordings are stored in video format .MOV file. This is the standard setting for video recording to produce good quality of video and audio's recording. All recording equipments are arranged according to standard procedure (Yong, Swee, & Mazenan, 2014; Yilmazyildiz et al., 2011) as illustrated in the recording setup in Figure 3.5.

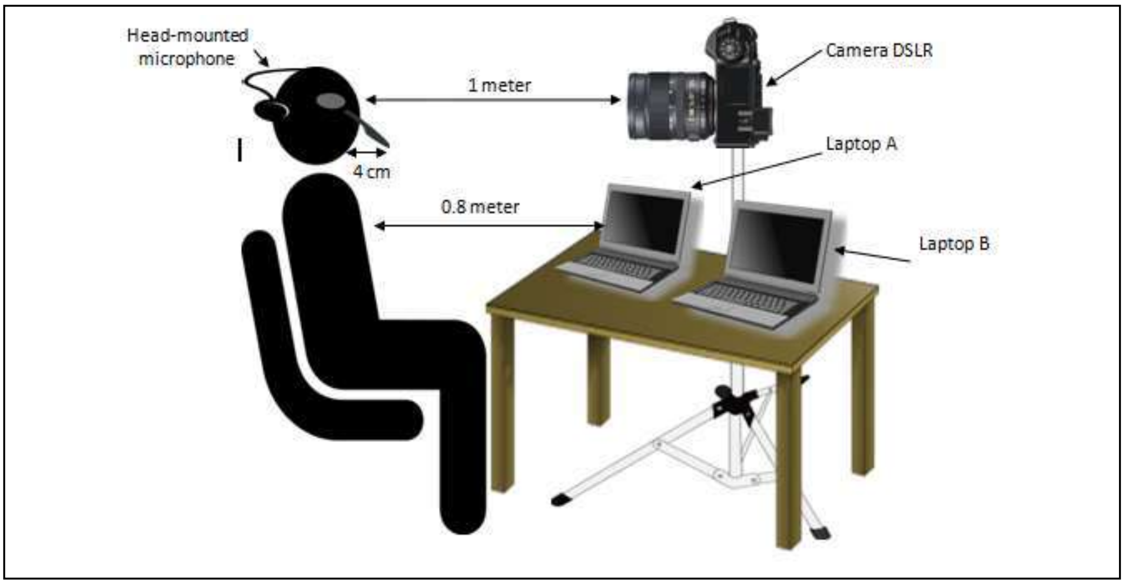



Figure 3.5 The recording setup

Two laptops are also used for the recording session. Laptop A is placed in front of the storyteller and it displayed the story's scripts. On its right side, laptop B is used to run open source digital audio editor and Audacity recording software to record the storytelling through the connected, head-mounted microphone. The head-mounted microphone is placed on the speaker's head, approximately 4 cm from the speaker's mouth. It recorded a stereo signal at 44.1 kHz and 16-bit resolution which is the standard recording setup to get high quality of speech with reasonable storage. The recorded audio is stored in a wave file (.WAV) with background noise level measured at 18 dB. The noise came from the air conditioner from the outside of the room. Table 3.2 listed the specifications of both laptops.

Table 3.2
Specification of the laptops used for recording

| Specifications |  |  |
|---|---|---|
| Laptop | A | B |
| Brand | HP Pavilion m4-1002tx | Dell Inspiron 14 (1464) |
| Window | Windows 8 | Window 7 |
| RAM | 8 GB | 4 GB |
| System type | 64 bit operating system | 64 bit operating system |
| Microprocessor | 2.2 GHz Intel Core i7-3632QM | 2.1GHz Intel Core i3-330M |
| Display | 14" diagonal HD BrightView LED-backlit (1366 x 768) | 14" diagonal HD LED display (1366 x 768) |

Recordings are made in an isolated room in Digital Image, Audio and Speech Technology Group (DIAST) laboratory. The quiet room is equipped with a centralized air conditioner with one door entrance. Each storyteller is given ample time to practice and get familiarize with the story's content before entering the recording room for a recording session. This is done in order to make the recordings as natural and fluent as possible. The recording session may begin at any time when the storyteller is comfortably seated on the chair and wearing a head-mounted microphone as shown in Figure 3.6. During the recording session, the storytellers may repeat the recording until they are fully satisfied. No specific instructions on how to read the stories are given, and the storytellers are free to move their body or arms to act out the narrations. When disfluencies occurred, the stories were re-recorded until it is fluent. Multiple attempts are allowed to achieve near-perfect storytelling speeches.

Figure 3.6 Recording session for nine storytellers

The storytellers need to record the three stories in two versions that are neutral speech and storytelling speaking style. The neutral speech is relaxed and free of all possible stress or emphasis (He et al., 2013) with minimal intonation (Prasanna & Govind, 2010). Maintenance of constancy of pitch and intensity is another important requirement at the time of recording. To achieve all these as well as to obtain a good voice quality, the storyteller must maintain their vocal qualities in terms of intelligibility and pronunciation during neutral speech recording (Sebastian, 2014). The storytellers just need to read the stories script like newsreader (Theune et al., 2006).

The storyteller must pronounce the entire possible stress or emphasis syllable clearly. For this research, the storytelling must be free from all the emotions to the story and only focus on narrative style. The narrated story must be recorded by a storyteller according their style without influence by another storyteller. Firstly, the speech recording started with the neutral speech. Once completed, the storytellers are given time to rest and when they are ready the recording session preceded with the same story in storytelling speaking style. This is to ensure a smooth storytelling without hesitation is conducted. Two different recorded files (neutral and storytelling speech) are collected from one story. The same processes continued for the other two stories. A complete recording session for one storyteller took approximately one hour. At the end, the recorded storytelling speeches consist of 54 audio files comprising speeches by nine storytellers reading three different stories in neutral and storytelling speeches.

### 3.2.2 Pre-Processing

The recorded speech's information such as spectral characteristics, ideal resolution, spectral representation and disturbance are needed to be analyzed in order to maintain or increase the speech quality. During recording, the disturbances such as background noise and humming noise from the microphone cannot be avoided. Thus, before further processing, it is necessary to deal with the identified artifacts in the speech signal to reduce any subsequent problems.

Therefore, once the recorded speeches are acquired, the next process is pre-processing of the recorded neutral and storytelling speech. The need of pre-processing is to maintain and produce good quality speech signal before further processing or analysis. Pre-processing phase started with spectral analysis such as sampling, determining bit resolution, framing, windowing, and filtering. Then, segmentation and labeling are described further. A flowchart depicting the overall per-processing steps is shown in Figure 3.7.

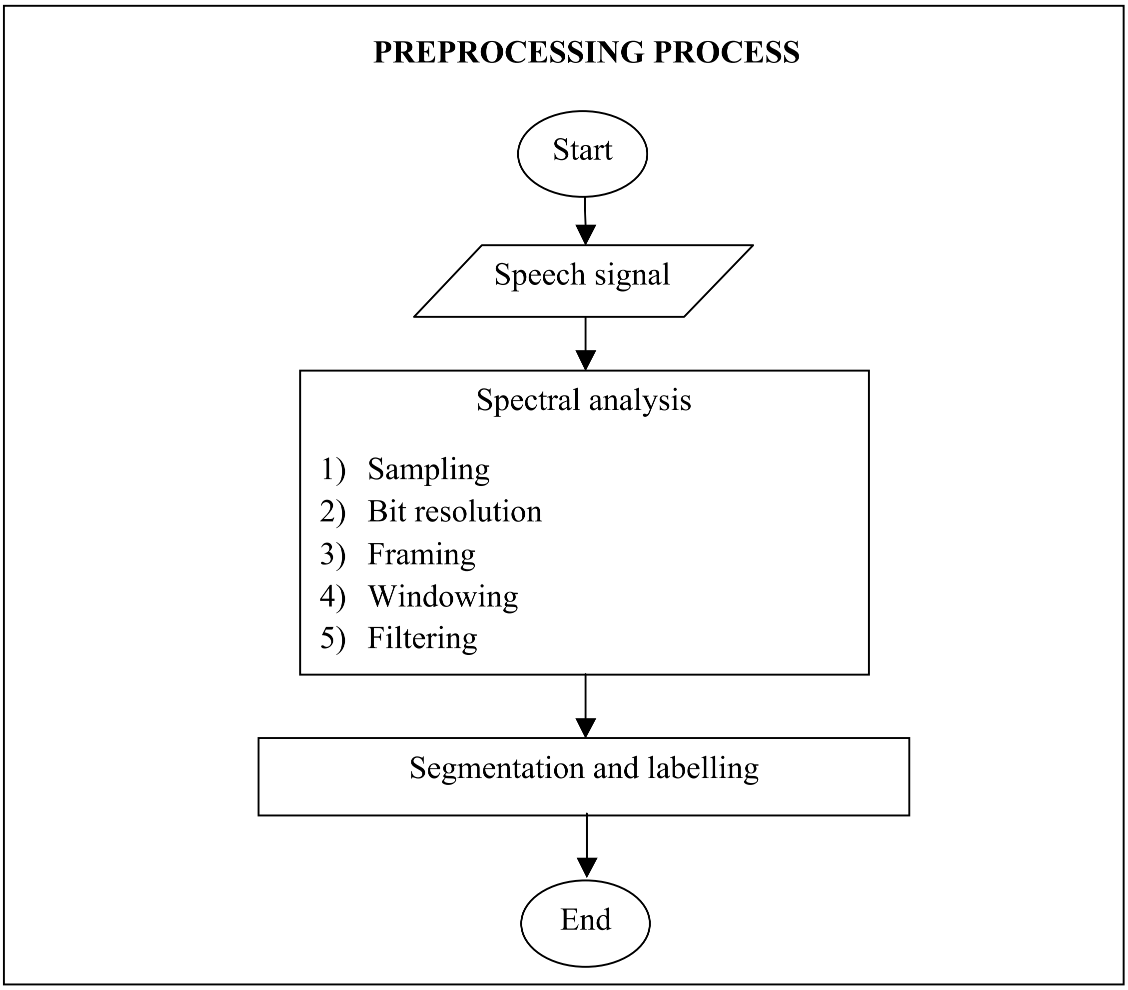



Figure 3.7 Flowchart of pre-processing of the speech signal

### *3.2.2.1 Speech Sampling*

The speech signal has frequency components in the audio frequency ranging from 20Hz to 20 kHz of the electromagnetic spectrum (Hargus, 2005). The standard sampling frequency of recorded speech is chosen to be 44.1 kHz in the stereo channel (Sebastian, 2014; Birkholz, 2013). This is because sampling frequency of 44.1 kHz is able to gather audio frequency up to 20 kHz as the maximum frequency component. The 20 kHz sampling frequency is good enough to digitize the signals to keep all the speech information (Chowdhury, 2006). Lesser sampling rate will cause a loss of naturalness of sound quality. Thus, sampling frequency of 44.1 kHz is used as sampling frequency in this research.

#### *3.2.2.2 Bit Resolution For Speech*

The next important parameter in the digitization process is bit resolution. The number of bits used to store each sample of speech is termed as bit resolution. The number of bits per sample depends on the number of quantization levels used during analog to digital conversion. More speech information is preserved with an increased number of quantization level. Hence, it is a trade-off between the number of bits and information representation. Thus, 16-bit is the preferred bit resolution for speech synthesis (Sarkar et al., 2014).

#### *3.2.2.3 Framing*

The speech signal is a non-stationary time variant signal because of the changes of frequency and spectral component over time. The human speech signal is built from the dictionary of phonemes, and most of the phonemes properties remain invariant for a short period of time (~5-100 ms) (Ikkunointi, 2016). Thus, the non-stationary speech signal need to be transformed as stationary using framing method (Hamzah, 2016). Framing is the process of blocking the speech signal into frames of $N$ samples. The adjacent frames are separated and shifted for $M$ samples to overlap with the previous frames. The shift of the $M$ samples determines the smoothness of the spectral features. If the $M$ samples are small, the spectral features will be smooth. Without overlapping between the adjacent frame, the correlation between frames and adjacent frames will contain noise component (Seman, 2011). The illustration of the framing process is shown in Figure 3.8.

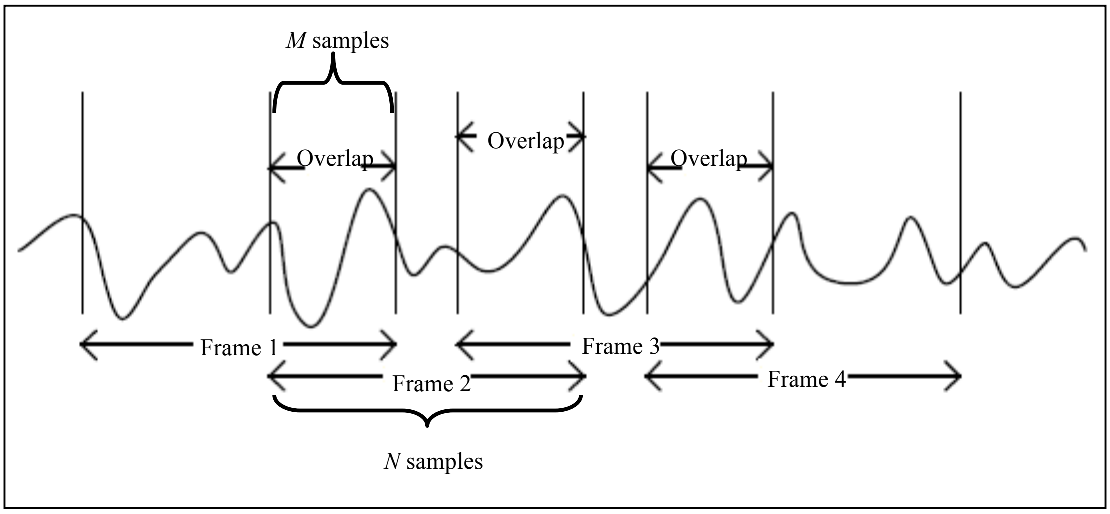


Figure 3.8 Illustration of framing process

The number of $N$ sample for each frame can be range from 160 to 640 samples for durations 10ms to 40ms at 16 kHz sampling rate. The general equation for frame blocking is shown in Equation (3.1). The symbol $S$ represents the length $l_{th}$ frame of the speech signal and $L$ represents the entire speech signal.

$$x_l(N) = \bar{S}(M_l + N) \tag{3.1}$$

Here,

$x_l$ Frame of speech

$N$ 0,1....., N-1 sample

$l$ 0,1....., $L$-1 frames

As the frame length increases, spectral features become smoother. Since 10 ms frame length produces too many details, the preferred length is between 20 ms to 40 ms (20 ms is chosen for our speech data) for frame length and 10 ms for frame shift (Paliwal et al., 2010).

#### ***3.2.2.4 Windowing***

Windowing is to minimize the signal discontinuities at the beginning and ending of each frame. The "leakage" aberrations are caused from sudden changes in the frame at the start and end frame. Thus, windowing pre-multiplies the signal with a window function that smoothly decreases to zero value at each start and end frame.

The choice of the window in short-time speech processing determines the nature of the measurement representation. The window function is defined as *w(n)*, then the windowed signal is as in Equation (3.2). Based on Heuser (2014), the illustration of the speech signal using Hamming window function is shown in Figure 3.9.

$$\bar{y}(n) = x(n).w(n), \quad 0 \leq n \leq N-1 \tag{3.2}$$

For Hamming window, the form is written in Equation (3.3).

$$w(n) = 0.5 - 0.4\, cos\left(\frac{2n}{N-1}\right), \qquad 0 \leq n \leq N-1 \tag{3.3}$$

Where,

$\bar{y}$ = Windowed speech signal

$x$ = Speech signal

$w$ = Hamming window function

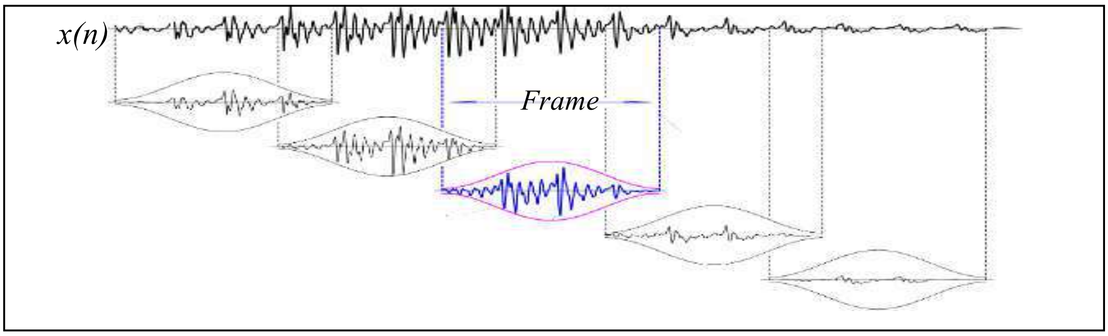
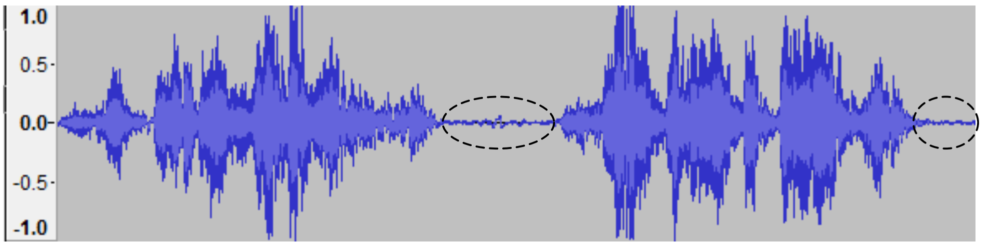



Figure 3.9 Illustration of frame formation with Hamming windowing function

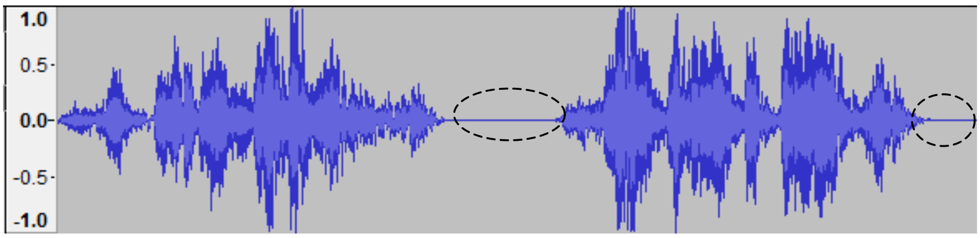
The highlighted frame (in blue colour) is one of five frames in the signal. Other than Hamming window, another two representation windows can also be used that are Rectangular and Hanning windows. In this research, Hanning window is chosen because it produced a smoother and accurate signal (Podder et al., 2014).

### *3.2.2.5 Filtering*

The recording speech contained non-linear distortions due to recording devices, analog or digital (A/D) conversion, and environment noise that disturb the quality of the speech. In order to suppress interfering signals and reduce environment noise, filtering is done. The goal of the filtering process is to remove unwanted components or features from a speech signal. Environment noise is measured using Audacity (version 2.1.3), quantified at 18 dB and removed using noise reduction technique. The noise reduction technique can reduce constant background sounds such as hum, whistle, whine, buzz, tape hiss, fan noise or FM/webcast carrier noise. In this thesis, high pass filter in Audacity with cut-off value of 18 dB, frequency smoothing (band) of 3 and sensitivity of 6 are applied to reduce the noise. The cut-off value is chosen based on the analysis of the environment noise as stated earlier. The speech waveform before and after filtering is shown in Figure 3.10.




(a) Before filtering




(b) After filtering

Figure 3.10 Speech signal before (a) and after (b) filtering

#### *3.2.2.6 Speech Labelling And Segmentation*

In the final phase of pre-processing, the storytelling audio corpus is annotated manually using speech analysis tool known as PRAAT (Boersma, David, & Heuven, 2015). Each audio file is imported to PRAAT and annotated at the sentence, word, and syllable level. After annotations of all 54 audio files (9 storytellers x 2 version x 3 stories) are done, the 54 transcriptions are produced and stored in text grid file (.textgrid).

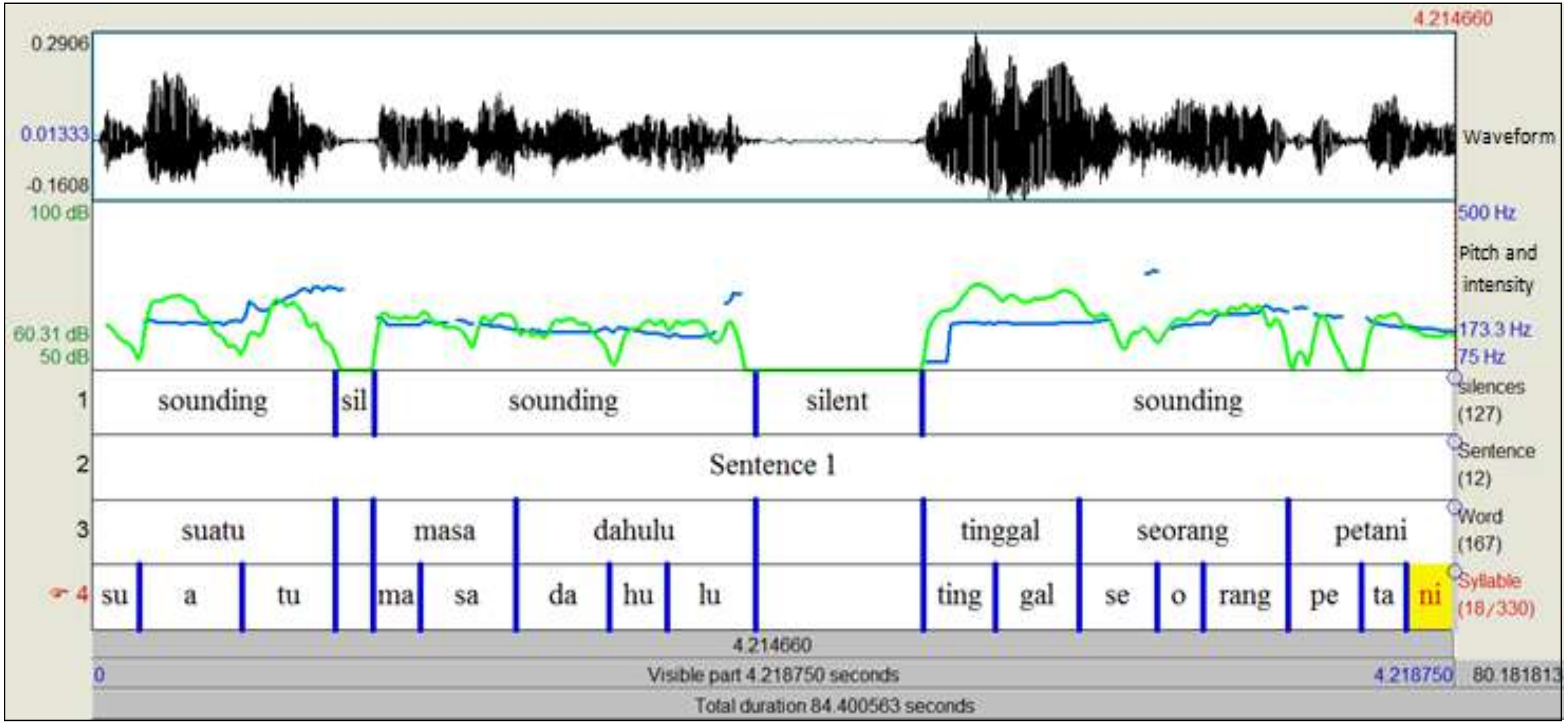



Figure 3.11 Transcription of neutral speech

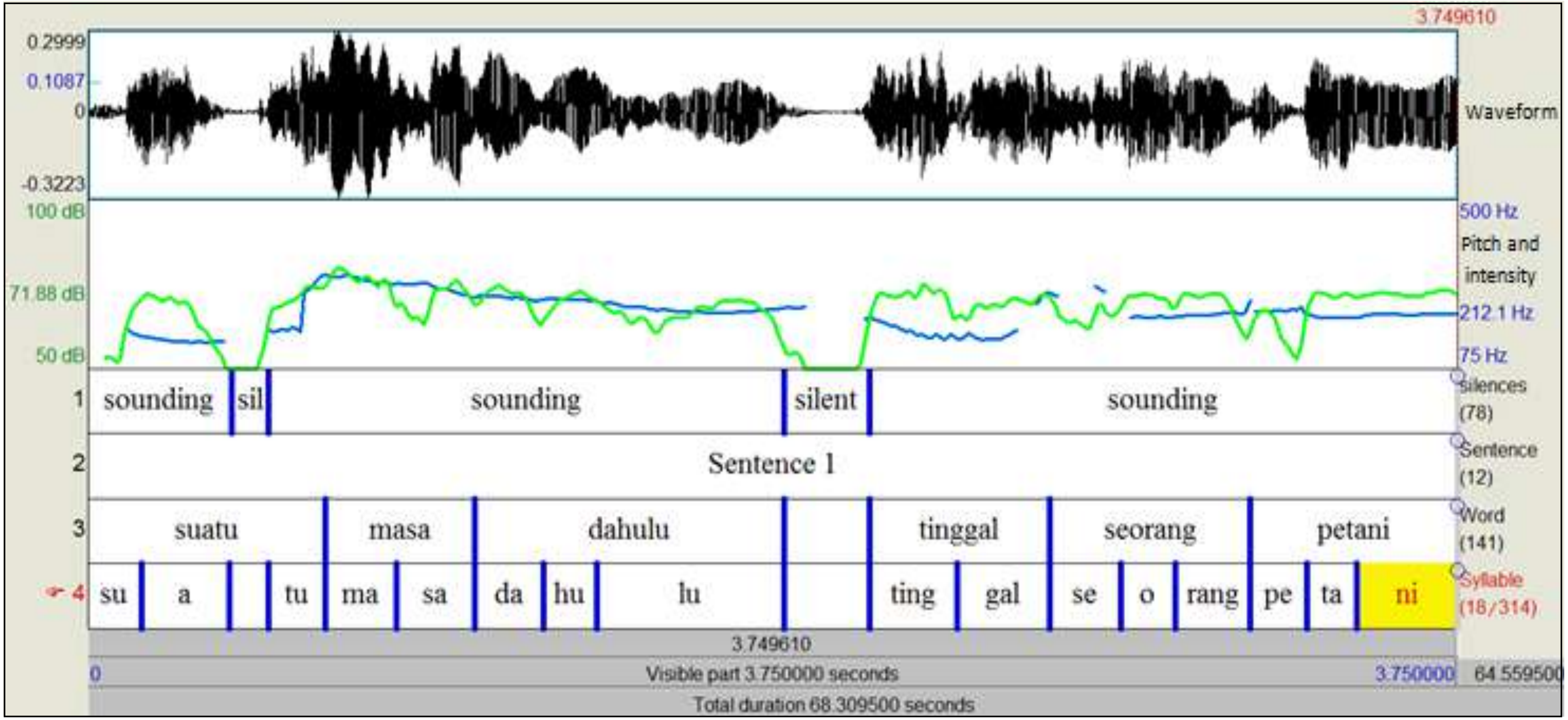



Figure 3.12: Transcription of storyteller speech

Figure 3.11 and Figure 3.12 illustrated the transcription of neutral and storytelling speech file of a female speaker for a phrase suatu "*masa dahulu, tinggal seorang petani*". In both figures, the first row consists of the speech waveform. The second row illustrated the pitch by blue colored line and intensity by green colored line) patterns of the speech waveform. For annotation or labeling, the first tier (marked as 1) shows the automated sound/silent labeling of the phrase. The second, third and fourth tiers (marked as 2, 3, and 4) show manual labeling at sentence, words, and syllable-level, respectively. The syllables are labeled based on Malay language syllable structure (Montaño et al., 2013). The empty labels at word and syllable-levels are the silence areas which are not annotated and left as blanks.

Once the speech corpus is labeled and segmented, the syllable text annotation and syllable speech signal are categorized to three different datasets that are syllable text datasets (TXT_DATA), syllable speech datasets for neutral (NEUTRAL_DATA) and syllable speech datasets for storytelling (STORY_DATA) as illustrated in Figure 3.13. The syllable text datasets are collections of syllables in text form without redundancy in alphabetical order. After removing the redundant syllables, a total of 164 non-redundant syllables are stored in the TXT_DATA as in Appendix B. It is later used in text processing stage.

The extracted syllable speech signal is stored in datasets categorized by neutral speech (NEUTRAL_DATA) and storytelling speech (STORY_DATA). The total neutral speech syllable is 6147 (9 storytellers x 683 neutral speech syllable). The total storytelling speech syllables are also 6147 (9 storytellers x 683 storytelling speech syllable) with the overall speech syllables collected is 12,294. The syllable speech datasets (neutral and storytelling) is used in synthesis phase later.

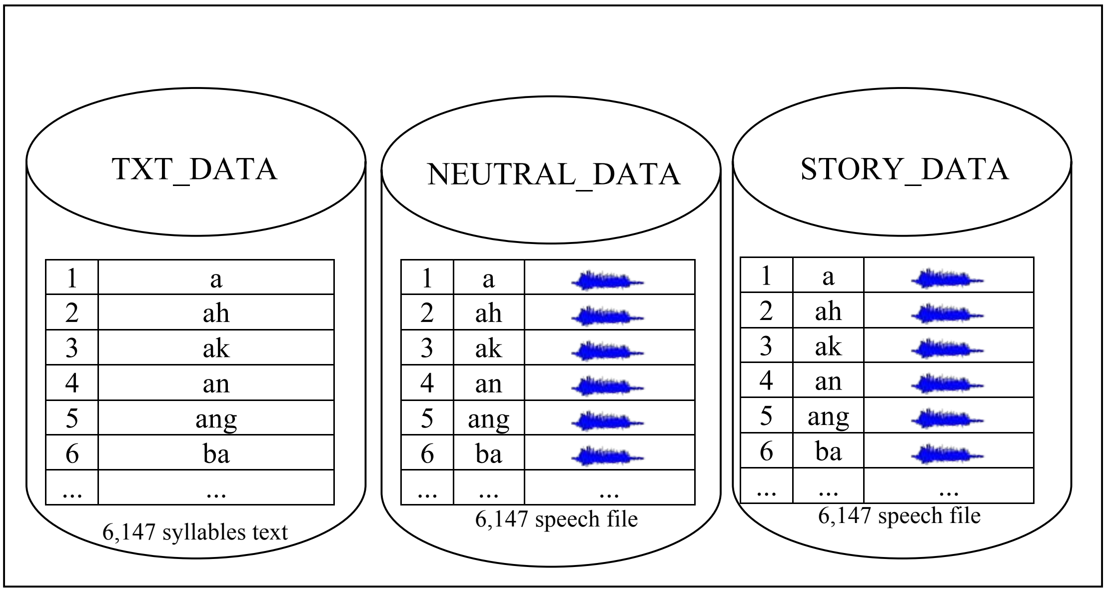



Figure 3.13 Illustrations of three different datasets

The datasets collection and pre-processing phase are discussed. Three datasets are developed as the output in this phase as the first contribution in this research. The syllable text datasets (TXT_DATA) are further used in the next phase (text processing phase).

## 3.3 Text Processing Phase

The main aim of text processing phase is to segment the given text input into a sequence of phonemic or syllabic speech units. These speech units are then produced into speech sounds using speech generation component either by synthesis from parameters or by selection of a unit from a large speech corpus (Govind & Mahadeva, 2013). Text processing is responsible for producing correct sequence of speech units for a natural speech synthesizer (Raj et al., 2007). In many languages, speech units may be syllabic or phonemic. However, the Malay language is an alphabetic language with salient syllabic structures (Lee et al., 2013). Hence, segmentation of text into syllabic speech units is most suitable (Tiun, Abdullah, & Tang, 2011; Tan & Ranaivo-Malançon, 2009; Samsudin et al., 2004). The segmentation text into syllabic unit called syllabification.

In this research, the syllabification developed is based on Tan and Ranaivo-Malançon (2009). The syllabification of a word starts with selecting 5 characters sequences beginning with the rightmost characters of the word. The selected characters sequence is then compared to the syllable database (TXT_DATA) for a match. If a syllable in the TXT_DATA is matched, the characters sequence is identified as a syllable. Otherwise, the leftmost character is dropped from the characters sequence leaving a 4-characters sequence and a match is then searched again syllable from the TXT_DATA. The dropped-and-matched process is continued until a syllable unit match is found in the TXT_DATA. The process continues in right to the left direction for all characters in the word and the word is then segmented based on the matched syllable unit. The segmented syllable text is called as linguistic representation. The text processing flow chart for syllabification technique is shown in Figure 3.14.

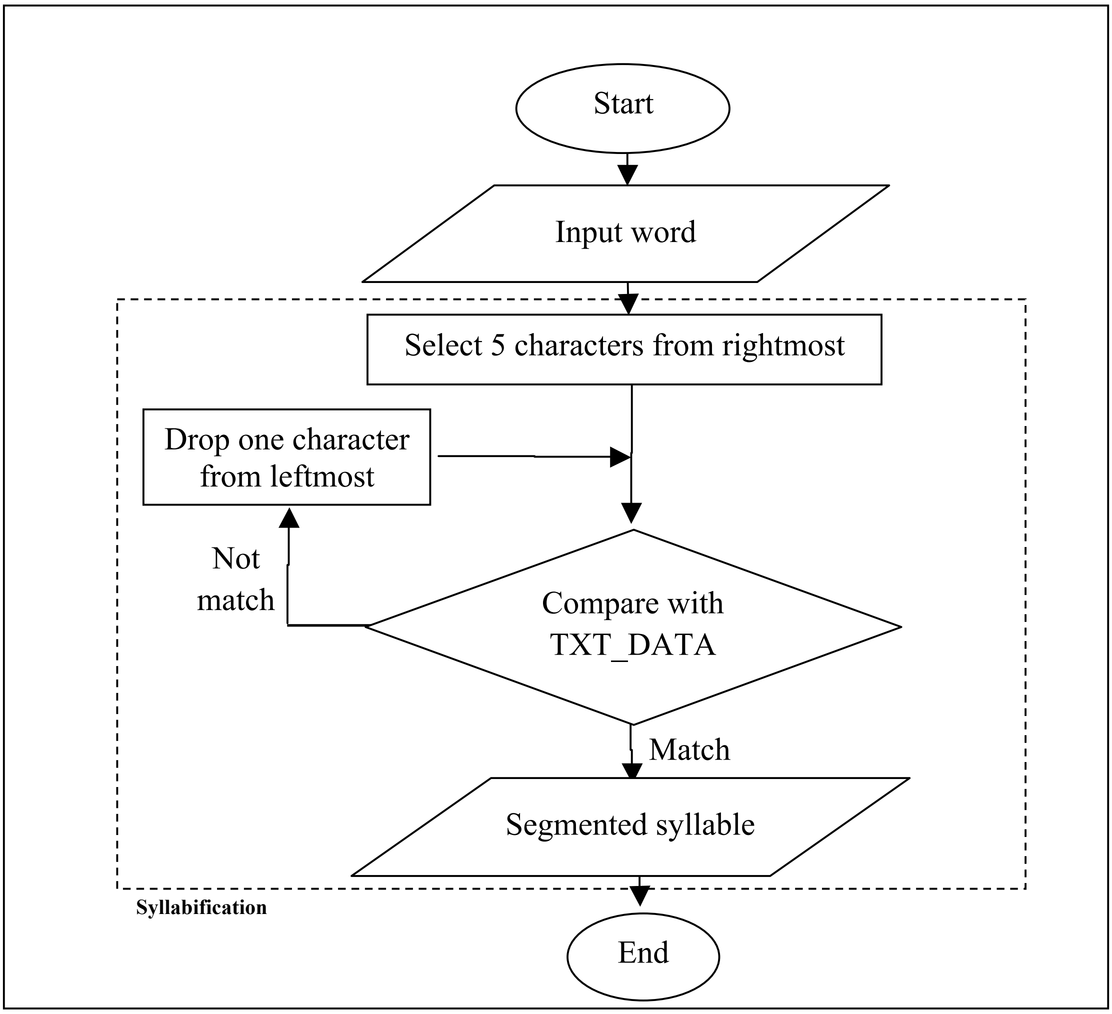



Figure 3.14 Text processing flowchart (Tan & Ranaivo-Malançon, 2009)

However, there is an anomaly for 8 syllables that is located within a word or at the end of a word. These syllables are referred to as *MustFront* syllables (see Table 3.3) signifying that these designated syllables must be positioned at the beginning of a word. For example, the word /kemaskan/ is wrongly segmented as /ke/ma/skan/ instead of /ke/mas/kan/ because the 4-characters sequence /skan/ is identified as syllable during syllabification. An example of the word that used /skan/ as a syllable is the word /skandal/, and the syllable is located at the beginning of the word. In the case of the word /kemaskan/, the syllable /skan/ is located at the end of the word. Hence this 4-characters sequence should not be correctly identified as syllable at the back. Thus, this research proposed a new additional rule called *MustFront* rule to improve the syllabification technique as shown in Figure 3.15. The proposed rule is manually verified by a linguistic academician from Akademi Pusat Bahasa, UiTM Shah Alam.

Table 3.3
*MustFront* syllables

| *MustFront* Syllables | False segmentation | Correct segmentation |
|---|---|---|
| skan | ke/ma/***skan***/ | ke/mas/kan/ |
| kri | ma/**kri**/fat/ | mak/ri/fat/ |
| ste | mi/**ste**/ri/ | mis/te/ri/ |
| sta | ku/**sta**/ | kus/ta/ |
| stik | mi/**stik**/ | mis/tik/ |
| klu | ma/**klu**/mat/ | mak/lu/mat/ |
| pli | a/**pli**/ka/si/ | ap/li/ka/si/ |
| spek | a/**spek**/ | as/pek/ |
| | **spek**/u/la/si | spe/ku/la/si |
| | su/**spek** | sus/pek |

```
IF a syllable is found in the syllable database
  Check whether syllable is MustFront syllable
  IF syllable == MustFront syllable THEN
      Check its position in the word
       If position == begin of word THEN
           SET syllable = true
       ELSE
           new syllable = truncate leftmost phoneme in syllable
           Find new syllable in syllable database. If found
           repeat the step again
 ELSE
     SET syllable = true
```

Figure 3.15 A new syllabification rule (*MustFront* rule)

With the addition of the new rule, if the *MustFront* syllables are located at the end or within a word, the leftmost character is dropped from the phoneme sequence and a search for syllable match from the syllable database is reiterated. As an example, in the case of word /kemaskan/, the leftmost characters /s/ is truncated from the syllable /skan/ creating a new syllable /kan/. A match search is reiterated from the syllable database (TXT_DATA) for the syllable /kan/ (in bold). The overall syllabification step is as illustrated in Figure 3.16.

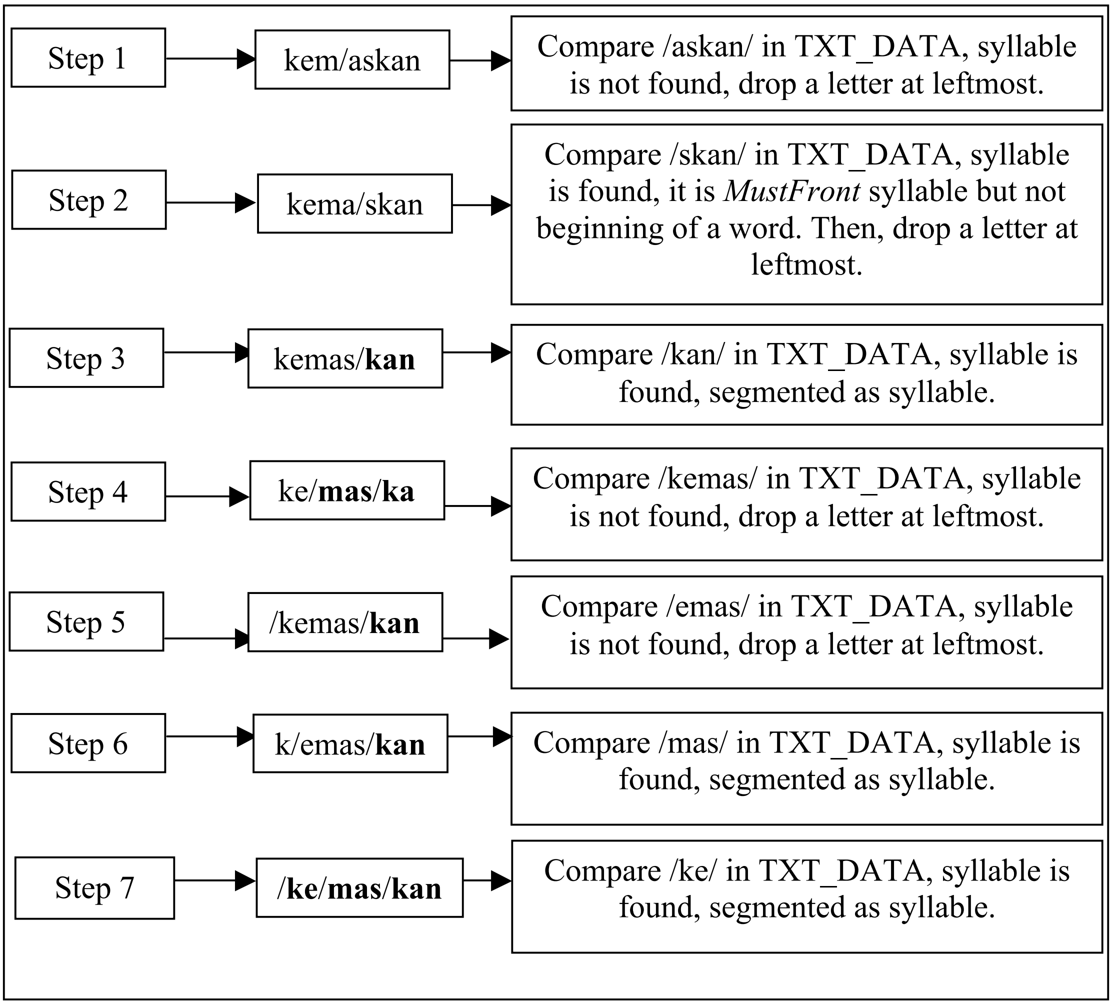


Figure 3.16 Syllabification step using *MustFront* rule

To experiment the syllabification with *MustFront* rule, the collection of the word was acquired from online national newspaper articles of different dates published in between Jan 2015 to October 2015 and topics such as sports, political events, crime, business and opinion (http://www.bharian.com.my, http://www.hmetro.com.my) and Wiktionary Open Content Dictionary (http://en.wiktionary.org/wiki/Category: Malay_nouns). Even though there are previous works of syllabification on Malay language documents, the datasets are not made available. A total of 25,000 Malay words without duplication are collected and their syllable length distributions are graphically represented in Figure 3.17 (a). It can be seen from the figure that trisyllabic words (3 syllables per word) have the highest percentage of occurrence in Malay document, while one syllable per word has the least occurrence. All words are further manually segmented to syllable units using Malay syllable structure and stored in a syllable database for syllabification usage. The total 1,444 different units of syllables acquired from these 25,000 words are stored in syllable database. In syllable database, the distribution of characters in a syllable is also shown in Figure 3.17 (b). As can be seen, 68% of the collected words have 3 characters per syllable. Furthermore, it is also discovered that none of the collected words consists of more than 5 characters per syllable. Due to this fact, a sequence of more than 5 characters is irrelevant for syllabification in this experiment.

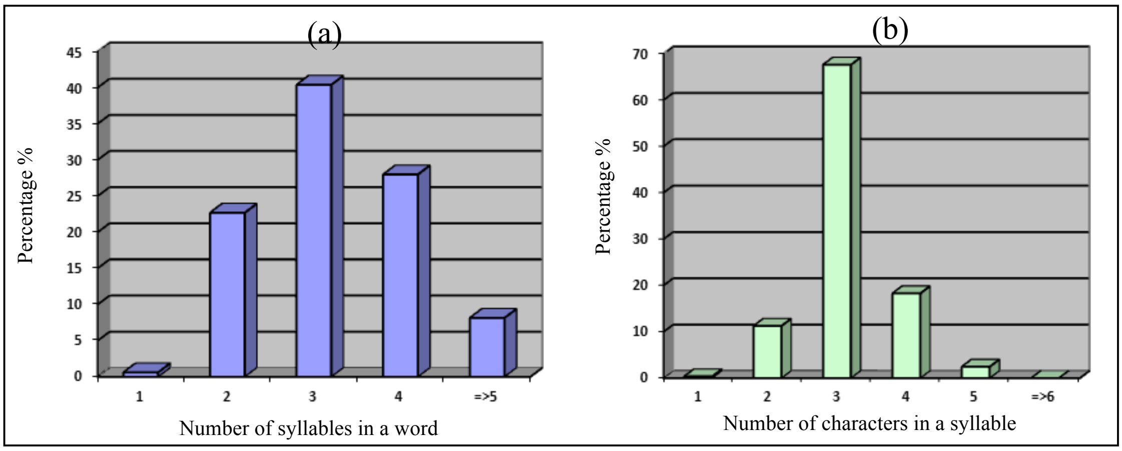



Figure 3.18 Tabulated syllable in word and character in syllable

Four syllabifications experiments are conducted using the 25,000 words. The four syllabication techniques are 1) Zeki & Azizah (2001); 2) Samsudin et al. (2004); 3) Tan & Ranaivo-Malançon (2009) and 4) *MustFront* rule. The graphical user interface is developed for the comparison is shown in Appendix C. The syllabification techniques are evaluated using Word Error Rate (WER) as in Equation (3.4) and syllabification results are tabulated in Table 3.4.

$$WER = \frac{Total\ incorrect\ segmented\ words}{Total\ number\ of\ words} \qquad (3.4)$$

Table 3.4
Syllabification results

| Syllabification technique | Word Error Rate (WER) |
|---|---|
| Zeki & Azizah (2001) | 77.44% |
| Samsudin et al. (2004) | 36.52% |
| Tan & Ranaivo-Malançon, (2009) | 3.75 % |
| *MustFront* rule | 2.61% |

Table 3.6 shows that the highest WER is produced by Zeki & Azizah (2001) and the lowest WER is achieved by our proposed syllabification called *MustFront* rule). Based on the detailed result analysis, Zeki & Azizah (2001)'s syllabification structure is unable to cater for complex words such as tetrasyllabic words which comprise 34% of our datasets. On the other hand, Samsudin et al. (2004)'s syllabification managed a reduced WER of 36.52% due to the introduction of rules for Malay diphtongs and loan words. A much better result is produced by Tan & Ranaivo-Malançon, (2009)'s work which achieved only 3.75%. However, with the addition of new rule for *MustFront* syllables in our proposed syllabification technique, WER is further reduced from 3.75% to 2.61%. This proposed technique is used for syllabification in this research.

### 3.4 Summary

This chapter presents the methodology of this research in four phases. Dataset collection and pre-processing phase and text processing phase are discussed in detail in this chapter with three newly collected datasets and *MustFront* rule for the first and second contributions to this research. The first stage of synthesis phase is elaborated in Chapter 4.

# CHAPTER FOUR
# PROSODY FEATURES ANALYSIS

## 4.1 Introduction

Prosody features of the processed neutral and storytelling speeches are analyzed and discussed in this chapter. Analysis of the speech prosody is important to understand the prosodies produced between neutral and storytelling speeches. The flowchart of prosody features analysis is shown in Figure 4.1.

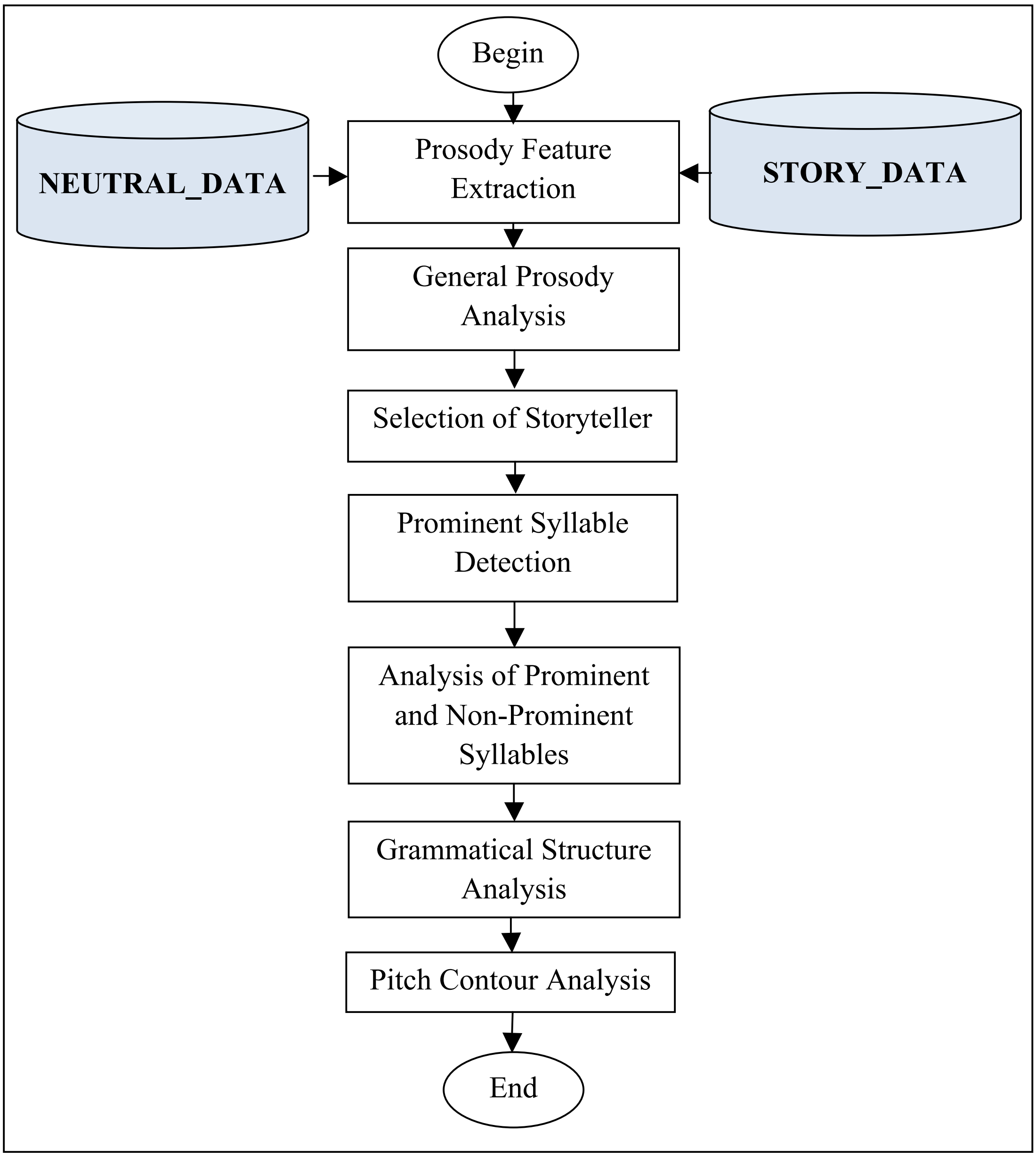



Figure 4.1: Flowchart of prosody features analysis

The analysis begins with the prosody features extraction for tempo, pause, duration, pitch and intensity of all the neutral and storytelling speeches of the 9 storytellers in NEUTRAL_DATA and STORY_DATA. The prosody features are extracted and analyzed to understand the general differences between all speakers. After the general prosody analysis is done, one male and one female storyteller is selected as baseline storytelling model for the storytelling speech synthesis. The selection of storyteller is important because some storytellers are amateur at storytelling and are not suitable to represent a good storytelling model. It is also a standard practice in storytelling speech synthesis to synthesize a neutral speech based on one storyteller (Verma et al., 2015). As an example, (Gelin et al., 2010) recorded storytelling speech using seven storytellers and only choose a storyteller as a storytelling model. Further analysis of prominent syllables, grammatical structure and pitch contour are done on the selected storytellers. The analysis results are described in detail in this chapter and are used in designing the improved prosody modification rule in Chapter 5.

## 4.2 Prosody Feature Extraction

Prosody features are extracted from the neutral (NEUTRAL_DATA) and storytelling (STORY_DATA) of all the storytellers. The prosody features are tempo, pause, duration, pitch and intensity. The PRAAT (Boersma et al., 2015) is used to extract these prosodic parameters (Montaño et al., 2013). All the 6,147 neutral syllables and 6,147 storytelling syllables from nine storytellers are used to extract the prosody feature.

### 4.2.1 Tempo Feature Extraction

The purposes of calculating the tempo is to determine how fast or slow the speaker speaks for neutral and storytelling speech. The formula for calculating speech tempo is described in Section 2.4.1. For better understanding, the formula is interpreted as in Equation (4.1).

$$Tempo = \frac{Total\ syllable}{Total\ speech\ duration\ without\ pause} \tag{4.1}$$

An example of the calculation of average tempo for neutral and storytelling speech is shown in Table 4.1 and Table 4.2. The calculation is done by dividing the total syllables with the total speech durations without pause (Montaño et al., 2013). As an example, the total duration of Story 1 is 90.32 seconds and is subtracted from the pause durations at 23.95 seconds to produce total speech durations without pause. The rate-of-speech (ROS) is then calculated by dividing total syllable (276 syllables) with the value of speech duration without pause (66.37 seconds) and producing the value 4.16 syllable per seconds (SPS). The average rate-of-speech (ROS) of three stories for neutral speech and storytelling speech is 3.74 and 4.96 in syllable per seconds (SPS), respectively. Based on the average results, storytelling speech tempo is faster with 4.96 syllables spoken in a second than neutral speech with 3.74 syllables spoken in a second. The tempo for the entire nine storytellers are presented and discussed in Section 4.3.1.

Table 4.1
Tempo calculation for neutral speech

| Story | Total duration (s) | Pause duration (s) | Total Syllable | ROS |
|---|---|---|---|---|
| Story 1 | 90.32 | 23.95 | 276 | 4.16 |
| Story 2 | 58.17 | 9.72 | 175 | 3.61 |
| Story 3 | 80.43 | 13.70 | 232 | 3.48 |
| | | | Average | 3.74 |

Table 4.2
Tempo calculation for storytelling speech

| Story | Total duration (s) | Pause duration (s) | Total Syllable | ROS |
|---|---|---|---|---|
| Story 1 | 66.34 | 12.11 | 276 | 5.09 |
| Story 2 | 41.86 | 6.56 | 175 | 4.96 |
| Story 3 | 57.21 | 9.18 | 232 | 4.83 |
| | | | Average | 4.96 |

### 4.2.2 Pause Feature Extraction

The purpose of pause extraction is to analyze the pause in the neutral and storytelling speaking speech. Pause feature are categorized based on phrase and sentence level. In this research, pause is calculated manually based on pause at end of phrase and end of sentence in second (s). In this thesis, a phrase is defined as a collection of words and determined by the symbol comma (,) that exist in a sentence. The example of extracted pause feature of neutral and storytelling speech for a male storyteller and a female storyteller can be seen in Appendix D and Appendix E, respectively.

### 4.2.3 Duration Feature Extraction

Duration feature is calculated based on duration in seconds (s) of a syllable in NEUTRAL_DATA and STORY_DATA. The duration of a syllable's speech signal is extracted using PRAAT. The example of extracted syllable's duration of NEUTRAL_DATA and STORY_DATA from one storyteller is shown in Table 4.3.

Table 4.3
Extraction of syllable's duration

| No. | Syllables | NEUTRAL_DATA | STORY_DATA |
|---|---|---|---|
| | | Duration (s) | Duration (s) |
| 1. | *su* | 0.20 | 0.17 |
| 2. | *a* | 0.25 | 0.25 |
| 3. | *tu* | 0.15 | 0.10 |
| 4. | *ma* | 0.15 | 0.19 |
| 5. | *sa* | 0.28 | 0.22 |
| 6. | *da* | 0.19 | 0.13 |
| 7. | *hu* | 0.18 | 0.16 |
| 8. | *lu* | 0.32 | 0.43 |
| 9. | *ting* | 0.17 | 0.12 |
| 10. | *gal* | 0.25 | 0.25 |
| 11. | *se* | 0.14 | 0.10 |
| 12. | *o* | 0.08 | 0.10 |
| 13. | *rang* | 0.26 | 0.18 |
| 14. | *pe* | 0.17 | 0.16 |
| 15. | *ta* | 0.17 | 0.22 |
| 16. | *ni* | 0.38 | 0.34 |
| ... | ... | ... | ... |

Table 4.3 only shows the extraction of duration for 16 syllables from 6,147 syllables in NEUTRAL_DATA and STORY_DATA. The first syllable is '*su*'. The extracted duration for neutral speech and storytelling speech is 0.20s and 0,17s, respectively. The extraction of syllable's duration for all the storytellers are available in Appendix L. The average duration is presented and discussed later in Section 4.3.3.

### 4.2.4 Intensity Feature Extraction

Intensity feature is calculated based on decibel (dB) of a syllable in NEUTRAL_DATA and STORY_DATA. Once again, PRAAT is used to extract the intensity of a syllable's speech signal. Example of extracted syllable's intensity of NEUTRAL_DATA and STORY_DATA from one storyteller is shown in Table 4.4.

Table 4.4
Extraction of syllable's intensity

| No. | Syllables | NEUTRAL_DATA | STORY_DATA |
|---|---|---|---|
| | | Decibel (dB) | Decibel (dB) |
| 1. | *su* | 66.98 | 65.48 |
| 2. | *a* | 77.60 | 78.04 |
| 3. | *tu* | 79.12 | 79.32 |
| 4. | *ma* | 80.52 | 80.97 |
| 5. | *sa* | 75.79 | 80.73 |
| 6. | *da* | 75.88 | 83.57 |
| 7. | *hu* | 73.52 | 83.31 |
| 8. | *lu* | 65.75 | 75.55 |
| 9. | *ting* | 76.43 | 75.67 |
| 10. | *gal* | 84.00 | 80.72 |
| 11. | *se* | 72.19 | 72.01 |
| 12. | *o* | 79.03 | 79.57 |
| 13. | *rang* | 73.88 | 79.74 |
| 14. | *pe* | 69.63 | 73.49 |
| 15. | *ta* | 80.94 | 78.98 |
| 16. | *ni* | 77.21 | 74.47 |
| ... | ... | ... | ... |

Intensity is also extracted from the NEUTRAL_DATA and STORY_DATA. The intensity extraction for 16 syllables from 6,147 syllables is shown in Table 4.4. Based on Table 4.4, the intensity of the first syllable 'su' is 66.98dB for neutral speech and 65.48dB for storytelling speech. The extraction of syllable's intensity for all storytellers are available in Appendix L. The average intensity is presented and discussed later in Section 4.3.4.

### 4.2.5 Pitch Feature Extraction

Pitch feature is calculated based on Hertz (Hz) of a syllable in NEUTRAL_DATA and STORY_DATA. The pitch of a syllable's speech signal is also extracted using PRAAT. Example of extracted syllable's pitch from NEUTRAL_DATA and STORY_DATA from one storyteller is as shown in Table 4.5.

Table 4.5
Extraction of syllable's pitch

| No. | Syllables | NEUTRAL_DATA | STORY_DATA |
|---|---|---|---|
| | | Hertz (Hz) | Hertz (Hz) |
| 1. | *su* | 118.93 | 107.23 |
| 2. | *a* | 122.77 | 125.45 |
| 3. | *tu* | 170.17 | 223.89 |
| 4. | *ma* | 142.24 | 229.72 |
| 5. | *sa* | 127.78 | 175.23 |
| 6. | *da* | 109.33 | 131.61 |
| 7. | *hu* | 102.04 | 122.17 |
| 8. | *lu* | 153.12 | 150.83 |
| 9. | *ting* | 116.41 | 105.62 |
| 10. | *gal* | 138.23 | 143.53 |
| 11. | *se* | 127.48 | 129.54 |
| 12. | *o* | 113.17 | 155.43 |
| 13. | *rang* | 114.33 | 134.21 |
| 14. | *pe* | 388.80 | 130.56 |
| 15. | *ta* | 110.16 | 120.83 |
| 16. | *ni* | 126.73 | 110.18 |
| ... | ... | ... | ... |

Table 4.5 also shows the pitch in fundamental frequency (F0) for 16 syllables from 6,147 syllables in NEUTRAL_DATA and STORY_DATA. The extracted pitch for neutral speech and storytelling speech is 118.93Hz and 107.23Hz, respectively. The entire nine storytellers used the same pitch extraction methods. The extraction of syllable's pitch for all storytellers are available in Appendix L. The average pitch is presented and discussed later in Section 4.3.5.

## 4.3 General Prosody Analysis

In this section, the prosodic features analysis is performed on the neutral speech and storytelling speech. For this purpose, 6,147 neutral syllables and 6,147 storytelling syllables from nine storytellers are considered. Neutral speech and storytelling speech was compared to storytelling in general with respect to the average tempo, average pause (phrase and sentence), average syllable duration, average syllable intensity and average syllable pitch. The purpose of the general analysis is to determine the difference of the speech prosody between nine storytellers. The abbreviation of the entire storyteller frequently used in this section is shown in Table 4.6.

Table 4.6
Abbreviation of storytellers

| No. | Storytellers | Type of storytellers | Abbreviation |
|---|---|---|---|
| 1. | Male storyteller 1 | Male speaker | MSt1 |
| 2. | Male storyteller 2 | Male speaker | MSt2 |
| 3. | Male storyteller 3 | Male professional speaker | MSt3 |
| 4. | Female storyteller 1 | Female professional speaker | FSt1 |
| 5. | Female storyteller 2 | Female speaker | FSt2 |
| 6. | Female storyteller 3 | Female storyteller | FSt3 |
| 7. | Female storyteller 4 | Female speaker | FSt4 |
| 8. | Female storyteller 5 | Female storyteller | FSt5 |
| 9. | Female storyteller 6 | Female storyteller | FSt6 |

### 4.3.1 Analysis of Tempo

The average tempo of neutral speech and storytelling speech for all the storytellers is shown in Figure 4.2. The analysis of tempo is important to know the difference between neutral and storytelling tempo for development of storytelling speech synthesis.

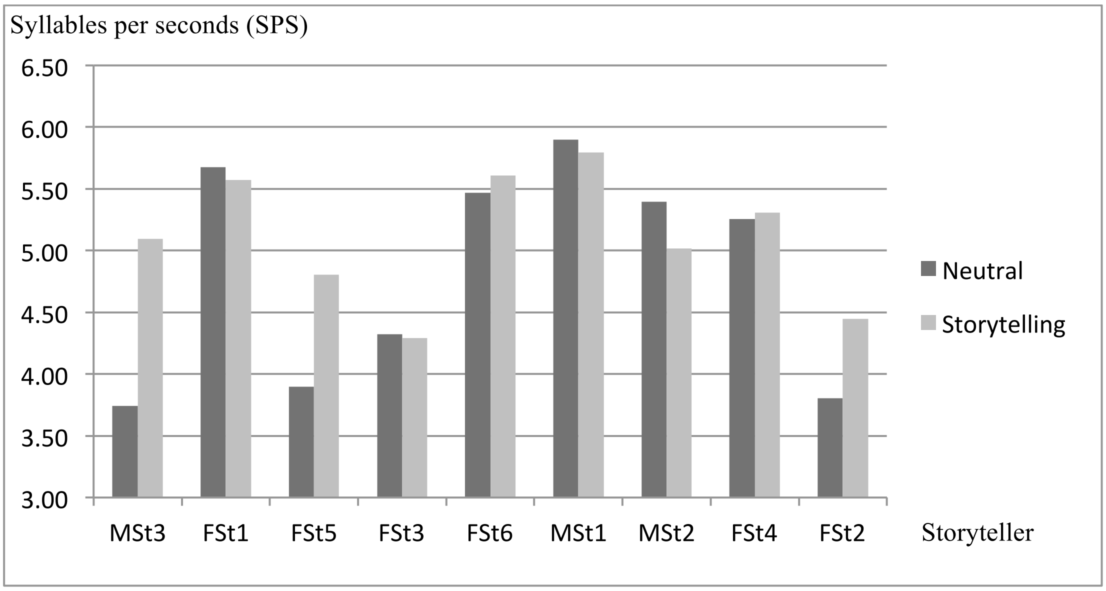



Figure 4.2 Average tempo based on storyteller

Previous research showed that the tempo of storytelling is slower than neutral speech (Theune et al., 2006). However, in this research, the tempo analysis shows that five storytelling speech tempos are faster than neutral speech. This phenomenon occurs because, during the recording of the neutral speech, the storyteller put his attention on each word pronunciations in an utterance which is time-consuming. The storytellers are instructed to deliver in clear and correct pronunciation to get good quality of the speech. However, it leads to slower tempo for the neutral speech. The similar phenomenon also occurred in other research (Verma et al., 2015). The average of nine storyteller's tempo of the neutral speech is 4.83, which are slower than storytelling at 5.10 SPS.

The analysis based on nine storytellers showed that the male storyteller 3 (MSt3) and the female storyteller 5 (FSt5) have significance difference in tempo for neutral and storytelling speech by 1.36 SPS and 0.91 SPS as in Figure 4.2, respectively. Meanwhile, the difference of tempo for other storytellers only differs in the range of 0.05 to 0.64 SPS only. It shows that the male storyteller 3 (MSt3) and the female storyteller 5 (FSt5) are able to manipulate their tempo based on the speaking style. The result shows that the difference in tempo between neutral and storytelling speech are crucial for development of storytelling speech synthesis from the neutral speech. The storytelling speech is also analyzed based on stories (story 1, story 2, and story 3) for each speaker and storyteller as in Figure 4.3.

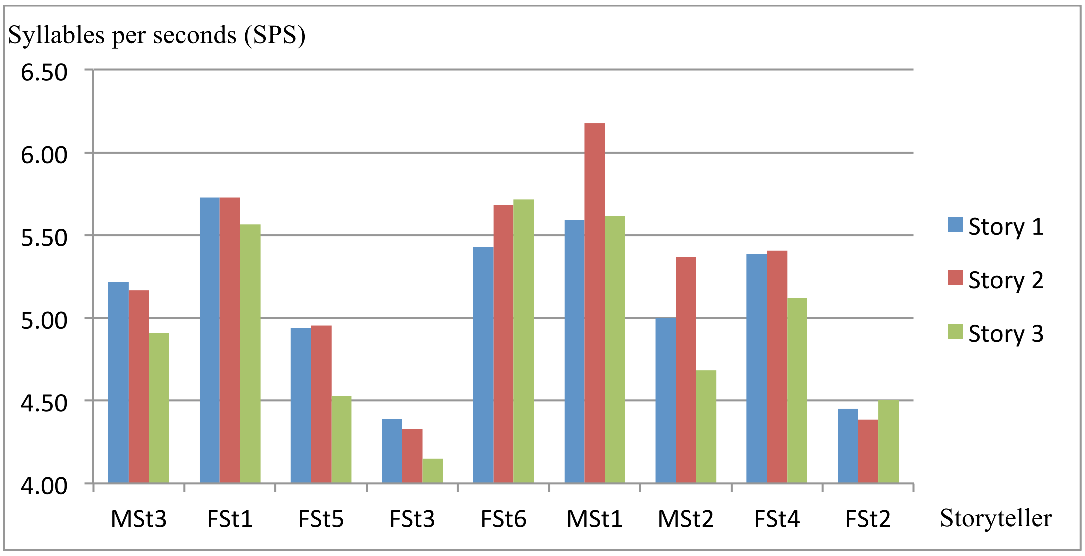



Figure 4.3 Average tempo based on stories

The analysis results showed that the average tempos for nine storytellers based on stories (story 1, story 2, and story 3) are 5.13, 5.24 and 4.98 SPS. The difference of tempo between stories is less than 0.26 SPS for every of the storyteller. It shows that the storytellers are able to maintain their tempo for every story without influence by the story script as one of the necessities in this research. The significance of maintaining the tempo speed is to show the consistency of the storyteller performing the storytelling speech without influenced by the storyline.

### 4.3.2 Analysis of Pause

The pause feature is analyzed at the phrase and sentence level in second (s). Figure 4.4 and Figure 4.5 shows the average pause at the phrase and sentence level for all the storytellers.

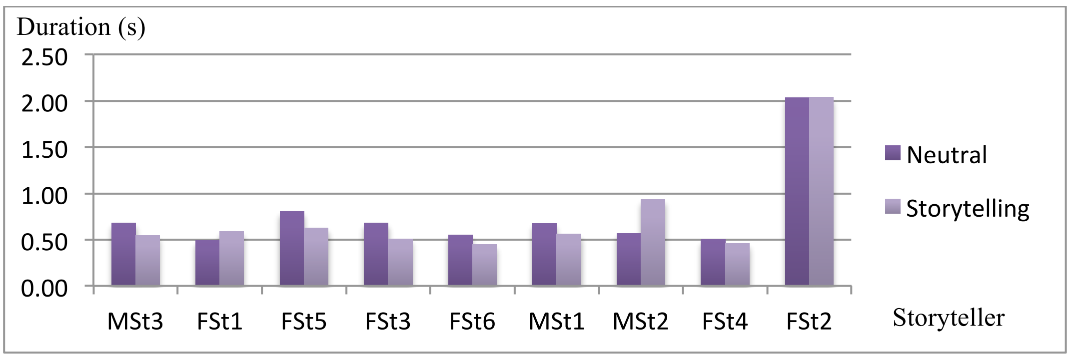



Figure 4.4 Average pause at sentence level

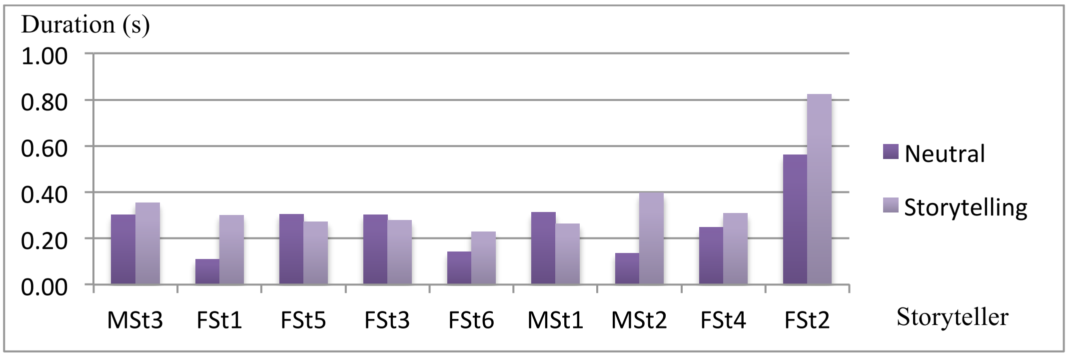



Figure 4.5 Average pause at phrase level

The observations on average pause at sentence level (in Figure 4.4) and phrase level (in Figure 4.5) showed that average pause at sentence level is longer than at phrase level for both neutral and the storytelling speech. In other words, the pause at the end of a sentence is longer than pause at the end of a phrase regardless of neutral or storytelling speech.

In sentence level, the average pause of all storytellers showed that neutral speech has a longer pause at 0.78 s compared to storytelling at 0.75 s. It shows that in neutral speech, a storyteller takes a longer time before starting a new sentence. However, there are some storytellers such as FSt1 and MSt2 have a longer pause for storytelling compared to neutral speech as the same reported by Verma et al., (2015).

At phrase level, a pause of storytelling speech at 0.36 seconds is longer than pause of neutral speech at 0.27 seconds. It indicated that, at phrase level, storytelling speech pause much longer before continuing to the next phrase. Based on Figure 4.4 and Figure 4.5, female storyteller 2 (FSt2) has longer pause compared to other storytellers for neutral and storytelling speech in phrase and sentence level. This may be caused by her natural style of taking longer time of pausing between sentences.

### 4.3.3 Analysis of Duration

The average syllable' duration for the nine storytellers is shown in Figure 4.6. The syllable duration also contributes to determine the tempo of the overall speech.

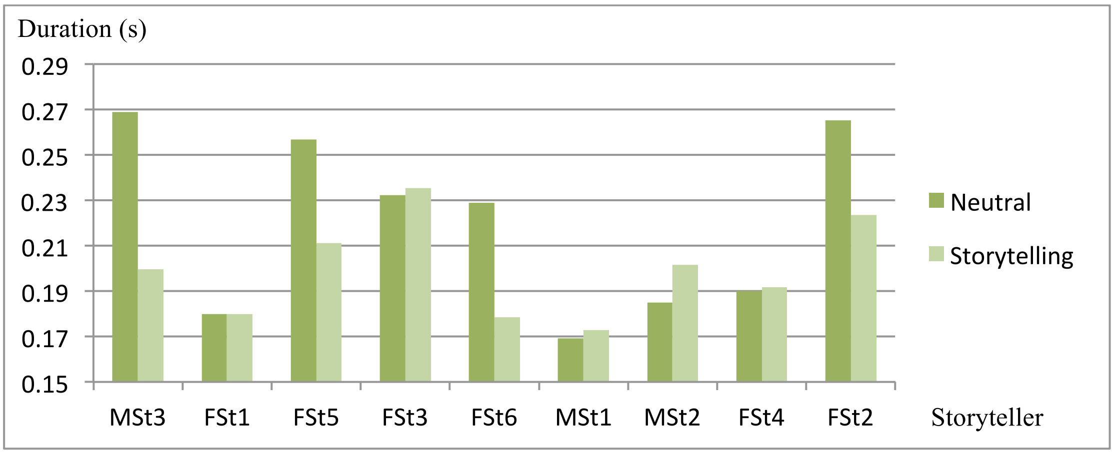



Figure 4.6 Average duration syllable in second (s)

Based on Figure 4.6, all the nine average syllables duration are presented. Four storytellers have average syllable duration of neutral speech higher than storytelling speech. It indicates that the neutral speech is spoken slower than storytelling speech. However, the other five storytellers do not show significance difference between neutral and storytelling.

### 4.3.4 Analysis of Intensity

The intensity of the prosody is a measure of loudness in the utterance (Bulut & Narayanan, 2008). It is calculated in unit decibels (dB). The analysis of the average intensity of neutral and storytelling speech for entire storytellers is shown in Table 4.7.

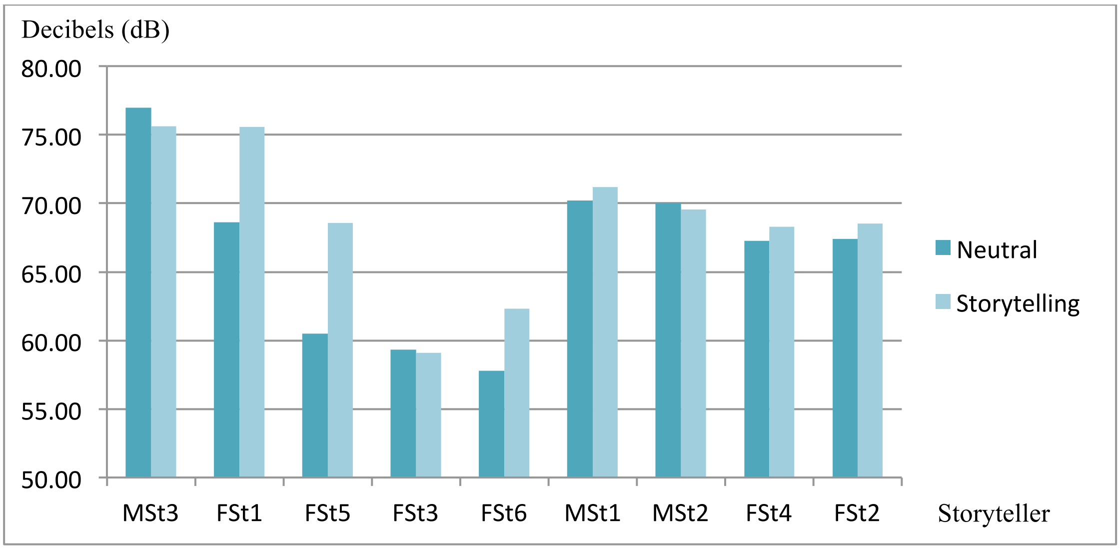



Figure 4.7 Average intensity in Decibels (dB)

Observation on Figure 4.7 showed that six storytellers have higher intensity or speech energy compared to neutral speech. It means that these storytellers speak louder when delivering a story as compared to his/her normal reading style. The analysis of intensity based on gender signifies that a male speaks louder than female storyteller for both neutral and storytelling speech.

### 4.3.5 Analysis of Pitch

The analysis of the average pitch between neutral and storytelling speech for nine storytellers are shown in Figure 4.8. In general, the analysis showed that the average pitch for storytelling speeches is higher compared to neutral speech.

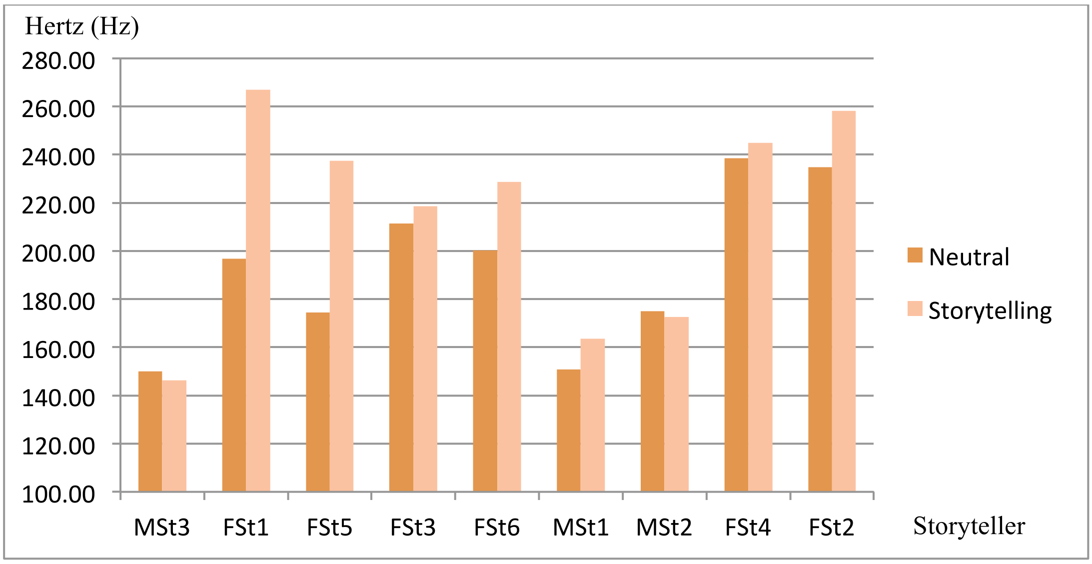



Figure 4.8 Average pitch in Hertz (Hz)

The result showed that seven storytellers have a higher average pitch in storytelling speech compared to their neutral speech. It indicates that storytellers increase their pitch in storytelling speaking style. The analysis based on gender showed that female storytellers has higher frequency than male storytellers.

The pitch contour of an utterance for the neutral and storyteller speech is shown in Figure 4.9a and Figure 4.9b, respectively. The observation shows that the storytellers used much more variations in pitch contour (shown in circle) compared to the neutral speech. As an example, in the first arrow at the duration 3.76 seconds, the neutral pitch point is 320.13 Hz and the storytelling pitch point is 393.87 Hz.

However, at the time 5.69 seconds as shown with the second arrow, the neutral pitch point is 310.59 Hz and the storytelling pitch point is 300.61. It shows that the storytelling pitch point drastically bend downwards for 93.26 Hz compared to neutral pitch point is only 9.54 Hz.

Based on pitch analysis, it is observed that the pitch of storytelling speaking style is always higher compared to neutral speaking style. This fact is important in constructing the storytelling speech synthesis. Variation of pitch contour in storytelling speaking style is also another important element in synthesizing neutral speech into storytelling speeches. The various intonation produced during storytelling need to be captured to produce quality of synthesized speech.

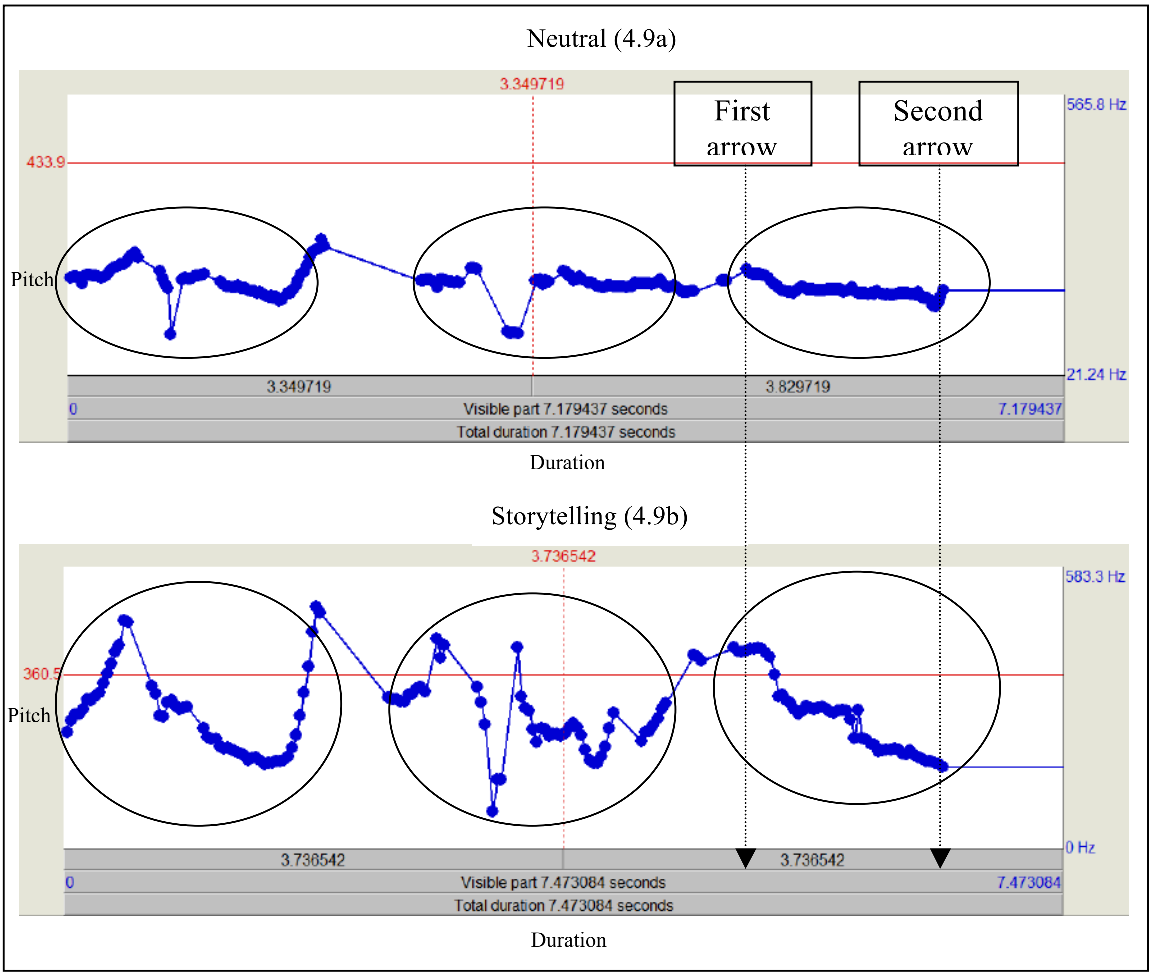



Figure 4.9 Pitch contour of an utterance for neutral and storytelling speech

### 4.3.6 Discussion of General Prosody Analysis

The conclusion for the general prosody analysis based on nine storytellers is shown in Table 4.7. Discussion of general prosody analysis for both genders is done separately as the different model of storytelling speech synthesize are constructed for male and female. Analysis of the five features for female storytellers showed that in general the tempo, duration, pitch and intensity increases in storytelling speaking style compared to neutral speaking style. It mean that in storytelling speaking style, the female storyteller tend to speak faster, louder, high pitch with shorter pause compared to neutral speech.

As for males, all five prosody features are increased in terms of tempo rate, pause length, duration of storytelling, pitch frequency and intensity volume. It is interesting to note that while females paused less in storytelling speaking style, while males paused longer during storytelling speech compared to neutral speeches. For both genders, pitch contour variation increased during storytelling because different intonations are used to narrate the stories in many expressions and moods. Besides that, the female has a higher pitch than male but speaks slower than female for both neutral and storytelling speech.

Table 4.7
Conclusion for general prosody analysis

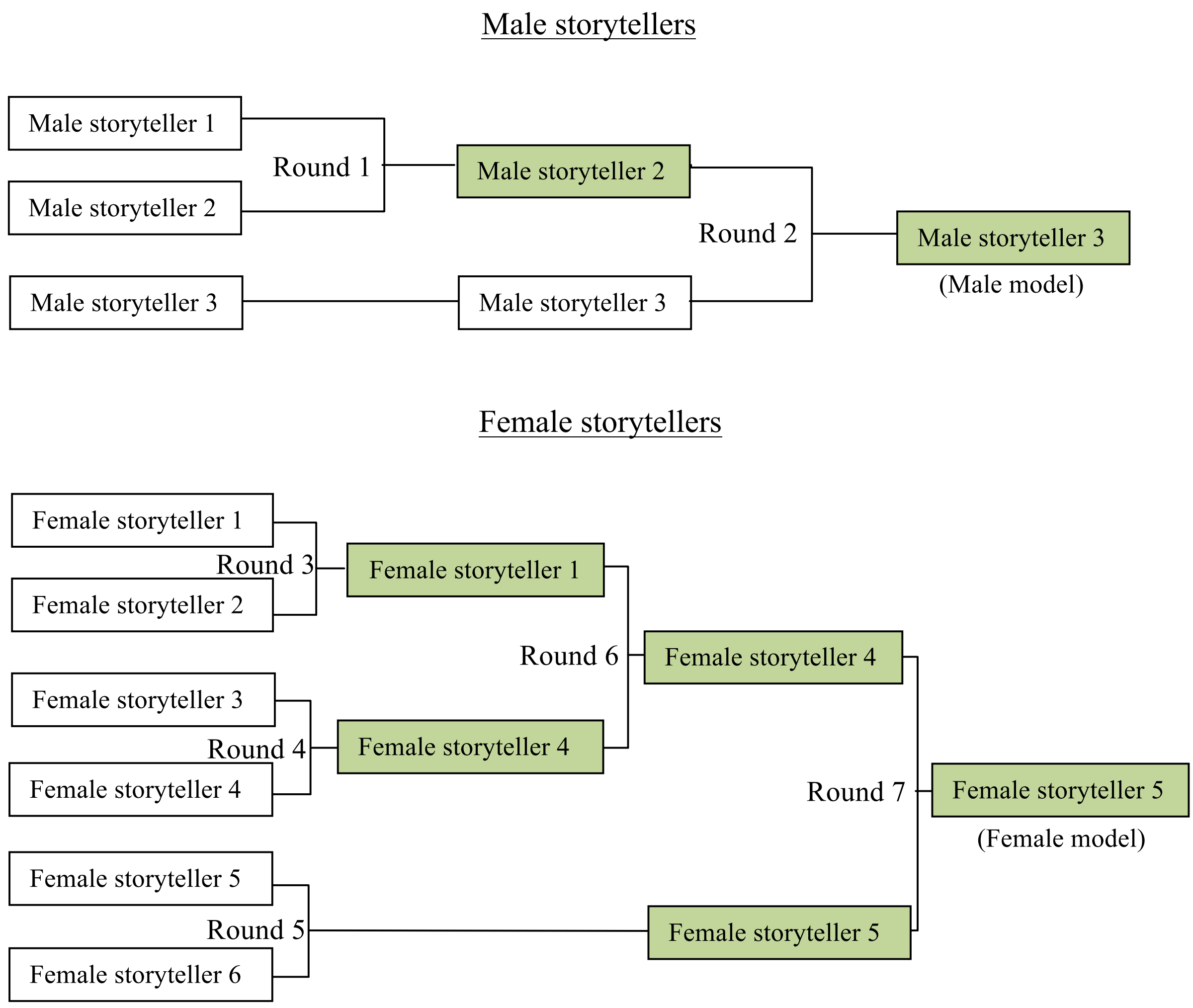
| Prosody features | Neutral speech | | Storytelling speech | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| Tempo | Slower | Slower | Faster | Faster |
| Pause | Shorter | Longer | Longer | Shorter |
| Duration | Slower | Slower | Faster | Faster |
| Pitch | Low | Low | High | High |
| Pitch contour | Less variation | Less variation | High variation | High variation |
| Intensity | Low | Low | High | High |

## 4.4 Selection of Storyteller

General prosody analysis showed that the each storyteller showed different styles of delivering storytelling. Out of the nine storytellers, the better of one male and one female storyteller are chosen as the model for storytelling speech synthesis. Since the analysis of pitch range and intensity discussed earlier showed that a vast difference exist between genders, a separate speech synthesis model of male and female is proposed. Since the synthesized stories are targeted for children, it is only natural that the selection of storytellers is done by children.

Thus, a simple listening survey was conducted among five years old to select the most favourable storyteller as models of the synthesized storytelling. The selection session is done at the kinder garden named *Integrasi Prasekolah Islam* (RESTU KIDS). A total of 18 children (8 males and 10 females) and two teachers are involved in the survey. The teachers are briefed on the purpose of the survey and specific instructions on how to conduct the survey is described to the teachers. The actual survey session is conducted by the teachers and monitored by the researcher.

The process for selecting a male and a female storyteller is illustrated in Figure 4.10. In scheduling the survey rounds, an elimination technique called single-elimination or sudden death is taken where the loser of each match-up is immediately eliminated from the selection (Christopher, 1991). Since the survey subjects are children, the researcher tried to keep the survey process as short as possible. There are only three male storytellers, two rounds of survey are needed for the selection. In the first round, the recorded storytelling speeches of male storyteller 1 is compared against male storyteller 2. Story 1 titled si *angsa yang bertelur emas* is played to the children in the first round and they vote their preferences of the storyteller. Meanwhile, the second round again presented the same story of storytelling speeches of the winner of Round 1 that is Male storyteller 2 against male storyteller 3. The votes are counted and male storyteller 3 (MSt3) is selected as the model of storytelling speech synthesis for male.




| Storyteller | Type of storyteller |
|---|---|
| Male storyteller 1 | Male speaker (MSt1) |
| Male storyteller 2 | Male speaker (MSt2) |
| Male storyteller 3 | Male professional speaker (MSt3) |
| Female storyteller 1 | Female professional speaker (FSt1) |
| Female storyteller 2 | Female speaker (FSt2) |
| Female storyteller 3 | Female storyteller (FSt3) |
| Female storyteller 4 | Female speaker (FSt4) |
| Female storyteller 5 | Female storyteller (FSt5) |
| Female storyteller 6 | Female storyteller (FSt6) |

| Round | Story |
|---|---|
| Round 1 | Story 1 |
| Round 2 | Story 1 |
| Round 3 | Story 2 |
| Round 4 | Story 2 |
| Round 5 | Story 2 |
| Round 6 | Story 3 |
| Round 7 | Story 3 |

Figure 4.10 Survey for selection best male and female storyteller

There are six female storytellers, thus four rounds are needed to do the selection for female storyteller. In Round 3, the recorded storytelling of female storytelling 1 and 2 are playback to the children. Meanwhile, Round 4 compared storytelling of female storytelling 3 and 4 and Round 5 presented storytelling of female storyteller 5 and 6. In these three rounds, another story that is "*Anjing dengan bayang-bayang*" is presented to the children. A different story is playback to the children to avoid them from getting bored having to listen to the same story in all rounds. As can be seen from Figure 4.10, female storyteller 1 get most votes for Round 3. In Round 4 and 5, female storyteller 4 and female storyteller 5 won the round, respectively. The same procedure is repeated for Round 6 and 7, whereby the winners of the previous round who are female Storyteller 1, 4 and 5 are placed into another round of survey with the third story entitled "*Semut dan merpati*". In Round 6, female storyteller 4 gets most votes against female storyteller 1. Finally, female storyteller 4 is put up against female storyteller 5 in Round 7. The children selected the female storyteller 5 (FSt5) as the model for storytelling synthesized speech for female. The listening survey took two hours for completion.

### 4.5 Prominent Syllable Detection

Prominent syllable is a syllable that has an extra-long duration, a higher pitch mean and rising pitch movement from their local environment (Roekhaut et al., 2010). The syllables that are not classified as prominent are categorized as non-prominent syllables. In storytelling, prominent syllables are used to describe narrative expressions in the story (Verma et al., 2015). Therefore, the detection of prominent syllables is important to construct storytelling synthesized speech. Once the male and female storytellers are selected, the prominent syllables of both storytellers are detected using two common prominent syllable detection methods, that are auditory and automatic detection (Martin, 2010). Prominent syllables detected by auditory and automatic detections are the ground truth. This is because the prominent syllables detected by both detection is acceptable. The groud truth is listed in Appendix K.

#### 4.5.1 Auditory Detection

The detection of prominent syllable based on auditory detection requires an expert in phoneticians or linguistic to identify the prominent syllables in the corpus.

Based on Goldman et al. (2007), the expert annotator needs to listen to a small portion of speech (3.5-second duration) and determines the prominent syllable. Each speech segment can be replayed three times at most and the syllables perceived as prominent are labeled with ‘P’. This syllable prominent detection relies on the auditory perception of salience, and not the visual analysis and mathematical calculation on duration, intensity, and pitch.

Even though auditory detection of prominent syllables is rather straight forward, some problems that occured during recording sessions may effect the read aloud speech corpus (Goldman et al., 2007). Some distractions in the speech corpus such as filled pause, hesitation and false start may exist in the speech corpus. As an example, a very long syllable produced due to hesitation will distract the detection process by the annotator. Thus, during recording, multiple attempts should be allowed to produce near-perfect recorded speeches.

In this research, a linguistic lecturer from *Pusat Pengajian Bahasa, UiTM Shah Alam* is hired to annotate the prominent syllables in the stories. An example of auditory detection done by annotator for story entitled “*si angsa yang bertelur emas*” is depicted in Figure 4.11. The complete prominent syllable detection for all stories is in Appendix F.

**Si angsa yang bertelur emas (Story 1)**

1. Suatu masa dahu**lu**, tinggal seorang peta**ni** yang memeliha**ra** seekor ang**sa**.
2. Pada suatu ha**ri**, ketika itu dia ingin mengambil telur angsa**nya**.
3. Si peta**ni** mendapati telur itu kelihatan a**neh**.
4. Warnanya kuning keema**san** dan **be**rat!
5. Dia menyang**ka** jirannya cuba bergu**rau** lalu bercadang untuk membu**ang** telur itu.
6. Namun selepas berfi**kir**, dia memba**wa** telur i**tu** pulang ke rumah untuk diperik**sa**.
7. Si petani berasa terke**jut** apabila mendapati i**tu** adalah telur e**mas**!
8. Si petani **sung**guh gembi**ra**.
9. Hari demi hari selepas itu, si angsa **te**rus bertelur e**mas**.
10. Si petani mula menjadi ta**mak**.
11. Si petani mengambil pisau dan menyembe**lih** angsa bertuah**nya**.
12. Apabila mendapa**ti** tiada sebiji pun telur e**mas** di dalam perut angsa i**tu**, si petani mula menyedari kesilapannya dan berasa **sa**ngat menye**sal**.

Figure 4.11 Prominent syllables detection by auditory detection

### 4.5.2 Automatic Detection

Automatic detection of prominent syllables is based on some typical acoustic parameters of prosody (pitch, intensity, and duration) (Roekhaut et al., 2010). In this research, Prosogram tool[1] (Mertens, 2004) is used for automatic detection. It contains two successive steps. The first step is nuclei segmentation and pitch stylisation. In nuclei segmentation, the vocalic nucleus within each syllable is detected as voiced segment which has sufficient intensity (threshold relative to local peak). Then, the pitch is stylized for each nucleus in one or more segments. The stylized pitch can be stylized as a flat contour or a melodic slope.

The second step is the computation of the acoustic parameters for prominence detection. Two basic acoustic-prosodic parameters are computed for each nucleus that is nuclei duration (in millisecond) and a maximum pitch of the nuclei (in semitones). These parameters are computed relatively to the adjacent syllables that is preceding two and the following syllable to obtain the local rate and local pitch.

The detection of syllable prominence can be done automatically by comparing prosody to their local rate or by visual inspection of stylized pitch contour (Martin, 2010). The results of automatic detection for an utterance can be seen Figure 4.12.

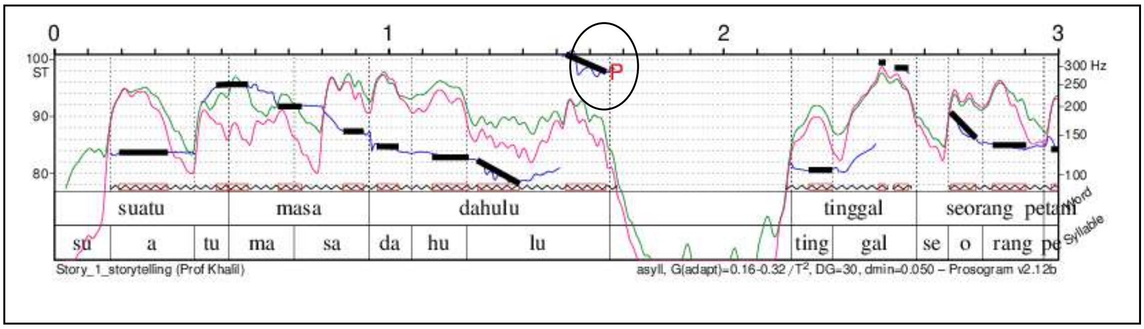



Figure 4.12 Prominence syllable detection using automatic detection

Based on the Figure 4.12, the prominent syllable is labeled as "P" (in circle). It means that the syllable /lu/ is prominent. Non-prominent syllables are not labeled. As can be seen, syllable /gal/ has higher pitch, but is not detected as prominent because some of the prominent criteria is not met such as higher intensity and stylized pitch. The completed results of detection using automatic detection for both male and female storytellers are available at Appendix G. In four cases, there is a conflict between auditory and automatic detection. As an example, for word *berfikir*, automatic

[1] https://sites.google.com/site/prosogram/home

detection labeled /*fi*/ as prominent syllable but auditory syllable detected /*kir*/ as a prominent syllable. A prominent syllable that is adjacent to each other is not valid because the term prominent syllable itself is stand out from the local environment (preceding two and the following syllable). If /*kir*/ is prominent, the syllable /*ber*/, /*fi*/, and the following syllable after /*kir*/ must a non-prominent syllable. Therefore, if this case occurs, the auditory detection is accepted as the first choice (Goldman et al., 2007). The results of prominent syllables detection for both methods are shown in Table 4.8.

Table 4.8
Result of prominent syllable detection for both methods

| Storyteller | Automatic detection | Auditory detection | Redundant syllable | Total prominent syllables |
|---|---|---|---|---|
| Male storyteller 3 | 84 | 89 | 62 | 111 |
| Female storyteller 5 | 50 | 105 | 40 | 115 |

Based on the result in Table 4.8, the total prominent syllables detected for male storyteller 3 (MSt3) and female storyteller 5 (FSt5) is 111 and 115 respectively. The calculation of total detected prominent syllables is in Equation (4.2).

$$Total\ prominent\ syllable = (Automatic + \ Auditory\ ) – Redundant \qquad (4.2)$$

where,
*Automatic* = Total prominent syllable detected by automatic detection
*Auditory* = Total prominent syllable detected by auditory detection
*Redundant* = Total redundant prominent syllable detected by automatic and auditory detection

Table 4.8 shows that auditory detection is able to detect more prominent syllable than automatic detection especially for female storyteller 5 (FSt5). Auditory detection managed to detect 105 prominent syllables, while automatic detection only detected 50 prominent syllables. It is because female storyteller 5 (FSt5) speaks slower causing difficulty of automatic detection of prominent syllables compared to male storyteller 3 (MSt3). The redundant detection between automatic and auditory detection showed male storyteller 3 (MSt3) has 62 redundant prominent syllables out of 111 total prominent syllables and female storyteller 5 (FSt5) has 40 redundant prominent syllables out of 115 total prominent syllables.

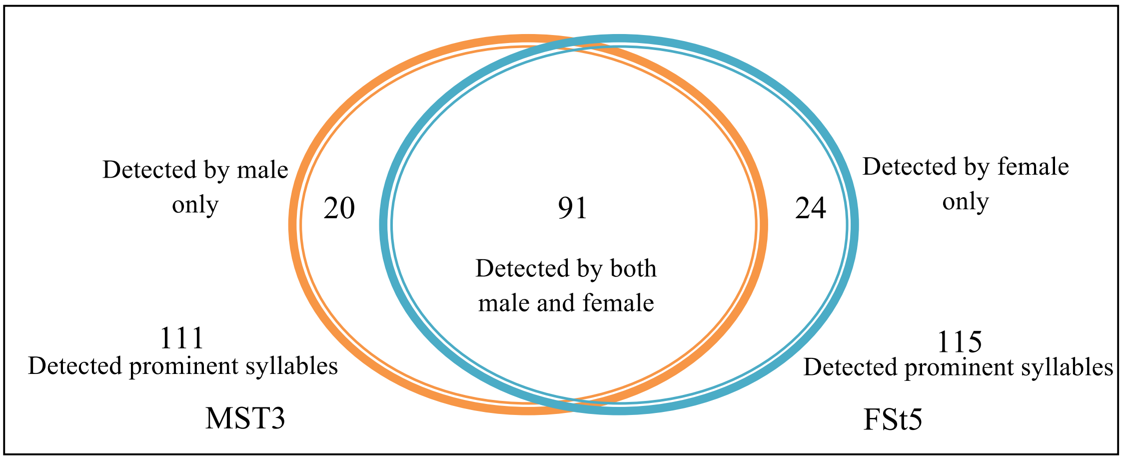


Figure 4.13 Redundant prominent syllable between MSt3 and FSt5

Once compared within both storytellers, it shows that 91 prominent syllables are redundant as shown in Figure 4.13. This implies that 67% of the automated detected prominent syllables are equal between the male storyteller 3 (MSt3) and female storyteller 5 (FSt5). It can be concluded that when the male storyteller 3 (MSt3) stressed a syllable, the female storyteller 5 (FSt5) also stressed the same syllable. Only a few syllables that are 20 for MSt3 and 24 for FSt5 is prominent syllables) differ for both storytellers.

## 4.6 Analysis of Prominent And Non-Prominent Syllables

In this section, the prominent and non-prominent syllables of the selected storytelling speeches are analysed to compute the percentage of change (POC) based on prosody. The prosodies observed for this research are duration, intensity and pitch because these features are relevant to prominent and non-prominent syllables. The percentage of change (POC) is calculated using Equation (4.3) (Doukhan et al., 2011; Roekhaut et al., 2010).

$$POC = \frac{\mu(\alpha) - \mu(\beta)}{\mu(\beta)}\% \qquad (4.3)$$

$POC$ = Percentage of change

$\alpha$ = Prosody of prominent or non-prominent syllables

$\beta$ = Prosody of all syllables in storytelling speech

An example of the POC for prominent and non-prominent syllables of the male storyteller 3 (MSt3) is shown in Table 4.9. An increase in the percentage of change (POC) is notated by the symbol '+', while a decrease in POC uses the symbol '-'. High positive value of POC means the prosody of the synthesized speech is increased significantly from the neutral speech, while low positive value indicates a minimal change. For high negative value, the prosody of the synthesized speech is decreased significantly from the neutral speech, while low negative value indicates a small change. As can be seen, the duration of prominent syllables is increased by 80% during storytelling. The mean duration of all syllables in the storytelling is calculated as 0.2s. Therefore, the POC for duration is computed as follows:

$$\text{POC} = \frac{(0.36 - 0.2)}{0.2}\% = 80\% \tag{4.4}$$

Table 4.9
Prominent and non-prominent syllable analysis for MSt3

| Type of syllable | Duration (s) | POC % | Intensity ( dB ) | POC % | Pitch (Hz) | POC % |
|---|---|---|---|---|---|---|
| Prominent | 0.36 | +80% | 73.71 | -3% | 164.43 | +12% |
| Non-prominent | 0.17 | -15% | 74.51 | -2% | 142.19 | -3% |

The mean prosody of all syllables for MSt3 based on duration is 0.2 s, intensity and pitch is 75.64 dB and 146.39 Hz, respectively. Based on Table 4.9, prominent syllable increased the prosody by 80% and 12% for duration and pitch from their local duration which is 0.2 s and 146.39 Hz. It indicates that prominent syllables have 80% extra longer duration and 12% higher pitch compared to the local syllables. By comparing the duration and pitch of non-prominent syllable, it reduces to 15% for the duration and reduces 3% for pitch. The intensity for prominent syllable is reduced by 3% which is slower than non-prominent syllable which only reduces to 2%.

The analysis is also done on female model as shown in Table 4.10. For female model, the mean prosody of all syllables for the duration, intensity and pitch is 0.21 s, 68.58 dB and 237.33 Hz calculated using Equation (4.3). The prominent syllable for female model is increased by 48% compared to male model for 80%. It indicates that prominent syllable of male model is longer than female model. The pitch and intensity for prominent and non-prominent syllable are reduced in female model. The result shows that only duration is increased for prominent syllable and the other prosodies are decreased. The percentage of change (POC) for female model is different than male model. It shows that in general, the style of delivering storytelling is different based on gender.

Table 4.10
Prominent and non-prominent syllable analysis for FSt5

| Type of syllable | Duration (s) | POC % | Intensity ( dB ) | POC % | Pitch (Hz) | POC % |
|---|---|---|---|---|---|---|
| Prominent | 0.31 | +48% | 68.05 | -1% | 225.18 | -5% |
| Non-prominent | 0.19 | -10% | 68.03 | -1% | 234.18 | -1% |

The analyses of prominent and non-prominent syllables are further studied based on their word's position. If the syllable is located in the first word of a sentence, it is known as initial prominent (Roekhaut et al., 2010). Middle prominent refers to a syllable located at the middle word of a sentence. The full definitions are given in Table 2.5 of Section 2.5.2. The analysis results of prominent and non-prominent syllables based on the word's position for male model are shown in Table 4.11.

Table 4.11
Prominent and non-prominent syllable analysis based on the word's position

| Type of syllable | Duration (s) | POC % | Intensity ( dB ) | POC % | Pitch (Hz) | POC % |
|---|---|---|---|---|---|---|
| Initial prominent | 0.31 | +57% | 76.94 | NC | 182.89 | +25% |
| Middle prominent | 0.38 | +90% | 76.61 | +3% | 177.08 | +21% |
| Last prominent | 0.34 | +70% | 68.75 | -8% | 144.35 | -1% |
| Initial non-prominent | 0.17 | -15% | 72.79 | -3% | 138.86 | -5% |
| Middle non-prominent | 0.17 | -15% | 76.92 | +3% | 143.21 | -2% |
| Last non-prominent | 0.17 | -15% | 73.82 | -1% | 144.49 | -1% |

The results produced for male model are also calculated using the Equation (4.3) but the prominent and non-prominent syllables are separated based on location (initial, middle and last). The value NC (No-change) means the value of prosody remains the same as the mean of all prosody syllables. Based on the result, it shows that there is a variation in terms of percentage of prosody (POC) for each syllable's location. As an example, the duration of initial prominent, middle prominent and last prominent have different percentage of change (POC) with increment of 57%, 90% and 70%, respectively. The initial and middle prominent usually will increase the duration, intensity and pitch. While, last prominent only increase its duration and reduce its intensity and pitch. It is because last prominent occurs at the end of the sentence. The non-prominent syllables have the same percentage of change (POC) for duration but different for intensity and pitch for all the locations. It shows that syllable location also contributes for intonation in storytelling speech.

Table 4.12

Syllable position analysis for FSt5

| Type of syllable | Duration (s) | POC % | Intensity ( dB ) | POC % | Pitch (Hz) | POC % |
|---|---|---|---|---|---|---|
| Initial prominent | 0.28 | +32% | 72.01 | +5% | 234.16 | -1% |
| Middle prominent | 0.29 | +39% | 68.90 | +1% | 235.08 | -1% |
| Last prominent | 0.35 | +66% | 66.31 | -3% | 207.25 | -13% |
| Initial non-prominent | 0.20 | -6% | 67.91 | -1% | 230.97 | -3% |
| Middle non-prominent | 0.19 | -10% | 69.11 | +1% | 243.95 | +3% |
| Last non-prominent | 0.18 | -15% | 67.07 | -2% | 227.61 | -4% |

The result for female storyteller 5 (FSt5) also shows variations of value and percentage of change (POC) as is in Table 4.12. For female model, the observation clearly showed that the last prominent syllable produce highest duration POC duration at 66% as compared to initial and middle position. It shows that the female storyteller 5 (FSt5) produces long syllable duration at the end of the sentence. This female storyteller also shows that last prominent syllable largely reduces its intensity and pitch by 3% and 13%, respectively compared to initial and middle prominent. It means when the prominent syllable located at the last word, storyteller tend to stretch the syllable and lower the pitch and loudness. Other observations of prominent syllables are the POC of intensity for initial prominent syllables produced the highest value at 5% as compared to initial and middle position. It indicates that when prominent syllable exists at the initial of a sentence, the female storyteller will speak louder from the start.

The non-prominent syllable shows different percentage of change (POC) of duration by decreasing 6%, 10% and 15% at initial, middle and last location, respectively. Compared to male model, percentage of change (POC) of duration is decreased by 15% for all locations. However, when compared based on duration of non-prominent syllable for initial, middle and last position, the duration are insignificant for both male and female storyteller. It means that the non-prominent syllables are not lengthened in initial, middle and last position. However, at the last non-prominent syllables, the female storyteller will slower the pitch and loudness similar to the last prominent syllables. Based on the syllable position analysis for both male and female storyteller, the position of syllable determines the duration of the syllable, the loudness or volume of the syllable and it's pitching. It proved that the syllable's position influences the intonation in storytelling speech.

## 4.7 Grammatical Structure Analysis

Previous literature of other languages stated that prominent syllables are pertinent in word categories such as noun, verb, adjectives, and adverbs (Montaño et al., 2013; Theune et al., 2006). Therefore, all the words existing in the three stories used in this research are analyzed to determine the word category containing prominent syllables. Figure 4.14 shows the division of word categories based on the 291 words of the three stories. The analysis of the word categories showed that 31% of the words are noun words, followed by verb at 19% and preposition at 10%. Very few words are categorized as auxiliary, negation, linking, intensifier, and particle. After analyzing the word categories of the stories, further investigation is done on the word categories of all the prominent syllables identified earlier in Section 4.5. The investigation result is summarized in Table 4.13.

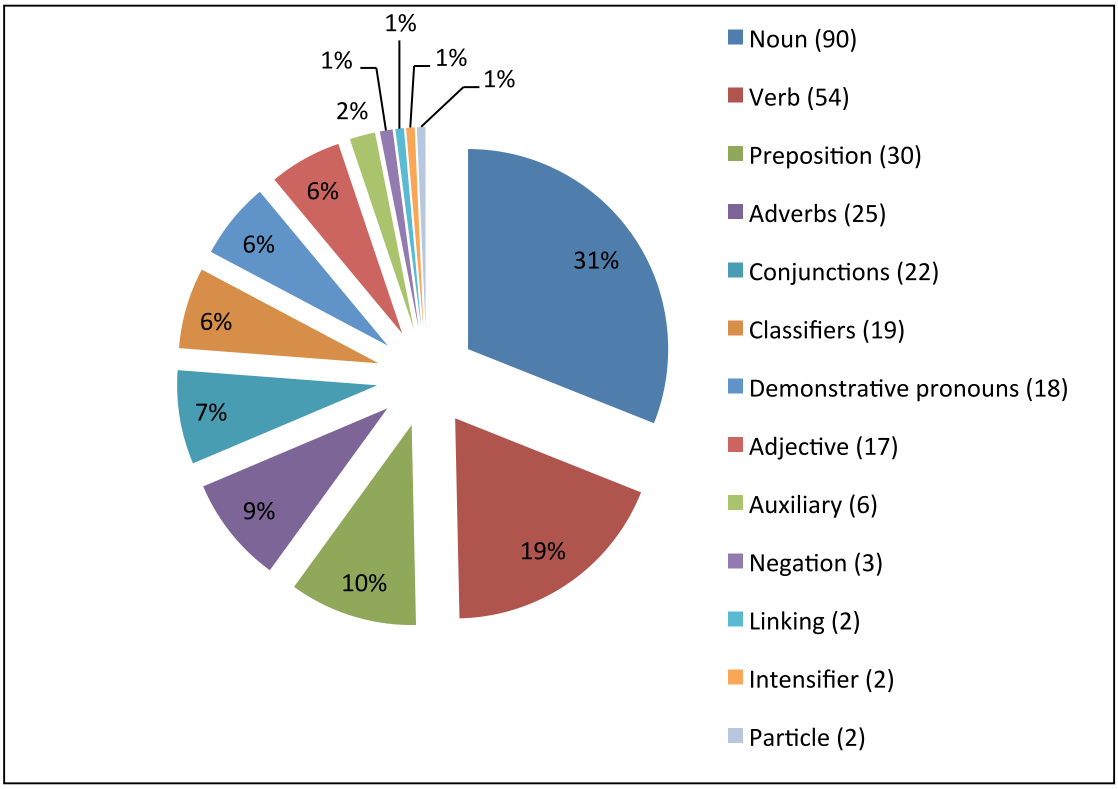



Figure 4.14 Word categories of the three stories

Table 4.13
Prominent syllables based on word categories

| No | Word categories | Total words | Prominent syllables detected in stated word category | |
|---|---|---|---|---|
| | | | MSt3 | FSt5 |
| 1 | Noun | 90 | 33 | 35 |
| 2 | Verb | 55 | 32 | 37 |
| 3 | Preposition | 30 | 2 | 1 |
| 4 | Adverbs | 25 | 6 | 6 |
| 5 | Conjunctions | 22 | 2 | 4 |
| 6 | Classifiers | 19 | 0 | 2 |
| 7 | Demonstrative pronouns | 18 | 14 | 12 |
| 8 | Adjective | 17 | 16 | 14 |
| 9 | Auxiliary | 6 | 3 | 2 |
| 10 | Negation | 3 | 0 | 0 |
| 11 | Linking | 2 | 0 | 0 |
| 12 | Intensifier | 2 | 2 | 2 |
| 13 | Particle | 2 | 1 | 0 |
| | Total | 291 | 111 | 115 |

Table 4.13 shows the prominent syllables located classified by word categories for male model and female model. As can be seen from Table 4.13, prominent syllables for female model occurred mostly in noun and verb categories at 35 and 37 counts, respectively. Considerable amount of prominent syllables also exist in adjective (14 counts) and demonstrative pronouns (12 counts). Prominent syllables also occurred at adverb and conjuncture, while in other word categories, the prominent syllables are very few.

Once the word categories of prominent syllables are determined, the analysis of prominent syllables based on word categories is done and shown in Table 4.14.

Table 4.14
Analysis prominent syllable based on word categories for MSt3

| Type of syllable | Duration | POC | Intensity | POC | Pitch | POC |
|---|---|---|---|---|---|---|
| Initial prominent | (s) | % | ( dB ) | % | (Hz) | % |
| Noun | 0.21 | +8% | 70.86 | -6% | 106.14 | -27% |
| Conjunctions | 0.51 | +153% | 74.41 | -2% | 188.61 | +29% |
| Auxiliary | 0.22 | +11% | 85.53 | +13% | 253.92 | +73% |
| Middle prominent | (s) | % | ( dB ) | % | (Hz) | % |
| Noun | 0.39 | +98% | 75.66 | NC | 163.26 | +12% |
| Verb | 0.38 | +89% | 77.03 | +2% | 177.53 | +21% |
| Preposition | 0.50 | +152% | 79.27 | +5% | 209.88 | +43% |
| Adverbs | 0.33 | +65% | 75.86 | +1% | 170.82 | +17% |
| Demonstrative pronouns | 0.25 | +23% | 73.94 | -2% | 204.56 | +40% |
| Adjective | 0.43 | +118% | 76.17 | +1% | 152.60 | +4% |
| Auxiliary | 0.11 | -43% | 84.92 | +12% | 223.48 | +53% |
| Intensifier | 0.47 | +137% | 79.51 | +5% | 252.07 | +72% |
| Particle | 0.38 | +88% | 71.86 | -5% | 165.96 | +13% |
| Last prominent | (s) | % | ( dB ) | % | (Hz) | % |
| Noun | 0.4 | +100% | 69.66 | -8% | 147.58 | +1% |
| Verb | 0.33 | +64% | 69.42 | -8% | 127.27 | -13% |
| Adverbs | 0.37 | +87% | 76.23 | +1% | 191.56 | +31% |
| Conjunctions | 0.46 | +132% | 75.53 | NC | 208.10 | +42% |
| Demonstrative pronouns | 0.23 | +17% | 63.16 | -17% | 146.87 | NC |
| Adjective | 0.35 | +74% | 68.30 | -10% | 119.45 | -18% |
| Auxiliary | 0.39 | +95% | 73.93 | -2% | 181.53 | +24% |

Based on Table 4.14, only 11 out of 13-word categories have prominent syllables while negation and linking verb categories have none. Thus, negation and linking verb are excluded in the analysis.

Initial prominent showed that only word categories noun, conjuncture and auxiliary has initial prominent syllable. The example of an initial prominent word for the noun is *si* in a sentence "***si** petani mengambil pisau dan menyembelih angsa bertuahnya"*. Example for prominent syllable in conjuncture word is *namun* in sentence "*na**mun**, nasibnya malang apabila kakinya tergelincir dan terjatuh di dalam air terjun yang deras".* The percentage changes are different for these three-word categories based on duration, intensity and pitch.

Most of the prominent syllable are located at the middle word. Preposition showed highest duration changes by 152%. The example of the word is "*pun"* for a sentence "*semut itu **pun** memanjat ke atas daun tersebut dan akhirnya tiba dengan selamat di tebing sungai".* The other word categories also show an increase in duration, intensity (not for auxiliary) and pitch with a different percentage value. The observations based on word category and position also shown a unique phenomenon. As an example, the noun at the initial word is increased by 8% but at the middle is increased by 98%. It shows that, other than word category, position of the word in a sentence also play important roles.

Last prominent syllable also showed different value and percentage change. As an example of last prominent for adjective word is *tersasar* for a sentence "*semut pun lantas menggigit kaki pemburu itu dan tembakannya tersa**sar**"*. The duration for prominent syllable *sar* is increased by 74% and reduced by 10% and 18% for intensity and pitch respectively. The overall analyzed result showed other than position, word categories also produced unique prosodic features. The result for female storyteller 5 (FSt5) is shown in Table 4.15.

Table 4.15
Analysis prominent syllable based on word categories for FSt5

| Type of syllable | Duration | POC | Intensity | POC | Pitch | POC |
|---|---|---|---|---|---|---|
| Initial prominent | (s) | % | ( dB ) | % | (Hz) | % |
| Noun | 0.29 | +39% | 70.82 | +3% | 229.50 | -3% |
| Verb | 0.13 | -37% | 72.50 | +6% | 258.29 | +9% |
| Conjunctions | 0.39 | +85% | 73.92 | +8% | 219.33 | -8% |
| Middle prominent | (s) | % | ( dB ) | % | (Hz) | % |
| Noun | 0.29 | +36% | 68.04 | -1% | 204.39 | -14% |
| Verb | 0.28 | +35% | 69.65 | +2% | 245.70 | +4% |
| Preposition | 0.23 | +8% | 73.63 | +7% | 196.28 | -17% |
| Adverbs | 0.24 | +14% | 72.32 | +6% | 257. | +8% |
| Conjunctions | 0.64 | +202% | 70.20 | +2% | 196.06 | -17% |
| Demonstrative pronouns | 0.26 | +21% | 68.15 | -1% | 241.30 | +2% |
| Adjective | 0.45 | +115% | 69.40 | +1% | 233.26 | -2% |
| Auxiliary | 0.24 | +12% | 65.90 | -4% | 393.08 | +66% |
| Intensifier | 0.35 | +52% | 68.31 | NC | 260.33 | +10% |
| Last prominent | (s) | % | ( dB ) | % | (Hz) | % |
| Noun | 0.35 | +65% | 67.20 | -2% | 183.42 | -23% |
| Verb | 0.43 | +105% | 67.14 | -2% | 263.13 | +11% |
| Adverbs | 0.48 | +128% | 69.34 | +1% | 240.31 | +1% |
| Conjunctions | 0.5 | +139% | 72.31 | +5% | 216.19 | -9% |
| Demonstrative pronouns | 0.32 | +51% | 60.28 | -12% | 199.27 | -16% |
| Adjective | 0.26 | +25% | 66.49 | -3% | 180.80 | -24% |
| Auxiliary | 0.31 | +47% | 67.58 | -2% | 302.19 | +27% |

The analysis for female storyteller 5 (FSt5) also showed unique intonation at initial, middle and final and word categories similar to male storyteller 3 (MSt3). The difference between the male storyteller 3 (MSt3) and female storyteller 5 (FSt5) is the value of the prominents. As an example, duration of initial prominent for conjuncture in male storyteller 3 (MSt3) is 0.51 s but in female storyteller 5 (FSt5) is 0.39 s. It proved Hirschberg (2000)'s statement that every person (e.g. storyteller) has different style in delivering a speech. The result of the percentage of change (POC) will be converted to modification factor later in the Chapter 5.

## 4.8 Pitch Contour Analysis

Other than duration, intensity and pitch, pitch contour also contributes to the varying intonation of storytelling speaking style (Verma et al., 2015; Sarkar et al., 2014). The purpose of this analysis is to determine the pitch contour of prominent syllable existing in storytelling speech. Pitch contour of prominent syllable can be clustered into six clusters of pitch contour (Klabbers & Santen, 2004) as shown in Table 4.16. The y-axis is pitch (Hz) and the x-axis is the normalized time set to 100 data points. All pitch contours showed variations in terms of up-down movement, the location of pitch peaks (middle or last), and shape of the pitch contour.

Clustering of the pitch contours for prominent syllable is done using one minus the Pearson product moment correlation (Klabbers & Santen, 2004) as in Equation (4.5).

$$D = 1 - cor\left(F_{0i}, F_{0j}\right)$$

$$= 1 - \left(\frac{1}{n-1}\sum\left(\frac{F_{0i} - \overline{F}_{0i}}{sdF_{0i}}\right)\left(\frac{F_{0j} - \overline{F}_{0j}}{sdF_{0j}}\right)\right) \tag{4.5}$$

where,

$D$ Distance value

$F_{0i}$ Pitch contour cluster

$\overline{F}_{0i}$ Mean of pitch contour cluster

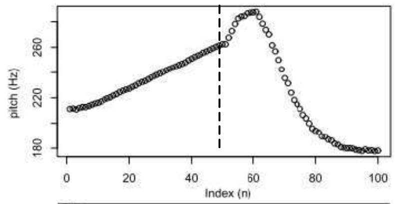
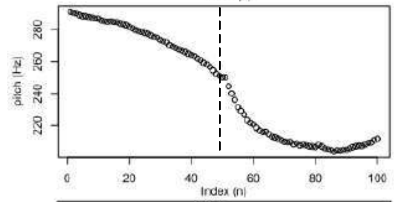
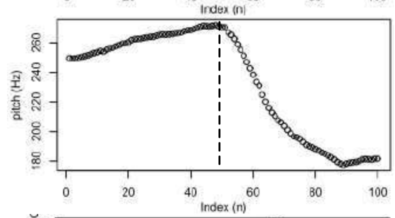
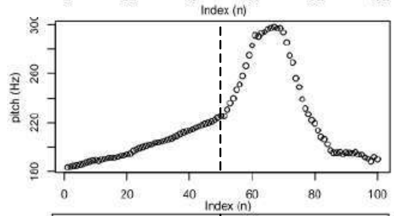
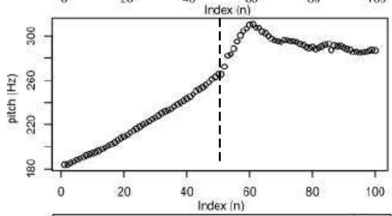
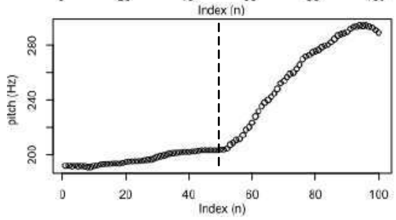
$F_{0j}$ Pitch contour of prominent syllable

$\overline{F}_{0j}$ Mean of pitch contour prominent syllable

$n$ Length of pitch contour

In the first stage, the six clusters of pitch contour that represent most of the speech data are developed as a benchmark as shown in Table 4.16 (Klabbers & Santen, 2004). The six clusters of pitch contours are developed by normalizes the pitch contour's duration to 100 points. Then, the effects of pitch range and height are removed by subtracting the mean of that contour and dividing by the standard deviation. In the end, this set of six pitch contour clusters are computed.

Table 4.16
Pitch contour clustering

| Cluster | Pitch contour benchmark | MSt3 | FSt5 |
|---|---|---|---|
| | | Number of pitch contour | Number of pitch contour |
| Cluster 1 |  | 10 | 4 |
| Cluster 2 |  | 34 | 31 |
| Cluster 3 |  | 14 | 12 |
| Cluster 4 |  | 7 | 12 |
| Cluster 5 |  | 8 | 16 |
| Cluster 6 |  | 8 | 13 |
| Others | - | 30 | 27 |
| Total number of pitch contour | | 111 | 115 |

All pitch contours of the prominent syllables are compared to the six clusters using one minus the Pearson product moment correlation. They are then clustered based on its distance value. The description of the distance value used for clustering is shown in Table 4.17.

Table 4.17
Description of distance value for clustering (Keith, 2005)

| Distance value (*D)* | Description |
|---|---|
| 1.0 – 0.9 | Very highly correlated |
| 0.9 – 0.7 | Considered highly correlated |
| 0.7 – 0.5 | Considered moderately correlated |
| 0.5 – 0.3 | Low correlation |
| 0.3 – 0.0 | Little or no correlation |

The distance value from 0.7 to 1.0 indicate that the pitch contour is highly correlated to a pitch contour. Therefore, for this thesis, the distance value of 0.8 is used as a threshold value to determine which cluster the pitch contour of the prominent syllable because distance value of the range 0.7 to 1.0 is acceptable (Keith, 2005). A prominent syllable is assigned to a cluster if the distance between the prominent syllable's pitch contour is more than 0.8.

Cluster 1 contains 9% of the pitch contours (10 out of a total 111 pitch contours) for male storyteller 3 (MSt3) and 3% (4 out of total 115 pitch contours) which is the lowest for female storyteller 5 (FSt5). The contours represented in this cluster exhibit the default up-down movement. It starts at a lower pitch and increasing steadily until it reaches the middle of the contour and falling rather quickly to the end. In our dataset, Cluster 1 frequently occurs in the middle of a sentence at 70% (7 contours out of 10) for male storyteller 3 (MSt3) and 100% (4 contours out of 4) for female storyteller 5 (FSt5).

Cluster 2 is the largest cluster for both storytellers, containing 31% of the pitch contours (34 contours out of 111) for male storyteller 3 (MSt3) and 27% of the pitch contours (31 contours out of 115) female storyteller 5 (FSt5). They exhibit a gradual descent from the peak to the bottom. However, the last contour shows a slight increase of the contour. Cluster 2 exists more in the middle (62%) compared to the last position

(38%) for male storyteller 3 (MSt3) and 55% in the middle position and 45% at the last position for female storyteller 5 (FSt5).

Cluster 3 contains 13% of the pitch contours (14 out of a total 111 pitch contours) for male storyteller 3 (MSt3) and 10% (12 out of total 115 pitch contours) for female storyteller 5 (FSt5). It starts at a higher pitch with a comparison to Cluster 1. The growing accent curve can be observed until the end of the plateau and reduce until the end. This type of contour is observed in middle position in 79% for male storyteller 3 (MSt3) and 67% for female storyteller 5 (FSt5).

Cluster 4 is lowest in male storyteller 3 (MSt3) with 6% of the pitch contours (7 out of a total 111 pitch contours) and contains 10% (12 out of total 115 pitch contours) for female storyteller 5 (FSt5). The pitch contours in this cluster are similar to those in Cluster 1. The difference is that the peak occurs later and is higher than the pitch contour of Cluster 1. The peak location is late at the pitch contour. This cluster occurred more at the middle position at 71% (5 out of 7) for male storyteller 3 (MSt3) and 67% (8 out of 12) for female storyteller 5 (FSt5).

In this research, pitch contour of Cluster 5 comprises 7% of all pitch contours (8 out of 111) the third highest for male storyteller 3 (MSt3) and only 14% (16 out of total 115 pitch contours) for female storyteller 5 (FSt5). It displays a gradual incline until the middle of contour and followed by a plateau until the end. This contour exhibits the continuation rise and mostly followed by contours from Cluster 2. This type of contour is observed in middle position in 75% (12 out of 16) for female storyteller 5 (FSt5).

Cluster 6 contains a generally rising pitch. It contains 7% of the pitch contours (8 out of a total 111 pitch contours) for male storyteller 3 (MSt3) but 11% (13 out of total 115 pitch contours) for female storyteller 5 (FSt5). It can occur at initial, middle and last word position.

A total of 30 pitch contours of the male storyteller 3 (MSt3) and 27 pitch contours of the female storyteller 5 (FSt5) are unassigned to any of the six clusters. These pitch contours are assumed as trivial as they are not representative of the main six clusters of storytelling speech data (Klabbers & Santen, 2004). Even though further investigation can be a contribution, this is not within the scope of this research.

Analysis of the pitch contour of the prominent syllables are important in storytelling speech synthesis as they represent the intonation of the natural storytelling speech. When the prominent syllables are assigned to the cluster, the pitch contours are used to synthesize the prominent syllables using the correct intonation of the natural storytelling.

## 4.9 SUMMARY

This chapter presented the general prosody analysis for all storytellers. The observations showed that most storytelling speech has faster tempo, increased intensity and increased pitch as compared to neutral speech. Then, the analysis focused on two selected storytellers as storytelling model for storytelling speech synthesis. The intonation style of the storyteller model is analyzed by analyzing the prominent syllables. The prominent syllables is detected and analysis of based on position and word categories. Lastly, the pitch contour of prominent syllable was clustered and analyzed. All the analyzed results and finding are used in the next chapter.

# CHAPTER FIVE

# DEVELOPMENT OF PROSODY MODIFICATION RULES

## 5.1 Introduction

Prosody modification rules are the key factors for modification of prosody in explicit control storytelling speech synthesis. The findings from the prosody features analysis of Chapter Four provide the basis to construct the prosody modification rules. The rules are then feed into the speech synthesizer using Harmonic Noise Model (HNM) to generate the synthesized storytelling speech. The main function of prosody modification rule is to manipulate prosody parameters of the neutral speech into storytelling speech. Flowchart of the storytelling speech synthesis is illustrated in Figure 5.1.

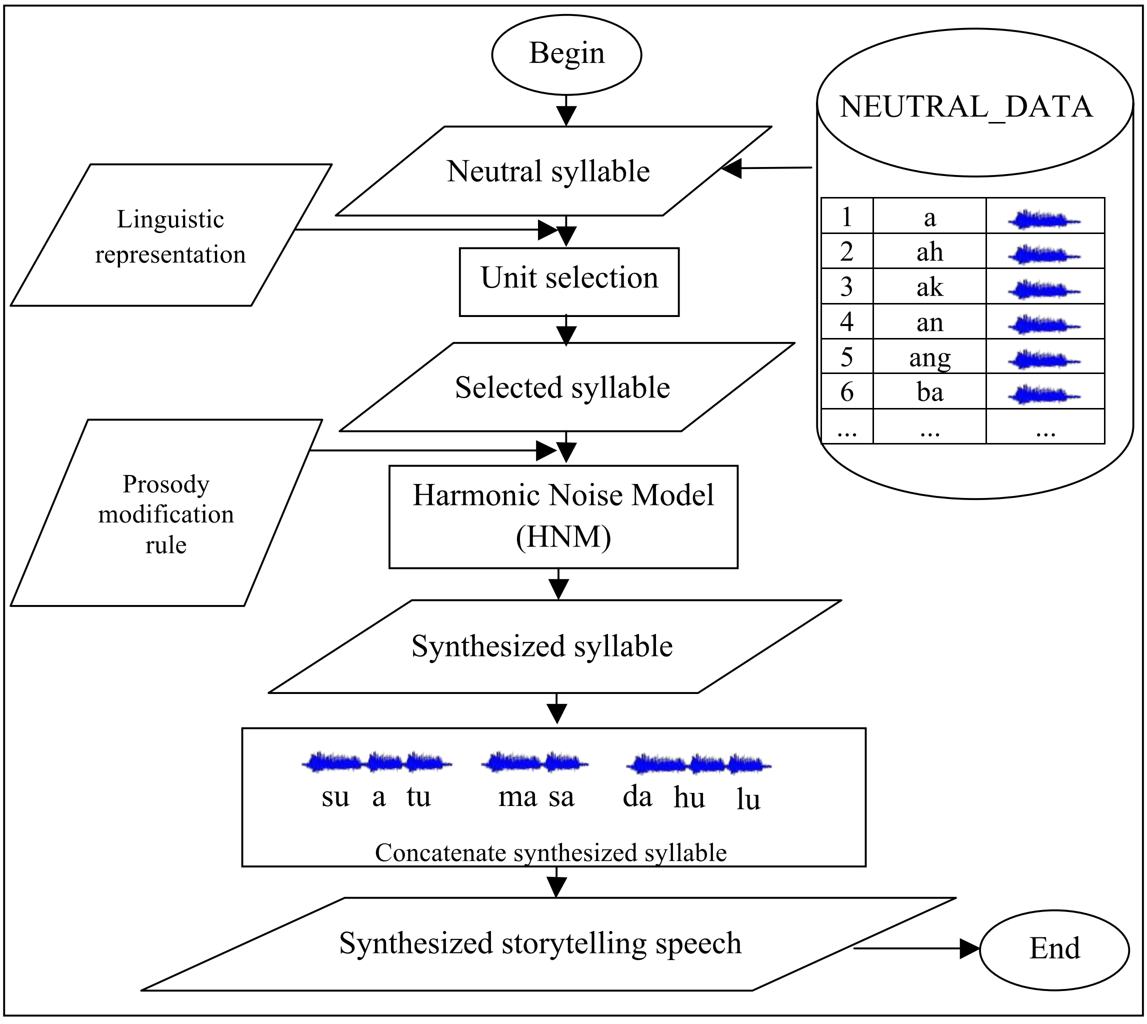



Figure 5.1 Flowchart of storytelling speech synthesis

Based on Figure 5.1, the target syllable is selected from the neutral syllable speech database (NEUTRAL_DATA) using unit selection method. The prosody of the target syllable is then modified using Harmonic Noise Model (HNM). HNM are explained in Section 2.6.4, respectively. The modification is based on the prosody modification rules and the modified syllables are finally concatenated to form synthesized storytelling speech sentences.

Literature described the baseline methods of prosody modification are global rules (Montaño et al., 2013; Theune et al., 2006) and local rules (Verma et al., 2015; Sarkar et al., 2014; Roekhaut et al., 2010) as in Section 2.5. Figure 5.2 compares the baseline methods and the proposed grammar-based rule. In this chapter, prosody modification using global, local and grammar-based rules are discussed. In the development of grammar-based prosody modification rule, grammatical structure information of the language is added to improve the limitation of global and local rules.

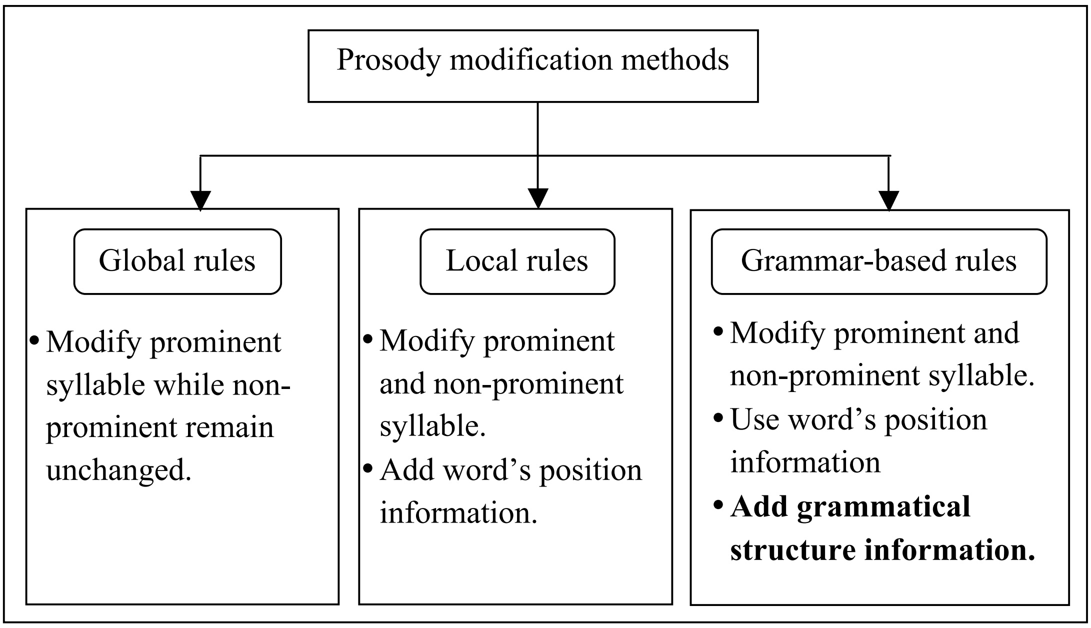



Figure 5.2 Prosody modification methods

## 5.2 Tempo Normalization

The first step of prosody modification rules development is the tempo normalization where tempo of the neutral speech is normalized with respect to the storytelling speech model. For male storyteller, the mean tempo of the storytelling model is 5.10 syllables per seconds (SPS), while the mean tempo of the female storyteller is 4.81 SPS. Neutral speech tempo and model speech tempo for male and female are shown in Table 5.1.

Table 5.1
Storyteller neutral speech tempo and model tempo

| Storyteller | Gender | Neutral speech tempo (SPS) | Model speech tempo (SPS) | Difference (SPS) |
|---|---|---|---|---|
| MSt1 | Male | 3.74 | 5.10 | -1.36 |
| MSt2 | Male | 5.90 | | +0.80 |
| MSt3 | Male | 5.40 | | +0.30 |
| FSt1 | Female | 5.67 | 4.81 | +0.86 |
| FSt2 | Female | 3.90 | | -0.91 |
| FSt3 | Female | 4.32 | | -0.49 |
| FSt4 | Female | 5.47 | | +0.66 |
| FSt5 | Female | 5.26 | | +0.45 |
| FSt6 | Female | 3.80 | | -1.01 |

Based on Table 5.1, there is a variation of tempo in neutral speech for each storyteller. Each neutral speech need to be normalized based on the male's tempo and female's tempo of the natural storytelling speech. The general calculation for a speech's tempo is as shown in Equation (5.1) (Montaño et al., 2013; Roekhaut et al., 2010; Nelson & Eric, 1998). The equation is modified as shown in Equation (5.2) in order to normalize the speech's tempo.

$$\text{Tempo} = \frac{\text{Total syllable}}{\text{Total duration}} \tag{5.1}$$

where,

Tempo = Tempo in syllables per seconds (SPS)
Total duration = Total duration of the speech in seconds (s)
Total syllable = Total syllables in the speech

$$\text{Normalized tempo} = \frac{\text{Total syllable}}{\text{Total duration} + (\frac{\text{Total syllable}}{\text{Target tempo}} - \text{Total duration})} \quad (5.2)$$

where,

| | |
|---|---|
| Normalized tempo | = Normalized tempo in syllables per seconds (SPS) |
| Total duration | = Total duration of the speech in seconds (s) |
| Total syllable | = Total syllables in the speech |
| Target tempo | = Model speech‘s tempo in syllables per seconds (SPS) |

The calculation of tempo is based on the total durations and number of syllables in a sentence (Montaño et al., 2013). It can be adjusted by increasing or decreasing the total duration. In this case, the total duration is adjusted based on the model speech’s tempo. By using Equation (5.2), the neutral speech‘s tempo is able to be decreased or increased depending on the tempo of the model’s storytelling speech. As an example, suppose a total of 5 syllables consumed a total duration of 1 second. Therefore, the tempo is calculated as 5.0 syllable per seconds (SPS). To normalize the tempo to 5.10 syllable per seconds (SPS), the calculation as follows:

$$\text{Normalized tempo} = \frac{5}{1 + (\frac{5}{5.1} - 1)}$$

$$= 5.1$$

Once the neutral speech’s tempo equates the model speech’s tempo, the prosody modification rules that is global, local and grammar-based rule is applied.

## 5.3 Prosody Modification

As stated in the literature, the base line prosody modification methods of explicit control speech synthesis are using global and local rules. In this section, the prosody modification using global, local and the proposed grammar-based rules are discussed and compared. The prosody features that are to be modified are duration, intensity, pitch and pause. The modification factor to modified duration, intensity and pitch are Duration Modification Factor (DMF), Intensity Modification Factor (IMF) and Pitch Modification Factor (PMF), respectively.

The Duration Modification Factor (DMF) is calculated as in Equation (5.3) (Sarkar et al., 2014). The Percentage of Change (POC) is discussed in prosody analysis in subchapter 4.3.2.

$$DMF = 1 + POC \tag{5.3}$$

Where,

DMF = Duration Modification Factor

POC = Percentage of Change

The example calculation of Duration Modification Factor (DMF) for prominent syllable (MSt3) using Equation (5.3) is as follows:

$$DMF = 1 + 80\% = 1.8$$

Or using Equation (5.4)

$$DMF = \frac{\mu(P)}{\mu(Q)} \tag{5.4}$$

where $\mu$ is mean,

DMF = Duration Modification Factor

P = Duration of prominent syllable

Q = Duration of all syllables in storytelling speech

The example calculation of Duration Modification Factor (DMF) for prominent syllable (MSt3) using Equation (5.4) is as follows:

$$DMF = \frac{0.36}{0.2} = 1.8$$

The calculation of Intensity Modification Factor (IMF) is different from the Duration Modification Factor (DMF). It is calculated using Equation (5.5) (Sarkar et al., 2014).

$$IMF = \mu(A) - \mu(B) \tag{5.5}$$

where,

IMF = Intensity Modification Factor

A = Intensity of prominent syllable

B = Intensity of all syllables in storytelling speech

The example calculation of Intensity Modification Factor (IMF) for prominent syllable (MSt3) using Equation (5.5) is as follows:

$$IMF = 73.71 - 75.64 = -2$$

Meanwhile, the calculation Pitch Modification Factor (PMF) is calculated in Equation (5.6).

$$PMF = \frac{\mu(X) - \mu(Y)}{\mu(Y)} \tag{5.6}$$

where,

PMF = Pitch Modification Factor

P = Pitch of prominent syllable

Q = Pitch of all syllables in storytelling speech

The example calculation of Pitch Modification Factor (PMF) for prominent syllable (MSt3) is using Equation (5.6).

$$PMF = \frac{154-146}{146} = 0.05$$

The pitch is modified based on the pitch contour of the prominent syllable. The sinusoidal formula as in Equation (5.7) is used to develop a pitch contour for the prominent syllables (Verma et al., 2015; Sarkar et al., 2014).

$$m'(t) = s(t) * (1 + \alpha \times \sin((\frac{t - t_1}{t_2 - t_1}) \times \beta \times pi) \tag{5.7}$$

where,

$m'(t)$ = Modified pitch contour
$s'(t)$ = Neutral pitch contour
$\alpha$ = Desired maximum shift
$\beta$ = Constant determined contour shape
$t$ = Current duration
$t_1$ = First duration
$t_2$ = Last duration

The pitch modification factor (PMF) is also called desired maximum shift ($\alpha$) (Verma et al., 2015). The value desired modification shift for male model is 0.12 and female model is -0.05 which are calculated by Equation (5.8). The variable $\beta$ is a constant to determine the pitch contour's shape which may fluctuates increasing and falling manner.

$$Desired\ maximum\ shift\ = \frac{Desired\ maximum\ pitch\ increase}{Average\ pitch} \tag{5.8}$$

An example calculation of PMF is as follow:

$$Desired\ maximum\ shift = \frac{18\ \text{Hz}}{146.39\ \text{Hz}} = 0.12$$

Based on the analysis result of the pitch, the desired maximum pitch increase is 18 Hz. It will be divided with the average pitch (146.39 Hz) to get the 0.12 as desired maximum shift.

The pause's length of the storytelling speech is also done at phrase and sentence level. The pause for male model and female model is shown in Table 5.2.

Table 5.2
Pause's length for MSt3 and FSt5

| Storyteller | MSt3 | FSt5 |
|---|---|---|
| | Duration (s) | Duration (s) |
| Phrase level | 0.25 - 0.56 s | 0.14 – 0.40 s |
| Sentence level | 0.34 - 0.72 s | 0.43 – 0.88 s |

Table 5.2 shows the minimum and maximum duration of the pause. The detailed pauses of male and female model can be found in Appendix D and E, respectively. According to Verma et al. (2015), the pause length depends on the number of words in the phrase and sentence level. The length pause also influences the speaking rate, breath, boundary tones and glottalization (Kim et al., 2006; Redi & Shattuck-Hufnagel, 2001). Basically, the number of words produces longer pause length (Sarkar & Sreenivasa Rao, 2015). However, based on our analysis result on the length of word and pause, it does not show a consistent relation between the length of word and length of pauses. As an example, a sentence that consists of four words shows average pause of 0.65 s but another sentence that consists of 16 words which are three times more only has pause of 0.63 s. Further investigations are needed for pause prosody. Since it is not within the scope of this research, the pause duration used in the storytelling synthesis is based on the pause of targeted speech sentence of the storytelling model.

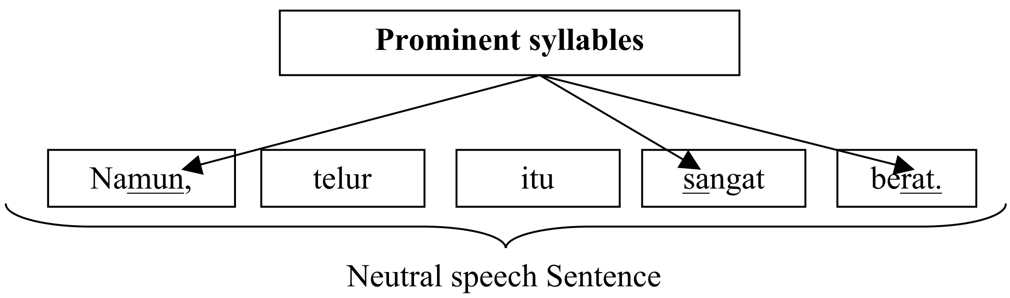
## 5.4 Global Prosody Modification Rule

The global rule is developed for modification in a sentence or phrase level with the slight changes in tempo which means that one can uniformly reduce the duration of syllables (for speeding up the tempo) or increase the duration (for slowing down the tempo). The general idea based on Theune et al. (2006) is to slow down the tempo and increase the intensity and pitch by increasing the duration, intensity and pitch of prominent syllable of certain words (typically, adjectives and adverbs). The global rule is shown in Figure 5.3.

```
Check syllable status
IF syllable status == Prominent
   SET Type of syllable == Prominent
             IF model == Male model
                SET DMF = 1.8
                SET PMF = 0.12
                SET IMF = -2
             IF model == Female model
                SET DMF = 1.48
                SET PMF = -0.05
                SET IMF = -1
ELSE
   SET Type of syllable == Non-Prominent
            IF model == Male model
                SET DMF = 1
                SET PMF = 0
                SET IMF = 0
             IF model == Female model
                SET DMF = 1
                SET PMF = 0
                SET IMF = 0
```

Figure 5.3 Pseudocode for global rule

For the global rule, duration, intensity and pitch are manipulated using modification factor for male model or female model. The modification factor (DMF, IMF and PMF) is shown in Figure 5.4. The prominent syllable is underlined.




Male storytelling model

| Type | Duration Modification Factor (DMF) | Intensity Modification Factor (IMF) | Pitch Modification Factor (PMF) |
|---|---|---|---|
| Prominent | 1.8 | -2 | +0.12 |
| Non-prominent | NC | NC | NC |

Female storytelling model

| Type | Duration Modification Factor (DMF) | Intensity Modification Factor (IMF) | Pitch Modification Factor (PMF) |
|---|---|---|---|
| Prominent | 1.48 | -1 | -0.05 |
| Non-prominent | NC | NC | NC |

Figure 5.4 Prosody modification factors used in global rules

Based on Figure 5.4, there are three prominent syllables. The prosodic parameters of a prominent syllable are modified using the DMF, IMF and IMF while non-prominent remain unchanged (NC-No Change). The prominent syllables observed in Figure 5.4 are *mun*, *sa* and *rat*. Therefore, to synthesize the neutral speech sentence the duration and intensity of the prominent syllables are modified using their respective DMF and IMF. Non-prominent remains unchanged. Prosody modification of the neutral speech sentence "*Namun telur itu sangat berat*" is shown in Table 5.3.

Table 5.3
Manipulation of prosody for MSt3 using global rule

| Neutral syllable | Duration (s) | | Intensity (dB) | |
|---|---|---|---|---|
| | Original | Modified using DMF | Original | Modified using IMF |
| na | 0.22 | NC | 79.81 | NC |
| mun | 0.41 | 0.41 x 1.8 = 0.74 | 78.24 | 78.24 – 2 = 76.24 |
| te | 0.12 | NC | 74.63 | NC |
| lur | 0.34 | NC | 72.17 | NC |
| i | 0.24 | NC | 72.10 | NC |
| tu | 0.36 | NC | 76.71 | NC |
| sa | 0.20 | 0.20 x 1.8 = 0.36 | 73.70 | 73.70 – 2 = 71.70 |
| ngat | 0.23 | NC | 78.63 | NC |
| be | 0.15 | NC | 77.37 | NC |
| rat | 0.32 | 0.32 x 1.8 = 0.58 | 75.74 | 75.74 -2 = 73.74 |

Based on Table 5.3, the duration and intensity of the prominent syllables in the neutral speech sentence are modified by a factor of 1.8 and -2, respectively. The duration is multiplied by 1.8 and intensity is subtracted by 2. Only method of calculation is adopted from Verma et al. (2015) and Theune et al. (2006). However, the prosody modification factor used in the calculation of duration and intensity is produced in this research. The prosody modification factor produced is language dependent which is not suitable to be applied in another language. The non-prominent syllables are not modified. The pitch contour modification in global rule used the Equation (5.6) in Section 5.3.

## 5.5 Local Prosody Modification Rule

In the local rule, the modification is done at syllable level by considering the position of the word for prominent and non-prominent syllables. The position of the words in the sentence are initial, middle and last words. The pseudocode for local rule is shown in Figure 5.5.

```
Check syllable position based on word's position
IF syllable's position == Initial Word THEN
   Check syllable status
   IF syllable status == Prominent THEN
      Type of syllable == Initial Prominent
             IF model == Male model
                SET DMF = 1.57
                SET PMF = 0.25
                SET IMF = 1
             IF model == Female model
                SET DMF = 1.32
                SET PMF = -0.01
                SET IMF = 3
   ELSE
      Type of syllable == Initial Non-Prominent
             IF model == Male model
                SET DMF = 0.85
                SET PMF = -0.05
                SET IMF = -3
             IF model == Female model
                SET DMF = 0.94
                SET PMF = -0.03
                SET IMF = -1

IF syllable's position == Middle Word THEN
   Check syllable status
   IF syllable status == Prominent THEN
      Type of syllable == Middle Prominent
             IF model == Male model
                SET DMF = 1.9
                SET PMF = 0.21
                SET IMF = 1
             IF model == Female model
                SET DMF = 1.39
                SET PMF = -0.01
                SET IMF = 0
```

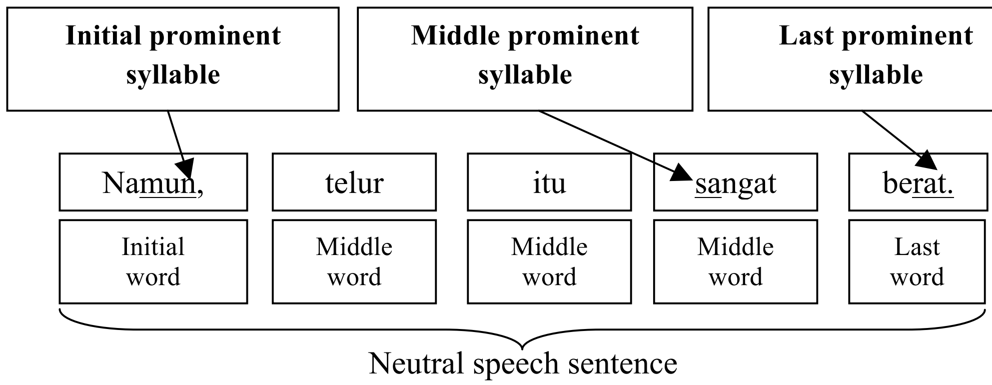
Figure 5.5 Pseudocode for local rule

```
   ELSE
      Type of syllable == Middle Non-Prominent
             IF model == Male model
                SET DMF = 0.85
                SET PMF = -0.02
                SET IMF = 1
             IF model == Female model
                SET DMF = 0.90
                SET PMF = 0.03
                SET IMF = 1

IF syllable's position == Last Word THEN
   Check syllable status
   IF syllable status == Prominent THEN
      Type of syllable == Last Prominent
             IF model == Male model
                SET DMF = 1.41
                SET PMF = -0.01
                SET IMF = -7
             IF model == Female model
                SET DMF = 1.66
                SET PMF = -0.13
                SET IMF = -2
   ELSE
      Type of syllable == Last Non-Prominent
             IF model == Male model
                SET DMF = 0.83
                SET PMF = -0.01
                SET IMF = -2
             IF model == Female model
                SET DMF = 0.85
                SET PMF = -0.04
                SET IMF = -2
```

Figure 5.5 Continued

As an example, the word *namun* is the initial word, so the syllables *na* and *mun* are referred as initial-word syllables. Therefore, the syllable *mun* (underlined) which is named as prominent syllable is called initial prominent syllable and *na* is named initial non-prominent syllable. The prosody modification factor based on word position using local rule is shown in Figure 5.6.




Male storytelling model

| Type | Duration Modification Factor (DMF) | Intensity Modification Factor (IMF) | Pitch Modification Factor (PMF) |
|---|---|---|---|
| Initial prominent | 1.57 | +1 | +0.25 |
| Middle prominent | 1.90 | +1 | +0.21 |
| Last prominent | 1.41 | -7 | -0.01 |
| Initial non-prominent | 0.85 | -3 | -0.05 |
| Middle non-prominent | 0.85 | +1 | -0.02 |
| Last non-prominent | 0.83 | -2 | -0.01 |

Female storytelling model

| Type | Duration Modification Factor (DMF) | Intensity Modification Factor (IMF) | Pitch Modification Factor (PMF) |
|---|---|---|---|
| Initial prominent | 1.32 | +3 | -0.01 |
| Middle prominent | 1.39 | NC | -0.01 |
| Last prominent | 1.66 | -2 | -0.13 |
| Initial non-prominent | 0.94 | -1 | -0.03 |
| Middle non-prominent | 0.90 | +1 | +0.03 |
| Last non-prominent | 0.85 | -2 | -0.04 |

Figure 5.6 Prosody modification factors used in local rule

The calculation of duration and intensity of neutral speech syllables for prominent and non-prominent syllable by modification factor based on position is shown in Table 5.4. The duration for prominent syllable at initial, middle and last position is modified by a modification factor of 1.57, 1.90 and 1.41, respectively. The duration of a prominent syllable is added by 1dB for initial, 1dB for middle and subtracted by 7dB for the last position. The pitch contour modification in local rule also used the Equation (5.6) in Section 5.3.

Table 5.4
Manipulation of prosody for MSt3 using local rule

| Neutral syllable | Duration (s) | | Intensity (dB) | |
|---|---|---|---|---|
| | Original | Modified | Original | Modified |
| na | 0.22 | 0.22 x 0.85 = 0.19 | 79.81 | 79.81 - 3 = 76.81 |
| mun | 0.41 | 0.41 x 1.57 = 0.64 | 78.24 | 78.24 + 1 = 79.24 |
| te | 0.12 | 0.12 x 0.85 = 0.10 | 74.63 | 74.63 + 1 = 73.63 |
| lur | 0.34 | 0.34 x 0.85 = 0.29 | 72.17 | 72.17 + 1 = 73.17 |
| i | 0.24 | 0.24 x 0.85 = 0.20 | 72.10 | 72.10 + 1 = 73.10 |
| tu | 0.36 | 0.36 x 0.85 = 0.31 | 76.71 | 76.71 + 1 =77.71 |
| sa | 0.20 | 0.20 x 1.9 = 0.38 | 73.70 | 73.70 + 1 = 74.70 |
| ngat | 0.23 | 0.23 x 0.85 = 0.20 | 78.63 | 78.63 + 1 = 79.63 |
| be | 0.15 | 0.15 x 0.83 = 0.13 | 77.37 | 77.37 - 2 = 75.37 |
| rat | 0.32 | 0.32 x 1.41 = 0.45 | 75.74 | 75.74 - 7 = 68.74 |

## 5.6 Grammar-Based Prosody Modification Rule

The proposed rule is developed to solve the problem of storytelling speech synthesis using explicit control. The first problem is the over-exaggeration which causes speech degradation in some cases.

To solve the problem, a limitation for modifying duration and pitch are examined as the first objective. Based on Theune et al. 2006, speech quality is reduced and become unnatural if pitch is increased to above 60 Hz. Therefore, an experiment is conducted to determine the duration and pitch modification range. The experiment collected all targeted speech prominent syllables (333 syllables from three male storytellers and 690 syllables from six female storytellers). The targeted speech prominent syllables are modified and synthesized using different Duration Modification Factor (DMF) from 1.0 (unchanged) to 2.6 (160% increment). It is because 2.6 are the maximum DMF in this research. The pitch modification factor (PMF) ranges from 0 (unchanged) to 0.9 (90% increment). The highest PMF used in this research is 0.73, thus the experiment is also done until 0.9. Firstly, all the speech prominent syllable from male and female storytellers have modified its duration with DMF value is 1.1. Then, Perceptual Evaluation of Speech Quality (PESQ) is used to determine the speech quality of the speech modified syllables with natural speech syllable as reference speech. The description about PESQ is presented in Section 2.7.1. The result is in Mean Opinion Score (MOS). The mean result for all speech prominent syllables are used to represent the speech quality of DMF value is 1.1. Then, the step is repeated with DMF value from 1.2 until 1.9 and the results are gathered. The experiment on pitch modification factor (PMF) also follow the same step start with PMF value is 0.1 and repeated until 0.9. All the results are shown in Figure 5.7 and Figure 5.8 for male and female storyteller, respectively. However, the result for the experiment of DMF is only presented from DMF value between 1 and 1.9 because the result more than that is showed insignificantly. The detail results are in Appendix H.

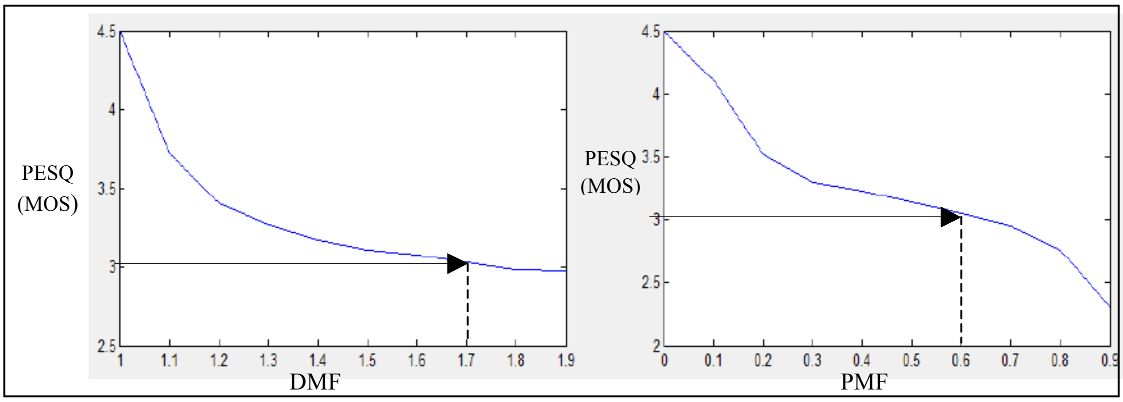



Figure 5.7 Result PESQ in MOS scale for male storyteller

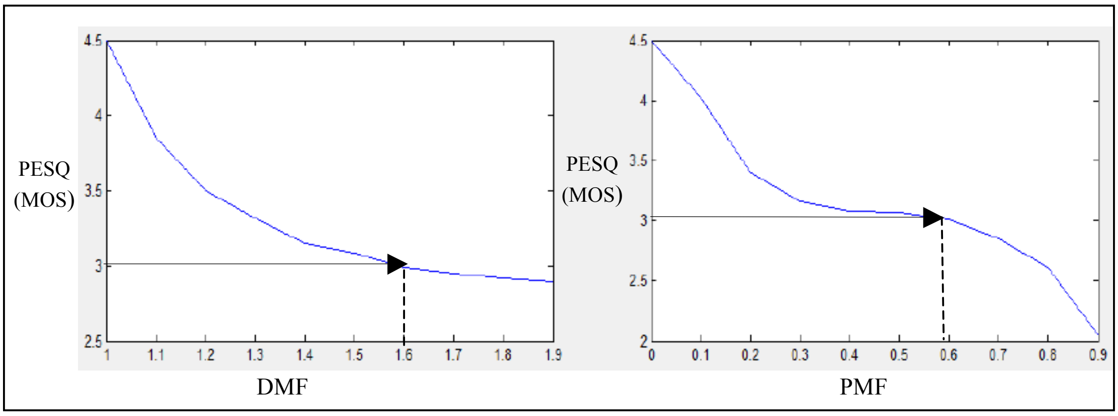



Figure 5.8 Result PESQ in MOS scale for female storyteller

Based on Figure 5.7 and Figure 5.8, the minimum speech quality based on Perceptual Evaluation of Speech Quality (PESQ) using Mean Opinion Score (MOS) is set at 3. A Mean Opinion Score (MOS) value of below than 3 is considered as unacceptable speech quality with distortion (Huang, 2011). Thus, the result shows that the maximum DMF to modify duration and at the same time maintaining the speech quality is 1.7 and 1.6 for male and female storyteller, respectively. The PMF for both male and female storytellers is 0.6 as the optimum value for pitch modification to produce great speech quality. Therefore, based on these results, a rule is proposed called *limitation* rule as shown in Figure 5.9. If the DMF and PMF exceed the maximum value, the optimum of DMF and PMF are used. The limitation rule is used after prosody manipulation rule takes place and prior to the syllable's prosody modification.

```
IF model == Male model
    IF DMF > 1.7
       SET DMF = 1.7
    ELSE
       DMF = UNCHANGED
    IF PMF > 0.6
       SET PMF = 0.6
    ELSE
       PMF = UNCHANGED

IF model == Female model
    IF DMF > 1.6
       SET DMF = 1.6
    ELSE
       DMF = UNCHANGED
    IF PMF > 0.6
       SET PMF = 0.6
    ELSE
       PMF = UNCHANGED
```

Figure 5.9 Limitation rule

The second problem is that the synthesized speech has low similarity to the original storytelling speech. Thus, this research introduces grammatical structure to the prosody modification rule called grammar-based rule. Based on the prosody analyzed result, the percentage change of word grammar has a unique variation as explained in Section 4.7. As an example, the conjunction has percentage duration change by 140 %, while the adjective changes by 115%. Previously, the grammar is not considered in the development of prosody modification rule. Therefore, this research includes grammar structure information to the modification rule. The rule is shown in Figure 5.10.

```
Check syllable position based on word's position
IF syllable's position == Initial Word THEN
   Check syllable status
   IF syllable status == Prominent THEN
      Check its word grammar
      IF syllable's word grammar == Noun
         SET Type of syllable == Initial Prominent Noun
             IF model == Male model
                SET DMF = 1.08
                SET PMF = -0.27
                SET IMF = -5
             IF model == Female model
                SET DMF = 1.39
                SET PMF = -0.03
                SET IMF = 2
      IF syllable's word grammar == Verb
         SET Type of syllable == Initial Prominent verb
             IF model == Male model
                SET DMF = 1
                SET PMF = 0
                SET IMF = 0
             IF model == Female model
                SET DMF = 0.63
                SET PMF = 0.09
                SET IMF = 4
      IF syllable's word grammar == Conjunctions
         SET Type of syllable == Initial Prominent Conjunctions
             IF model == Male model
                SET DMF = 2.53
                SET PMF = 0.29
                SET IMF = -1
             IF model == Female model
                SET DMF = 1.85
                SET PMF = -0.08
                SET IMF = 5
      IF syllable's word grammar == Auxiliary
         SET Type of syllable == Initial Prominent Auxiliary
             IF model == Male model
                SET DMF = 1.11
                SET PMF = 0.73
                SET IMF = 10
             IF model == Female model
                SET DMF = 1
                SET PMF = 0
                SET IMF = 0
```

Figure 5.10 Pseudocode for grammar-based rule

```
ELSE
         SET Type of syllable == Initial Non-Prominent
             IF model == Male model
                SET DMF = 0.85
                SET PMF = -0.02
                SET IMF = 1
             IF model == Female model
                SET DMF = 0.90
                SET PMF = 0.03
                SET IMF = 1

IF syllable's position == Middle Word THEN
   Check syllable status
   IF syllable status == Prominent THEN
      Check its word grammar
      IF syllable's word grammar == Noun
         SET Type of syllable == Middle Prominent Noun
             IF model == Male model
                SET DMF = 1.98
                SET PMF = 0.12
                SET IMF = 0
             IF model == Female model
                SET DMF = 1.36
                SET PMF = -0.14
                SET IMF = -1
      IF syllable's word grammar == Verb
         SET Type of syllable == Middle Prominent verb
             IF model == Male model
                SET DMF = 1.89
                SET PMF = 0.21
                SET IMF = 1
             IF model == Female model
                SET DMF = 1.35
                SET PMF = 0.04
                SET IMF = 1
      IF syllable's word grammar == Preposition
         SET Type of syllable == Middle Prominent Preposition
             IF model == Male model
                SET DMF = 2.52
                SET PMF = 0.43
                SET IMF = 4
             IF model == Female model
                SET DMF = 1.08
                SET PMF = -0.17
                SET IMF = 5
```

Figure 5.10 Continued

```
IF syllable's word grammar == Adverbs
         SET Type of syllable == Middle Prominent Adverbs
             IF model == Male model
                SET DMF = 1.65
                SET PMF = 0.17
                SET IMF = 0
             IF model == Female model
                SET DMF = 1.14
                SET PMF = 0.08
                SET IMF = 4
      IF syllable's word grammar == Conjunctions
         SET Type of syllable == Middle Prominent Conjunctions
             IF model == Male model
                SET DMF = 1
                SET PMF = 0
                SET IMF = 0
             IF model == Female model
                SET DMF = 3.02
                SET PMF = -0.17
                SET IMF = 2
      IF syllable's word grammar == Demonstrative
         SET Type of syllable == Middle Prominent Demonstrative
             IF model == Male model
                SET DMF = 1.23
                SET PMF = 0.4
                SET IMF = -2
             IF model == Female model
                SET DMF = 1.21
                SET PMF = 0.02
                SET IMF = 0
      IF syllable's word grammar == Adjective
         SET Type of syllable == Middle Prominent Adjective
             IF model == Male model
                SET DMF = 2.18
                SET PMF = 0.04
                SET IMF = 1
             IF model == Female model
                SET DMF = 2.15
                SET PMF = -0.02
                SET IMF = 1
      IF syllable's word grammar == Auxiliary
         SET Type of syllable == Middle Prominent Auxiliary
             IF model == Male model
                SET DMF = 0.57
                SET PMF = 0.53
                SET IMF = 9
             IF model == Female model
                SET DMF = 1.12
                SET PMF = 0.66
                SET IMF = -3
```

Figure 5.10 Continued

```
      IF syllable's word grammar == Intensifier
         SET Type of syllable == Middle Prominent Intensifier
             IF model == Male model
                SET DMF = 2.37
                SET PMF = 0.72
                SET IMF = 4
             IF model == Female model
                SET DMF = 1.52
                SET PMF = 0.10
                SET IMF = 0
      IF syllable's word grammar == Particles
         SET Type of syllable == Middle Prominent Particle
             IF model == Male model
                SET DMF = 1.88
                SET PMF = 0.13
                SET IMF = -4
             IF model == Female model
                SET DMF = 1
                SET PMF = 0
                SET IMF = 0
  ELSE
         SET Type of syllable == Middle Non-Prominent
             IF model == Male model
                SET DMF = 0.85
                SET PMF = -0.02
                SET IMF = 1
             IF model == Female model
                SET DMF = 0.9
                SET PMF = 0.03
                SET IMF = 1

IF syllable's position == Last Word THEN
   Check syllable status
   IF syllable status == Prominent THEN
      Check its word grammar
      IF syllable's word grammar == Noun
         SET Type of syllable == Last Prominent Noun
             IF model == Male model
                SET DMF = 2.00
                SET PMF = 0.01
                SET IMF = -6
             IF model == Female model
                SET DMF = 1.65
                SET PMF = -0.23
                SET IMF = -1
```

Figure 5.10 Continued

```
IF syllable's word grammar == Verb
         SET Type of syllable == Last Prominent verb
             IF model == Male model
                SET DMF = 1.64
                SET PMF = -0.13
                SET IMF = -6
             IF model == Female model
                SET DMF = 2.05
                SET PMF = 0.11
                SET IMF = -1
      IF syllable's word grammar == Adverbs
         SET Type of syllable == Last Prominent Adverbs
             IF model == Male model
                SET DMF = 1.87
                SET PMF = 0.31
                SET IMF = 1
             IF model == Female model
                SET DMF = 2.28
                SET PMF = 0.01
                SET IMF = 1
      IF syllable's word grammar == Conjunctions
         SET Type of syllable == Last Prominent Conjunctions
             IF model == Male model
                SET DMF = 2.32
                SET PMF = 0.42
                SET IMF = 0
             IF model == Female model
                SET DMF = 2.39
                SET PMF = -0.09
                SET IMF = 4
      IF syllable's word grammar == Demonstrative
         SET Type of syllable == Last Prominent Demonstrative
             IF model == Male model
                SET DMF = 1.17
                SET PMF = 0
                SET IMF = -12
             IF model == Female model
                SET DMF = 1.51
                SET PMF = -0.16
                SET IMF = -8
     IF syllable's word grammar == Adjective
         SET Type of syllable == Last Prominent Adjective
             IF model == Male model
                SET DMF = 1.74
                SET PMF = -0.18
                SET IMF = -7
             IF model == Female model
                SET DMF = 1.25
                SET PMF = -0.24
                SET IMF = -2
```

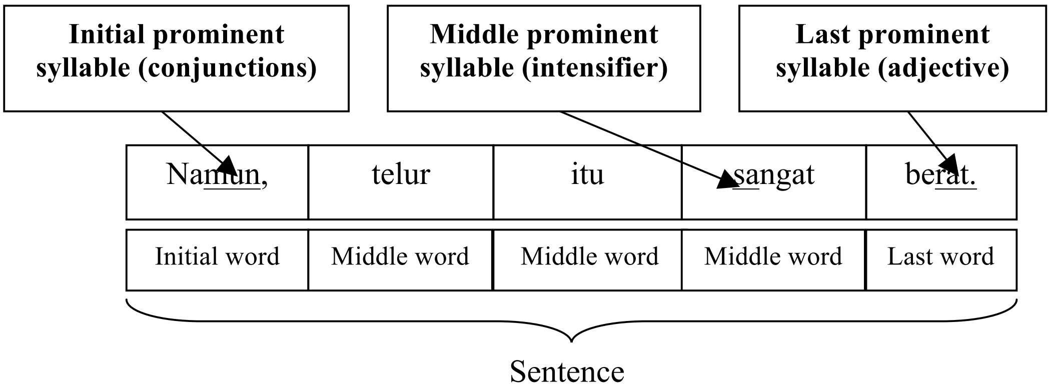
Figure 5.10 Continued

```
    IF syllable's word grammar == Auxiliary
        SET Type of syllable == Last Prominent Auxiliary
            IF model == Male model
               SET DMF = 1.95
               SET PMF = 0.24
               SET IMF = -2
            IF model == Female model
               SET DMF = 1.47
               SET PMF = -0.24
               SET IMF = -1
ELSE
        SET Type of syllable == Last Non-Prominent
            IF model == Male model
               SET DMF = 0.83
               SET PMF = -0.01
               SET IMF = -2
            IF model == Female model
               SET DMF = 0.85
               SET PMF = -0.04
               SET IMF = -2
```

Figure 5.10 Continued

The duration and intensity of neutral syllable for prominent and non-prominent syllable are modified based on position and word category using modification factor in Figure 5.11 for all three stories of the male model. As an example for the male model, the syllable *mun* is initial prominent syllable belonging to conjuncture. Thus, the duration of the syllable is increased by modification factor of 2.53 (before *limitation* rule takes place) and the intensity is reduced by 1dB. The syllable *sa* is a middle prominent syllable from amplifier. Its duration is increased by 2.37 (before *limitation* rule takes place) and the intensity is increased by 4dB. The prominent syllable *rat* is located at the end of the sentence and is classified as last prominent syllable from the adjective word. The duration is modified by modification factor of 1.74 (before *limitation* rule takes place) and its intensity is reduced by 7 dB.

The calculation of modification for the grammar-based rule can be seen in Table 5.5. This calculation is done before *limitation rule* takes place. Once the *limitation rule* is applied, the DMF that is greater than 1.7 reverted to 1.7 as the maximum DMF. Therefore, the DMF of syllable *mun, sa* and *rat* used 1.7 instead of 2.53, 2.37 and 1.74 (as bold) and become 0.7s, 0.34s and 0.54s syllable duration, respectively.




| Storyteller | Male storytelling model | | | Female storytelling model | | |
|---|---|---|---|---|---|---|
| Type of syllable | DMF | IMF | PMF | DMF | IMF | IMF |
| Initial prominent | - | - | - | - | - | - |
| Noun | 1.08 | -5 | -0.27 | 1.39 | +2 | -0.03 |
| Verb | - | - | - | 0.63 | +4 | +0.09 |
| Conjunctions | 2.53 | -1 | +0.29 | 1.85 | +5 | -0.08 |
| Auxiliary | 1.11 | +10 | +0.73 | - | | - |
| Middle prominent | - | - | - | - | | - |
| Noun | 1.98 | NC | +0.12 | 1.36 | -1 | -0.14 |
| Verb | 1.89 | +1 | +0.21 | 1.35 | +1 | +0.04 |
| Preposition | 2.52 | +4 | +0.43 | 1.08 | +5 | -0.17 |
| Adverbs | 1.65 | NC | +0.17 | 1.14 | +4 | +0.08 |
| Conjunctions | - | - | - | 3.02 | +2 | -0.17 |
| Demonstrative pronouns | 1.23 | -2 | +0.40 | 1.21 | NC | +0.02 |
| Adjective | 2.18 | +1 | +0.04 | 2.15 | +1 | -0.02 |
| Auxiliary | 0.57 | +9 | +0.53 | 1.12 | -3 | +0.66 |
| Intensifier | 2.37 | +4 | +0.72 | 1.52 | NC | +0.10 |
| Particle | 1.88 | -4 | +0.13 | - | - | - |
| Last prominent | - | - | - | - | - | - |
| Noun | 2.00 | -6 | +0.01 | 1.65 | -1 | -0.23 |
| Verb | 1.64 | -6 | -0.13 | 2.05 | -1 | +0.11 |
| Adverbs | 1.87 | +1 | +0.31 | 2.28 | +1 | +0.01 |
| Conjunctions | 2.32 | NC | +0.42 | 2.39 | +4 | -0.09 |
| Demonstrative pronouns | 1.17 | -12 | NC | 1.51 | -8 | -0.16 |
| Adjective | 1.74 | -7 | -0.18 | 1.25 | -2 | -0.24 |
| Auxiliary | 1.95 | -2 | +0.24 | 1.47 | -1 | +0.27 |
| Initial non-prominent | 0.85 | -3 | -0.05 | 0.94 | -1 | -0.03 |
| Middle non-prominent | 0.85 | +1 | -0.02 | 0.90 | +1 | +0.03 |
| Last non-prominent | 0.83 | -2 | -0.01 | 0.85 | -2 | -0.04 |

*DMF – Duration Modification Factor *PMF – Pitch Modification Factor *IMF – Intensity Modification Factor

Figure 5.11 Prosody modification factors used for grammar-based rule

Table 5.5
Manipulation of prosody for MSt3 using grammar-based rule

| Neutral syllable | Duration (s) | | Intensity (dB) | |
|---|---|---|---|---|
| | Original | Modified | Original | Modified |
| na | 0.22 | 0.22 x 0.85 = 0.19 | 79.81 | 79.81 - 3 = 76.81 |
| mun | 0.41 | 0.41 x **2.53** = 1.04 | 78.24 | 78.24 - 1 = 77.24 |
| te | 0.12 | 0.12 x 0.85 = 0.10 | 74.63 | 74.63 + 1 = 73.63 |
| lur | 0.34 | 0.34 x 0.85 = 0.29 | 72.17 | 72.17 + 1 = 73.17 |
| i | 0.24 | 0.24 x 0.85 = 0.20 | 72.10 | 72.10 + 1 = 73.10 |
| tu | 0.36 | 0.36 x 0.85 = 0.31 | 76.71 | 76.71 + 1 =77.71 |
| sa | 0.20 | 0.20 x **2.37** = 0.47 | 73.70 | 73.70 + 4 = 77.70 |
| ngat | 0.23 | 0.23 x 0.85 = 0.20 | 78.63 | 78.63 + 1 = 79.63 |
| be | 0.15 | 0.15 x 0.83 = 0.13 | 77.37 | 77.37 - 2 = 75.37 |
| rat | 0.32 | 0.32 x **1.74** = 0.56 | 75.74 | 75.74 - 7 = 68.74 |

The pitch contour modification in local and global used the Equation (5.6). However, it produced default pitch contour designed using a constantly rising and falling of pitch. The peak of the pitch contour is formulated only at the middle of the contour as illustrated in Figure 5.12. This up-down pitch contour is constantly rising and falling with the same degree (Theune et al., 2006; Verma et al., 2015; Sarkar et al., 2014). Therefore, it is unable to match the natural storytelling contour which has a different degree of rising and falling factor as discussed in Section 4.8. Even by controlling the parameters of the contour shape are difficult to produce the desired pitch contour.

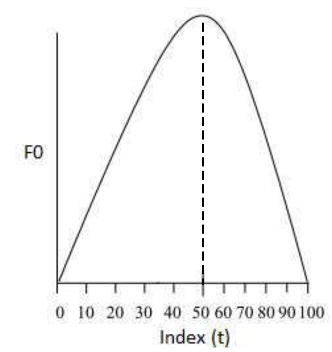



Figure 5.12 Illustrated default pitch contour from Equation (5.6)

In order to gain similarity modified contour to the desired pitch contour cluster, a modified formulation of the pitch contour was proposed by separating a pitch contour of a syllable into two sections (first step and second step). It is named *two-steps* formula because it modifies pitch contour using two steps. Two steps are necessary because some target pitch contour has different degree of rising and falling for the first half and the second half of the pitch contour. As an example, pitch contour cluster 5 (as mention is Section 4.8) has pitch contour is constantly rising for the first half and then constantly flat at the second half of the pitch contour that cannot be done by the previous formula.

For the first step, the pitch contour is formulated using Equation (5.9) and controlled by parameters α and β. The parameter $\beta$ determines the contour shape which is constantly increasing, rising and then falling, constantly falling or falling and then rising. While parameter $\alpha$ is the desired maximum pitch shift. The Equation (5.9) is derived from Equation (5.7) with the variable β replacing 2β. The reason is that the first half of the pitch contour needs to multiply by two to achieve the desired contour shape when combining with the second half of the pitch contour. On the other hand, the second step is formulated using Equation (5.10), which is exactly derived from the Equation (5.7). Lastly, these two modified contours are combined to produce a complete pitch contour as in Equation (5.11).

Step 1

$$p^{'}(t) = s(t) * (1 + \alpha \times \sin((\frac{t - t_1}{t_2 - t_1}) \times 2\beta \times pi) \tag{5.9}$$

Step 2

$$f^{'}(t) = p'(t) * (1 + \alpha \times \sin((\frac{t - t_1}{t_2 - t_1}) \times \beta \times pi) \tag{5.10}$$

Overall

$$m'(t) = \begin{cases} p^{'}(t) & if\ (t < |t_2/2| \\ f^{'}(t) & if\ (t \geq |t_2/2| \end{cases} \tag{5.11}$$

where,
$m'(t)$ = Modified pitch contour
$s'(t)$ = Neutral pitch contour
$p'(t)$ = Modified pitch contour at first half
$f'(t)$ = Modified pitch contour at second half
$\alpha$ = Desired maximum pitch shift
$\beta$ = Constant determines contour shape
$t$ = Current duration
$t_1$ = First duration
$t_2$ = Last duration

The variables (*α, β)* and their corresponding values used for modulating the pitch contour of Cluster 1 to 6 (left graph) are shown in Figure 5.13. It also shows the neutral and modified pitch contour separated based on the six clusters. As an example, in order to create a pitch contour resembling pitch contour of cluster 1, the neutral pitch contour is converted to target pitch contour (pitch contour of cluster 1) using Equation (5.11) with the value of the variable of *α, β* at the first half is *a ,0.1,* respectively and *α, β* at the second half is -*α,* 0.5 respectively. Every cluster has a unique variable value of β that determine the up and down contour and shape for the first half and the second half of the contour respectively. These variables value mainly contribute to the development of six pitch contour clusters in this research.

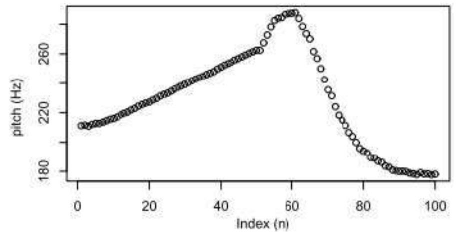
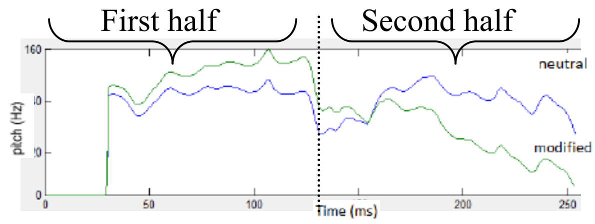
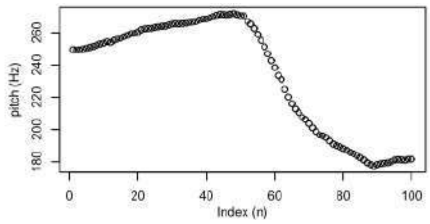
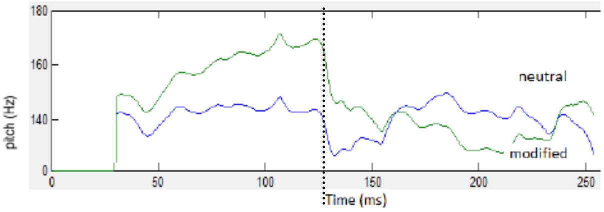
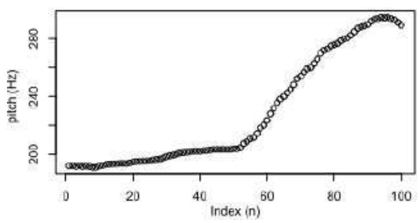
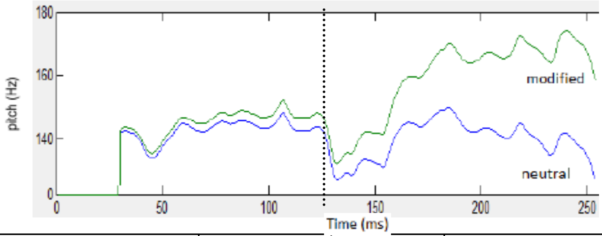
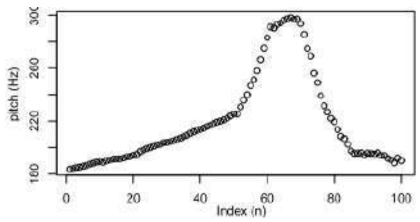
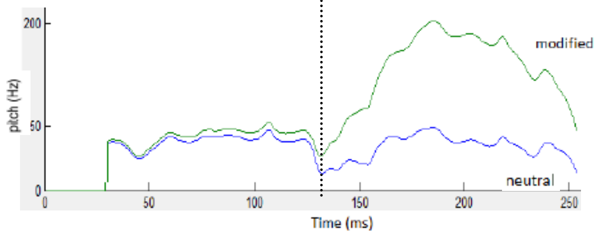
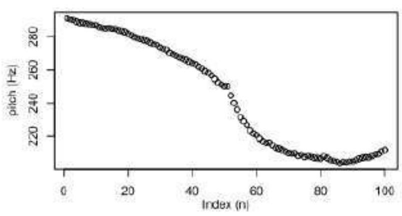
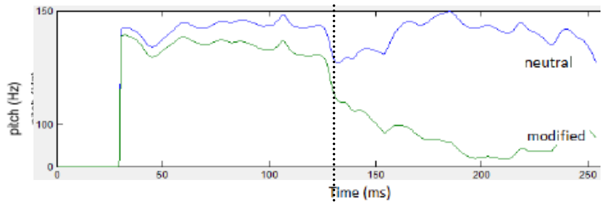
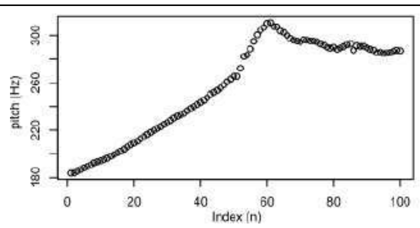
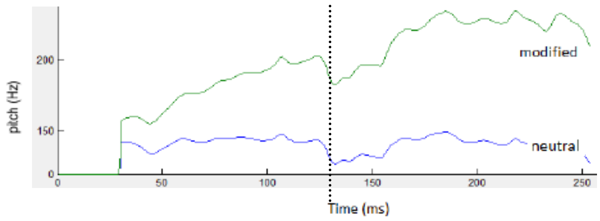
<table>
<tr><th>Clusters</th><th>α</th><th>β</th><th>α</th><th>β</th></tr>
<tr><td>Cluster 1</td><td>α</td><td>0.1</td><td>-α</td><td>0.5</td></tr>
<tr><td>
</td><td colspan="4">
</td></tr>
<tr><td>Cluster 2</td><td>α</td><td>0.2</td><td>-α</td><td>0.8</td></tr>
<tr><td>
</td><td colspan="4">
</td></tr>
<tr><td>Cluster 3</td><td>0.1</td><td>0.1</td><td>α</td><td>0.2</td></tr>
<tr><td>
</td><td colspan="4">
</td></tr>
<tr><td>Cluster 4</td><td>0.1</td><td>0.2</td><td>α</td><td>0.9</td></tr>
<tr><td>
</td><td colspan="4">
</td></tr>
<tr><td>Cluster 5</td><td>-α</td><td>0.1</td><td>-α</td><td>0.9</td></tr>
<tr><td>
</td><td colspan="4">
</td></tr>
<tr><td>Cluster 6</td><td>α</td><td>0.5</td><td>0.1</td><td>0.1</td></tr>
<tr><td>
</td><td colspan="4">
</td></tr>
</table>

Figure 5.13 Variables for modification each of pitch contour cluster

## 5.7 Summary

This chapter presented the prosody modification rule used for converting neutral speech to storytelling speech in the Malay language. A graphical user interface is developed for this experiment as can be seen in Appendix I. At the beginning of this chapter, a formula was introduced to change the tempo of the neutral speech before prosody modification rule is applied. The global and local rules are developed and the proposed rule (grammar-based rule) applied grammatical structure to extend the previous rule (local rule). Lastly, a formula to modify pitch contour (*two-steps pitch contour* formula) is also proposed to improve similarity to the desired pitch contour. The modification factor presented is very dependent on the dataset and language used. However, the step or approach used can be generalized to any dataset and language. The evaluation of synthesized speech using prosody modification rules and proposed pitch contour formulation is presented in the next chapter.

# CHAPTER SIX
# RESULTS AND EVALUATION

## 6.1 Introduction

The evaluation and results are discussed in this chapter. The purpose of the evaluation is to determine which prosody modification rule produced high quality synthesized storytelling speech and resemble the natural storytelling speech. This research recommended that the evaluations for synthesized storytelling speech are done using objective and subjective test. The variation of results from different type of test that is objective and subjective test can be compared and strengthened the final result.

The objective test is tested using Perception Evaluation of Speech Quality (PESQ) test (ITU-T, 2001; Rix, Beerends, Hollier, & Hekstra, 2001) and aspects or component test (Roekhaut et al., 2010; Taylor, 2009), while subjective test is using perception test (Verma et al., 2015; Sarkar et al., 2014). Perception test consists of naturalness, intelligibility and similarity test to compare the synthesized storytelling speech using global, local and grammar-based rule and recognition test (Verma et al., 2015) to verify the style of synthesized speech. The overview of the objective and the subjective test is shown in Table 6.1 and Table 6.2 respectively.

Table 6.1
Overview of objective test

| Evaluation | Type of evaluation | Purpose/ Objective | Data used | Evaluation method |
|---|---|---|---|---|
| PESQ test | Overall quality of speech test | Determine which prosody modification rule (global, local, or grammar-based) produced high overall quality after modification based on Mean Opinion Score (MOS) scale. | 1,044 sentences of synthesized storytelling speech (9 storytellers x 29 sentences x 4 modification rule).<br>1,044 sentence of natural storytelling speech. | PESQ score in Mean Opinion Score (MOS) |

| | | | | |
|---|---|---|---|---|
| Aspect or component test | Prosodic parameter test | Determine which prosody modification rules (global, local, and grammar-based) produced prosodic features (tempo, total duration, intensity and pitch) almost similar to the natural storytelling's prosody features. | 2 natural storytelling and 27 synthesized storytelling. | Mean prosody |
| | Pitch contour test | Determine which pitch contour formulation from baseline method or proposed formulation is able to modify pitch contour resembling the six types of pitch contour. | 226 natural pitch contours. 226 modified pitch contour (previous formula) 226 Modified pitch contour (*Two-steps formula*). | One minus the Pearson product moment correlation |

Table 6.2

Overview of subjective test

| Evaluation | Type evaluation | Purpose/ Objective | Data used | Evaluation method |
|---|---|---|---|---|
| Perception test | Naturalness, intelligibility and similarity test | Determine which modification rules (global, local and grammar-based) produced highest Mean Opinion Score (MOS) score in terms of naturalness, intelligibility and similarity. | 144 sentences of synthesized storytelling speech (4 storyteller x 12 sentences x 3 modification rule). | Mean opinion Score (MOS) |
| | Recognition test | Determine whether the grammar-based rule is able to synthesize storytelling speech and discriminate between neutral speeches. | 16 speech story (4 storytellers x 2 speech types). | Recognition accuracy (%) |

## 6.2 Perception Evaluation of Speech Quality (PESQ) Test

Perception Evaluation of Speech Quality (PESQ) is done to determine the overall quality of the synthesized speech (ITU-T, 2001; Rix et al., 2001). The same dataset comprising 1,044 sentences of synthesized storytelling speeches are used to compare the performance of all rules. The 1,044 sentences of natural speech are used as reference speech. The evaluation begins with synthesized storytelling speech using global rule for male storyteller 1. There are 29 synthesized storytelling speech sentences and 29 natural speech from reference speech are used in PESQ to calculate the overall speech quality. The result produced in PESQ is based on Mean Opinion Score (MOS) five-point scale (1: very poor, 2: poor, 3: fair, 4: good and 5: excellent). The average result in MOS for all 29 synthesized storytelling speech from the global rule for male storyteller 1 is 3.20. The evaluation is continued using other synthesized storytelling speech from different rules that are local, grammar-based only and grammar-based with limitation rule. Then, the step is repeated for each of the storytellers. The result for all the storytellers and modification rules are shown in Table 6.3.

Table 6.3
Result of PESQ test

| Storytellers | PESQ (MOS) | | | |
|---|---|---|---|---|
| | Global | Local | Grammar-based | Grammar-based + *limitation rule* |
| Male storyteller 1 | 3.20 | 3.26 | 3.09 | 3.52 |
| Male storyteller 2 | 3.68 | 3.76 | 3.54 | 4.00 |
| Male storyteller 3 | 3.16 | 3.29 | 2.91 | 3.55 |
| Female storyteller 1 | 2.63 | 2.56 | 2.45 | 2.95 |
| Female storyteller 2 | 3.19 | 3.30 | 3.07 | 3.51 |
| Female storyteller 3 | 2.97 | 2.99 | 2.67 | 3.29 |
| Female storyteller 4 | 2.98 | 3.21 | 3.04 | 3.39 |
| Female storyteller 5 | 2.72 | 2.79 | 2.51 | 3.14 |
| Female storyteller 6 | 2.52 | 2.64 | 2.37 | 2.81 |
| Average for all storytellers | 3.01 | 3.09 | 2.85 | 3.35 |

As can be seen in Table 6.3, there are improvements from global to local rule with average Mean Opinion Score (MOS) is 3.01 and 3.09, respectively. Local rule is slightly better than the global rule and grammar-based without *limitation rule* is the worst at 2.85. The grammar-based without *limitation-rule* contains speech over-exaggeration from over modification of the speech signal leading to the quality deterioration of the synthesized speech quality. Upon applying the *limitation rule* to the grammar-based, it improved the average MOS for all storytellers between 0.26 and 0.5 when subtracted with MOS of global, local and grammar-based without *limitation rule*. The improvement is because of the introduction of *limitation* rule that is able to maintain the quality of the synthesized speech. Therefore, it proved that the proposed *limitation rule* can increase the overall synthesized speech quality.

## 6.3 Evaluation with Aspects or Components Test

Aspects or component test (Roekhaut et al., 2010; Taylor, 2009) is carried out by verifying the prosodic parameters of the synthesized storytelling speech within the prosodic parameters of the natural storytelling speech. The prosodic parameters evaluated are tempo, duration, intensity, pitch and pitch contour. The pitch contour is evaluated separately from other prosodic parameters.

As for a review, in global rule, the prosodic parameters are modified for prominent syllable only while the non-prominent are not modified. In local and grammar-based rule both prominent and non-prominent are modified. Position information is used in both local and grammar-based rule, while grammar information is only used by grammar-based rule. In this section, all the prosodic parameters of synthesized storytelling speech will be tested. The aim is to determine which prosody modification rules (global, local, and grammar-based) produced prosodic features almost similar to the natural storytelling's prosody features. Global rule seems will be outperformed to be similar to natural storytelling's prosody features because it is only modified prominent syllable. Thus, this test is to compare between the local and grammar-based rule, while the global rule is optional.

### 6.3.1 Prosodic Parameters Test

In this test, prosodic parameters (tempo, duration, intensity and pitch) of synthesized storytelling speech and natural storytelling are extracted and compared. First of all, the collection of these speech files for evaluation is shown in Table 6.4.

Table 6.4

Collection speech for evaluation

| Speech | Total speech files |
|---|---|
| Natural storytelling speech | 2 (2 model storytellers x 1 story ) |
| Synthesized storytelling speech | 27 (9 storytellers x 3 modification rule x 1 story ) |

A story titled "*si angsa yang bertelur emas*" is chosen in this test. Two natural storytelling speech files from two model storytellers (male and female) are collected. For synthesized storytelling speech, 27 speech files are synthesized and acquired from the nine storytellers. A storyteller has three synthesized storytelling speech using three rules (global, local, and grammar-based). The prosodic parameters (tempo, duration, intensity and pitch) are extracted from the synthesized speech and compared as shown in Table 6.5 to Table 6.8.

Table 6.5

Result of tempo feature

| No. | Storyteller | Mean original tempo (SPS) | Synthesized tempo (mean) | | |
|---|---|---|---|---|---|
| | | | Global | Local | Grammar -based |
| 1 | Male storyteller 1 | 5.10 | 4.53 | 4.91 | 4.93 |
| 2 | Male storyteller 2 | | 4.68 | 5.28 | 4.90 |
| 3 | Male storyteller 3 | | 4.68 | 5.15 | 4.95 |
| 4 | Female storyteller 1 | 4.81 | 4.46 | 4.75 | 4.73 |
| 5 | Female storyteller 2 | | 4.46 | 4.76 | 4.75 |
| 6 | Female storyteller 3 | | 4.51 | 4.90 | 4.75 |
| 7 | Female storyteller 4 | | 4.48 | 4.87 | 4.72 |
| 8 | Female storyteller 5 | | 4.48 | 4.88 | 4.75 |
| 9 | Female storyteller 6 | | 4.51 | 4.90 | 4.78 |

The natural storytelling tempo from the model storyteller is 5.10 syllables per seconds (SPS) for male and 4.81 SPS for female. The prosody modification rule that is able to produce the mean tempo closest to the desired tempo is claimed as a better rule. Based on the results, the local and grammar-based rule produced tempo which is closest to the desired tempo. It is calculated by subtracting the tempo of the synthesized speech using global, local or grammar-based from the original tempo of the model storyteller. For example, the difference between the tempo of grammar-based rule and the original tempo is less than 0.2 SPS. Meanwhile, the difference between the tempos of global rule is up to 0.57 SPS. For tempo components, the local and grammar-based rules performed better than global rules.

Table 6.6

Results of total duration component

| No. | Storyteller | Mean original duration (s) | Synthesized duration (mean) | | |
|---|---|---|---|---|---|
| | | | Global | Local | Grammar-based |
| 1 | Male storyteller 1 | 135.55 | 152.42 | 140.4 | 138.36 |
| 2 | Male storyteller 2 | | 145.30 | 128.87 | 138.72 |
| 3 | Male storyteller 3 | | 145.49 | 132.32 | 137.28 |
| 4 | Female storyteller 1 | 143.61 | 149.78 | 147.41 | 143.74 |
| 5 | Female storyteller 2 | | 152.62 | 144.62 | 143.39 |
| 6 | Female storyteller 3 | | 150.94 | 139.06 | 143.56 |
| 7 | Female storyteller 4 | | 151.96 | 139.65 | 144.32 |
| 8 | Female storyteller 5 | | 151.96 | 139.35 | 143.56 |
| 9 | Female storyteller 6 | | 150.83 | 138.84 | 142.41 |

The total duration of the story without pause is 135.55 s and 143.61 s for male and female model, respectively. Based on the result in Table 6.6, the grammar-based rule is closest to the desired total duration because the difference is less than 4.0 s compared to global and local which produced a difference up to 17.0 s and 6.7 s, respectively. It is calculated based on subtraction of total duration for global, local and grammar-based with total duration from storyteller model. Again, global rule is outperformed by local and grammar-based rules. The average intensity feature of the original male and female model storyteller is 75.64 dB and 68.58 dB. Based on the result in Table 6.7, all the rules are able to meet the target intensity with less than 1db difference. All rules perform well for intensity.

In general, the pitch result shows that the desired pitch is not achieved for most of the storyteller using global, local and grammar-based rule. The result of grammar-based rule is influenced by the *limitation* rule, thus the pitch modification is controlled. Even it does not achieve the desired pitch; the synthesized speech is not degraded because the *limitation* rule is able to maintain its quality based on the results in Section 6.2.

Table 6.7

Results of intensity feature

| No. | Storyteller | Mean original intensity (dB) | Synthesized intensity (mean) | | |
|---|---|---|---|---|---|
| | | | Global | Local | Grammar-based |
| 1 | Male storyteller 1 | 75.64 | 76.61 | 76.63 | 75.68 |
| 2 | Male storyteller 2 | | 75.46 | 75.68 | 75.73 |
| 3 | Male storyteller 3 | | 75.24 | 75.73 | 75.71 |
| 4 | Female storyteller 1 | 68.58 | 68.44 | 68.91 | 68.76 |
| 5 | Female storyteller 2 | | 68.44 | 68.91 | 68.73 |
| 6 | Female storyteller 3 | | 68.44 | 68.91 | 68.70 |
| 7 | Female storyteller 4 | | 68.44 | 68.91 | 69.24 |
| 8 | Female storyteller 5 | | 68.44 | 68.92 | 68.52 |
| 9 | Female storyteller 6 | | 68.44 | 68.91 | 69.04 |

Table 6.8

Results of pitch feature

| No. | Storyteller | Mean original pitch (Hz) | Synthesized pitch (mean) | | |
|---|---|---|---|---|---|
| | | | Global | Local | Grammar-based |
| 1 | Male storyteller 1 | 146.39 | 151.69 | 150.46 | 149.51 |
| 2 | Male storyteller 2 | 146.39 | 136.41 | 134.46 | 134.19 |
| 3 | Male storyteller 3 | 146.39 | 175.07 | 173.09 | 172.31 |
| 4 | Female storyteller 1 | 237.33 | 159.53 | 161.18 | 160.08 |
| 5 | Female storyteller 2 | 237.33 | 188.84 | 191.55 | 190.15 |
| 6 | Female storyteller 3 | 237.33 | 210.30 | 213.06 | 211.80 |
| 7 | Female storyteller 4 | 237.33 | 237.46 | 241.12 | 239.04 |
| 8 | Female storyteller 5 | 237.33 | 238.72 | 240.64 | 240.43 |
| 9 | Female storyteller 6 | 237.33 | 194.68 | 196.96 | 196.20 |

Based on the evaluation goal, the prosody value of synthesized speech which is closest to original prosody parameter is considered as resembling the original storytelling speech. Based on the observation, the grammar-based rules show the closest value for tempo and total duration. All rules performed well for intensity. Only pitch feature did not meet the target due to maintaining the speech quality. Based on the overall results, the grammar-based rules produced most prosody parameters that resemble the natural storytelling speech for tempo, total duration and intensity.

### 6.3.2 Pitch Contour Test

The pitch contour test is to evaluate the modified pitch contour formulation (*two-steps formula*) against the baseline pitch contour formula (Verma et al., 2015; Sarkar et al., 2014). The prominent syllables of neutral speech are modified using the baseline formula to produce 124 modified pitch contours. The same step is repeated using *two-steps* formula for modification. The prominent syllables of the natural storytelling pitch contour are also extracted as a benchmark. All the pitch contour collections are shown in Table 6.9.

Table 6.9

Collection of pitch contours for evaluation

| Pitch contour | Total pitch contour |
|---|---|
| Natural pitch contour from storytelling prominent syllable | 226 |
| Modified pitch contour using baseline formula (Verma et al., 2015) | 226 |
| Modified pitch contour using *two-steps formula* | 226 |

The evaluations are done by comparing the distance between the natural pitch contour with the modified pitch contours of the baseline and *two-steps* formula**.** The distance between each pair of pitch contours is calculated using one minus the Pearson product moment correlation as in Equation (6.1) (Klabbers & Santen, 2004). This equation calculates the difference in pitch height or range by subtracting pitch contour with a mean pitch and dividing them by their standard deviation. A distance value, *D* that is closer to 1 indicates a higher similarity. The comparison results of pitch contour are shown in Table 6.10.

$$
\begin{aligned}
D &= 1 - cor\left(F_{0i}, F_{0j}\right) \\
&= 1 - \left(\frac{1}{n-1}\sum\left(\frac{F_{0i} - \overline{F}_{0i}}{sdF_{0i}}\right)\left(\frac{F_{0j} - \overline{F}_{0j}}{sdF_{0j}}\right)\right) \qquad (6.1)
\end{aligned}
$$

where,

$D$ = Distance value

$F_{0i}$ = Neutral pitch contour

$\overline{F}_{0i}$ = Mean neutral pitch contour

$F_{0j}$ = Modified pitch contour

$\overline{F}_{0j}$ = Mean modified pitch contour

$n$ = Length pitch contour

Table 6.10
Result of pitch contour comparison

| Storyteller | Baseline formula | *Two-steps* formula | Improvement |
|---|---|---|---|
| Cluster 1 | 0.78 | 0.80 | +0.02 |
| Cluster 2 | 0.77 | 0.82 | +0.05 |
| Cluster 3 | 0.75 | 0.78 | +0.03 |
| Cluster 4 | 0.81 | 0.94 | +0.13 |
| Cluster 5 | 0.77 | 0.78 | +0.01 |
| Cluster 6 | 0.73 | 0.77 | +0.04 |

Table 6.10 shows the mean result of the distance measurements achieved by baseline formula and *two-steps* formula for six clusters. As can be seen, the *two-steps* formula performed slightly better than the previous pitch contour formulation for the entire cluster based on the improvement value. It increased the similarity value (closest to one) with the natural pitch contour. Cluster 4 has increased considerably from 0.81 to 0.94.

Upon closer inspection of the results, several factors that affected the results of distance measurements are identified. In some cases, the neutral speech pitch contours spoken by the storyteller are not flat pitch contour and has pitch movement. This is due to the unnecessary emphasis on syllable during neutral speech recording**.** Upon modification of these pitch contours; the desired pitch contours are not acquired. Another factor is due to the vibrato produced by the vibrating glottis resonance of the vocal cord. The existence of vibrato in the pitch contour resulted as noises affecting the shape of the pitch contour. These two factors significantly affect the distance measurements.

## 6.4 Evaluation with Perception Test

A perceptive or subjective test is carried out to evaluate the quality of the synthesized speech (Verma et al., 2015; Sarkar et al., 2014). This test is known as listening test. Ten subjects (nine native Malay-speaking subjects, one professional subject) in the age group of 21-51 participated in the perceptive test. The mean and variance for all the ten subjects are 25.9 and 84.49, respectively. All native subjects are university students who are not directly involved in this research. Some of them have experience participating in a subjective test, while others have not. The professional subject is a senior lecturer from the Academy of Language Studies who is indirectly involved in this research. The listening test is done in offices with quiet surrounding. Bose QuietComfort 25, an acoustic noise cancelling headphone is used to prevent distraction from surrounding sounds. They can adjust the volume level themselves to suit their comfort and they can repeat listening until they are satisfied.

In this test, subjects have to listen and evaluate the synthesized storytelling speech using two perception tests. The first perceptive test is naturalness, intelligibility and similarity test. It lasted approximately 1 hour and 30 minutes including a few short breaks. Once finished, subjects were given another short break for 10 minutes before continuing the second perception test (recognition test). The recognition test only took 30 minutes.

### 6.4.1 Naturalness, Intelligibility and Similarity Test

In this test, the naturalness, intelligibility and similarity of the synthesized storytelling speech is compared to the natural storytelling speech at sentence level (Bhakat et al., 2013; Huang, 2011; Taylor, 2009). A complete 12-sentence story is synthesized using global, local and grammar-based rule for two females (FSt2 and FSt5) and two male storytellers (MSt1 and MSt3). A total of 144 sentences of synthesized storytelling speech are collected. Here, the 10 subjects are presented with both natural storytelling speech sentence and three samples (sample 1, sample 2, and sample 3) of synthesized storytelling speech sentences. The subjects are given ample time to listen to the natural storytelling speech sentence first and then judge the quality of sample 1, sample 2 and sample 3 without prior knowledge of the development of the speech sample. In this case, sample 1 is synthesized using global rules, while sample 2 and 3 are synthesized by local and grammar-based rules, respectively. Figure 6.1 shows the evaluation system presented to the subjects.

Before the evaluation sessions, the subjects are explained about all the criteria that are naturalness, intelligibility, and similarity (Huang, 2011) with notated by a, b and c, respectively. The definition of the criteria and their respected mean opinion score (MOS) (Taylor, 2009) is shown in Table 6.11.

Table 6.11
Definition of criteria

| Criteria | Description | MOS (1-5) |
|---|---|---|
| Naturalness | How natural is the synthesized speech? | 1: Robot-like to 5: Human-like |
| Intelligibility | How clear is the word pronunciation? | 1: Unrecognized to 5: Pronounced clearly |
| Similarity | How similar is the synthesized speech compared to natural storytelling speech? | 1: Not similar to 5: Very similar |

The naturalness is based on the speech quality. A score 5 to 4 is given for synthesized speech that sounds human-like or speech that doesn't sound synthesized. If the speech quality degenerated in certain syllables it can be scored 3 to 2. The score 1 is for speech with reduced speech quality and unnatural like a robot for most syllables. The MOS for naturalness provided by (Huang, 2011) is seen in Table 6.12.

Table 6.12
MOS for naturalness (Huang, 2011)

| MOS | Description |
|---|---|
| 5 | Very natural, no degradation |
| 4 | Fairly natural, little degradation |
| 3 | Somewhat natural, somewhat degradation |
| 2 | Fairly unnatural, fairly degradation |
| 1 | Very unnatural, very degradation |

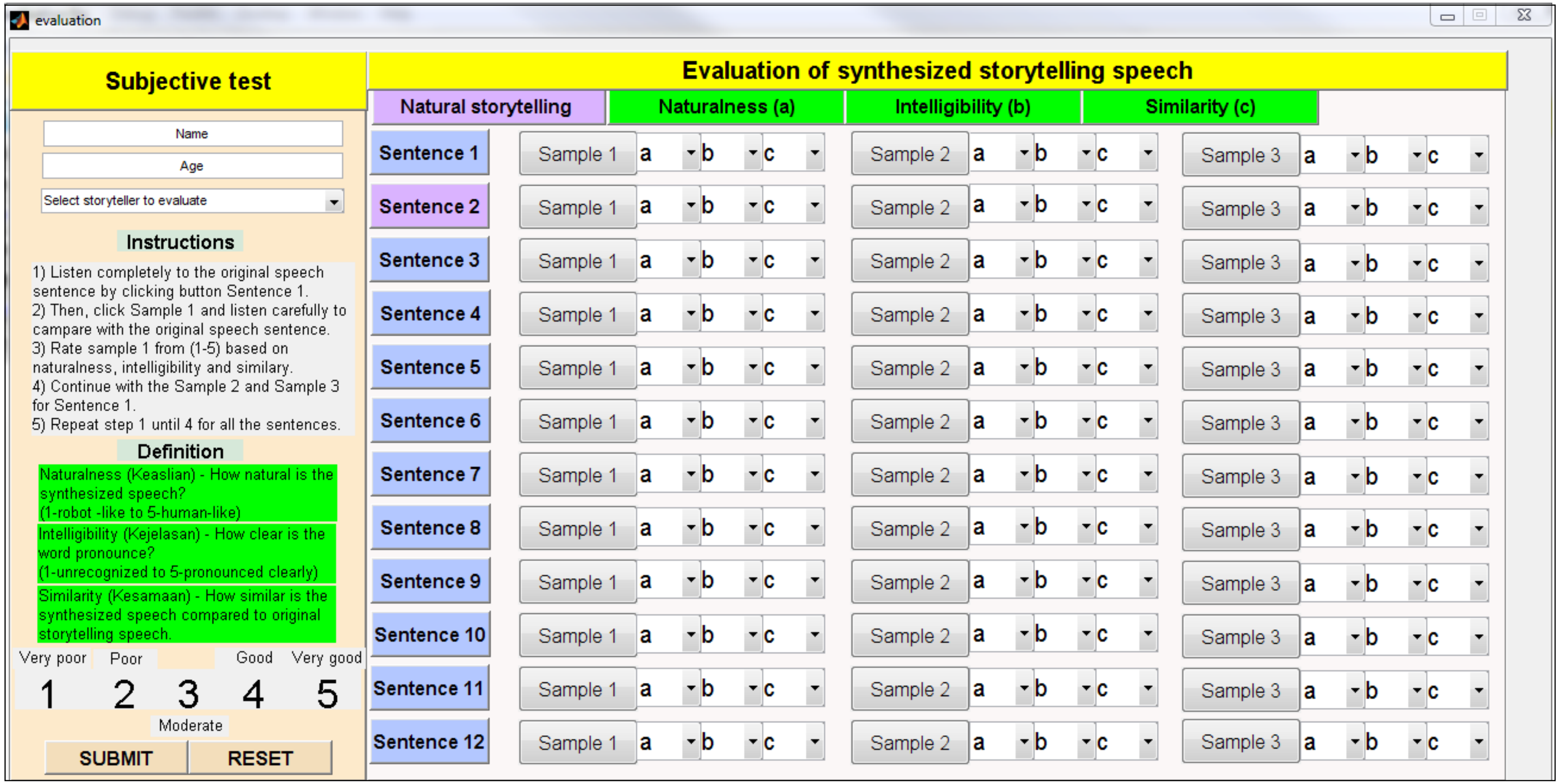


Figure 6.1: Evaluation system for listening test

Intelligibility is based on the pronunciation of the speech. All the words and syllables that are pronounced clearly can be scored 5 to 4. In other words, the subject can write back the all words correctly. The score 3 to 2 is given if there is one or two words not pronounced clearly or confusing but able to recognize the word or syllable. The score 1 is given for unrecognized word. The MOS for intelligibility (Taylor, 2009) is in Table 6.13.

Table 6.13
MOS for intelligibility (Taylor, 2009)

| MOS | Description |
|---|---|
| 5 | Pronounced very clearly |
| 4 | Fairly pronounced clearly |
| 3 | Somewhat clearly, somewhat unclear but recognizable |
| 2 | Somewhat clearly, somewhat confusing but recognizable |
| 1 | Unrecognized word |

The similarity is based on resemblance between the natural storytelling speeches with the synthesized storytelling speech. If the synthesized speech resembles the natural storytelling speech, the score is given 5 or 4. As an example, if the natural storytelling speech sentence stressed at two syllables and the synthesized speech is also able to stress the same syllables at the correct positions, that two speeches is considered similar to each other even when spoken by different storytellers. The score 3 or 2 is given if the similarity is only at certain prominent syllables. The score 1 is given if the tempo and the intonation are very different. (Huang, 2011) provides the MOS for similarity as in Table 6.14.

Table 6.14
MOS for similarity (Huang, 2011)

| Scale | Description |
|---|---|
| 5 | Similar |
| 4 | Fairly similar |
| 3 | Somewhat similar but not intrusive |
| 2 | Fairly dissimilar, somewhat intrusive |
| 1 | Different, very intrusive |

The results for the first perception test from the native and professional subjects are given in Table 6.15 and Table 6.16, respectively. The results for all subjects are in Appendix J.

Table 6.15

Result from nine native subjects

| Prosodic rule | Naturalness | Intelligibility | Similarity |
|---|---|---|---|
| Global | 3.40 | 3.95 | 3.47 |
| Local | 3.50 | 4.03 | 3.58 |
| Grammar-based | 4.11 | 4.47 | 4.06 |

Table 6.16

Result from a professional subject

| Prosodic rule | Naturalness | Intelligibility | Similarity |
|---|---|---|---|
| Global | 3.77 | 3.81 | 3.19 |
| Local | 3.65 | 3.50 | 3.02 |
| Grammar-based | 3.81 | 3.77 | 3.27 |

The results from the native subjects show that the grammar-based rule produced higher result from the global and local rule for all criteria. Grammar-based rule is also able to increase the naturalness result to 4.11 as compared to global rule at 3.40 and local rule at 3.50. This indicates that synthesized speech using grammar-based rules sound more human-like. The intelligibility also shows MOS score of 4.47. Meanwhile, the intelligibility of global and local rules is only at 3.95 and 4.03, respectively. Grammar-based rules showed improvement in terms of pronunciation. For similarity criteria, the grammar-based rules gain more similarity compared to global and local rule with MOS of 4.06. It showed enhancement from the global and local rule with the MOS of 3.47 and 3.58, respectively. Overall, the incorporation of grammatical structure in the proposed modification rule resulted in a better performance compared to other rules.

The same result acquired from the professional subject showed grammar-based rule is better. The professional subject gives higher result for the grammar-based rule at 3.81, and 3.27 for naturalness and similarity, respectively. However, the global rule shows higher MOS for intelligibility at 3.81 compared to grammar-based rule at 3.77. The synthesized storytelling speech from global and local rule sometimes produced over-exaggeration, speech dragging, and quality speech is degenerated which reduce the naturalness, intelligibility and similarity. Grammar-based rule also have that same problem but is able to reduce in most cases for better speech quality.

### 6.4.2 Recognition Test

The recognition test is to recognize and categorize the neutral speech and synthesized storytelling speech using grammar-based rule (Verma et al., 2015; Sarkar et al., 2014). This test is to prove that the synthesized storytelling speech using the grammar-based rule is able to produce storytelling speech style and discriminate between neutral speech. The subjects have to categorize a complete story in sample 1 and sample 2 and decide which one is presented in the storytelling style. The synthesized storytelling is randomly displayed in sample 1 or sample 2. Four decisions must be done based on four storytellers comprising two females (FSt5 and FSt3) and two male storytellers (MST3 and MSt1). A system developed to run the recognition test is shown in Figure 6.2.

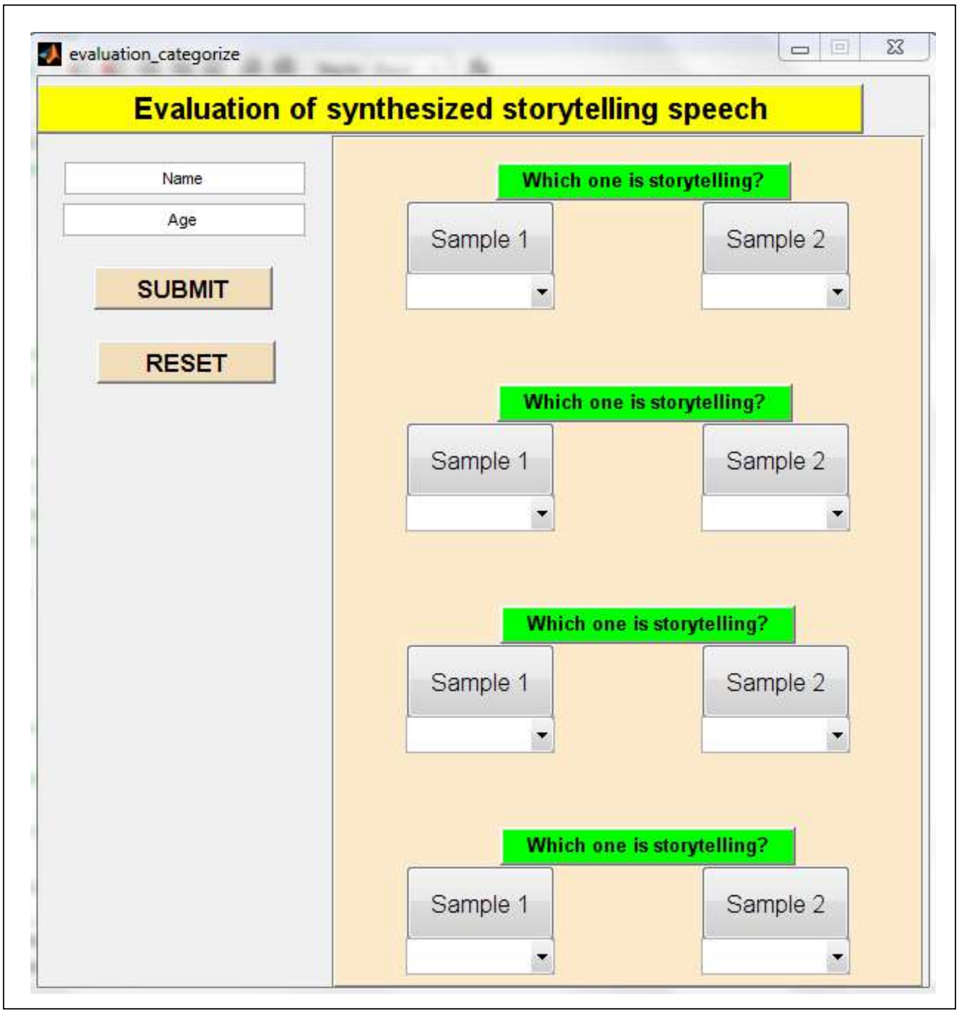


Figure 6.2 Evaluation system for recognition test

The results of the recognition test are given in Table 6.17. It is calculated using Equation (6.2).

$$Recognition\ Accuracy = \frac{Total\ correctly\ classified\ storytelling\ speech}{Total\ expected\ storytelling\ speech\ style} \quad (6.2)$$

Table 6.17
Recognition accuracy

| Subjects | Calculation | Recognition Accuracy (%) |
|---|---|---|
| Native speakers | 33 correctly recognized / (4 x 9 subjects) = 33 / 36 | 92% |
| Professional | 4 correctly recognized / (4 x 1 subjects) = 4 / 4 | 100% |

The results of the recognition test are divided into two subjects (native and professional). Based on the 9 native speakers, 33 storytelling speeches are correctly recognized from the total of 36 synthesized speech producing recognition accuracy of 92%. Three synthesized speeches are incorrectly recognized. The reason is the subjects cannot find the difference between neutral speech and the synthesized storytelling speech. A professional subject is able to correctly recognized four storytelling speeches from four comparisons. Thus, the recognition accuracy is 100%. Based on the result, it proved that the grammar-based rule is able to produce storytelling style with high accuracy rate.

## 6.5 Summary

The result of the synthesized storytelling is evaluated and discussed in this chapter. Based on the PESQ test, aspects or component test and perception test, the grammar-based rule is able to increase the naturalness, intelligibility, and similarity comparable to the natural storytelling speech and can produce synthesized speech in storytelling style without decreasing the speech quality.

# CHAPTER SEVEN
# CONCLUSION AND FUTURE WORKS

## 7.1 Introduction

This chapter summarized and concluded the research presented in this thesis and discusses the direction of future work. This thesis has addressed the challenge of developing the storytelling speech synthesis in explicit approach. An improved prosody modification rule (grammar-based rule) is introduced which integrate with grammatical structure information. This research also introduced a new pitch contour formulation (*two-steps* formula) by improving the baseline pitch formulation to gain higher similarity to the desired six cluster pitch contours. The Perception Evaluation of Speech Quality (PESQ) test, aspect or components test and the perceptive test showed that grammar-based rule achieved the highest similarity with respect to the natural storytelling speech as discussed is in Chapter Six. This chapter summarized the work executed in this research, the main contributions, findings and achievements, its significance and the limitations of the research framework. The future work for enhancement is discussed at the end of this chapter.

## 7.2 Review of Objectives

The problems associated with the storytelling speech synthesis are emphasized in Chapter 1 and Chapter 2. The main objective of this research is to develop storytelling speech synthesis for Malay language using explicit control. In order to accomplish this, several specific objectives were derived and achieved:

**Objective 1: To identify the suitable prosody modification factor of Malay language storytelling speech synthesis.**

This objective is achieved through an experiment on prosody modification factor for duration and pitch. The range of pitch and duration prosody modification factors are identified and shown in Figure 5.9 in Section 5.6. The ranges are then used as *limitation rules* and used to synthesize storytelling speech.

**Objective 2: To construct an improved prosody modification rules for Malay language storytelling speech synthesis.**

Objective 2 is achieved through the development of prosody modification rules that incorporates limitation rules and grammatical structure information to reduce over-exaggeration and improve similarity results. The rule is called grammar-based prosody modification rule. A new formulation of the pitch contour (*two-steps* formula) is also introduced that is able to convert a shape of pitch contour resembling the standard six types of pitch contour clusters.

**Objective 3: To recommend a comprehensive evaluations of the synthesized storytelling speech.**

The objective is fulfilled through the recommended evaluation of synthesized storytelling speech by including the objective and subjective test. The objective test contains PESQ test and aspects or component test, while subjective test using perception and recognition test. The criteria considered for evaluation are overall quality, naturalness, intelligibility and similarity of the synthesized storytelling speech from grammar-based, global and local rules.

## 7.3 Summary of Research Findings

Storytelling speech synthesis is not a new research area which has attracted attention since 2001 (Silva et al., 2001). However, this is the first attempt of the development of storytelling speech synthesis in the Malay language. The current state in the Malay language is emotional speech synthesis (Mustafa et al., 2014). The literature review finds that storytelling developed by explicit control have problems of quality degeneration in some cases and the similarity result of the synthesized speech can be improved (Verma et al., 2015; Sarkar et al., 2014; Theune et al., 2006).

The syllabification technique of Malay language discovers that several syllables exist in front rather than the middle or end of a word. These syllables always produce confusion during syllabification. Hence, *MustFront* rule is proposed to reduce the word error rate (WER) from syllabification. Based on the analysis of storytelling speech in the Malay language, several tempo of storytelling speech is faster than neutral speech. It contradicts with the previous researcher (Verma et al., 2015; Sarkar et al., 2014; Theune et al., 2006). However, the intensity and pitch features are increased in storytelling speech style similar to other researchers (Verma et al., 2015; Sarkar et al., 2014). The analysis of the pitch contour of prominent syllable finds that around 30% of the pitch contour are not classified to any of the six standard pitch contour clusters (Klabbers & Santen, 2004). These pitch contours belong to other cluster in a small numbers. It can also be further investigated for better understanding of Malay storytelling speech.

During the determination of prominent syllable, the literature mentioned that prominent syllable exist in word categories noun, verb, adjective, and adverb (Roekhaut et al., 2010). In Theune et al. (2006) work, only adjective and adverb are stated as prominent syllables. After features analysis and prominent syllable detection on Malay storytelling speech datasets, word categories such as preposition, classifiers, demonstrative pronouns, auxiliary and intensifier are also found to contain prominent syllable with unique modification factors.

The integration of the grammatical structure in grammar-based prosody modification rules is able to increase the similarity result as compared to local and global rule. The *limitation* rule also contributes to reduce the over-exaggeration and improve the speech quality. The proposed pitch contour formula (*two-steps* formula) produced pitch contour resembling the natural pitch contour as compared to baseline pitch contour methods. Based on the overall evaluation result, the grammar-based rule is able to synthesize storytelling speech that resembles natural storytelling speech and increase the speech quality. It also proved that the synthesized speech produced is in storytelling speaking style.

## 7.4 Contributions of The Research

This research introduced an improved prosody modification rule to develop storytelling speech synthesis for the Malay language. Having achieved the objectives of this research, several key contributions are made. The contributions of this research are showed in Figure 7.1 and summarized as follows:

i. The three datasets (TXT_DATA, NEUTRAL_DATA, and STORY_DATA) are created from the Malay language speech. The Malay language is still considered as an under-resourced language (Besacier et al., 2014) due to lack of available resources for research. The newly created speech datasets can be added to the digital resources of Malay language and publically made available. These datasets can be used for further research in neutral and storytelling speech in the Malay language in the area of speech recognition and speech synthesis.

ii. The improvement in syllabification of the Malay language. The proposed rule called *Mustfront* rules in syllabification method is able to reduce the word error rate (WER).

iii. Introduced *limitation* rule that provide solutions in order to reduce over-exaggeration and increase the speech quality.

iv. The introduction of the grammatical structure of grammar-based rule has significantly increased the similarity to the natural storytelling speech.

v. An improved formulation of pitch contour called *two-steps* formula is able to increase similarity value to the natural pitch contour. It can be used to formulate pitch contour of other expressive speech.

vi. Recommend a comprehensive evaluation of the synthesized storytelling speech by including the objective and subjective test.

vii. Presenting the first storytelling speech synthesis for the Malay language which can enrich the knowledge of speech in the Malay language.

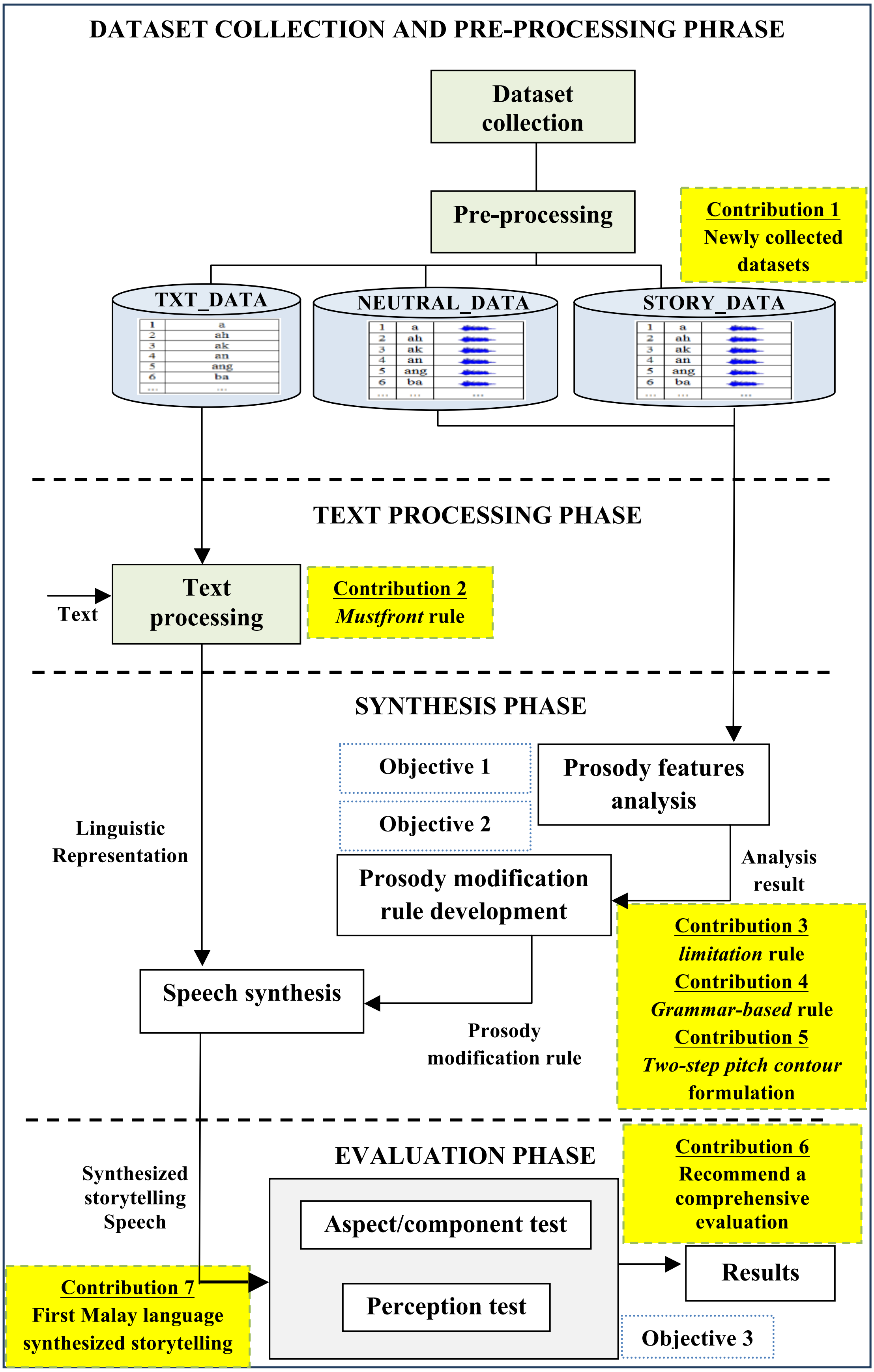



Figure 7.1 Contribution based on phases

## 7.5 Research Limitation

The storytelling speech synthesis is developed based on three stories in which the syllables in the dataset are limited. Due to this limitation, not all syllables can match the entire context in the speech and will cause unnatural speech. As for now, the syllables are limited to the story's scripts.

The text processing performs text normalization only for number (1 to 10) and alphabetic words. The dates, acronyms, abbreviations and non-standard word are not handled. The phrasification is only based on the comma in the last text, not based on text context.

The pitch contour of a prominent syllable is only modified based on six clusters of pitch contour based on Klabbers & Santen (2004) in expressive speech. Around 30% of it is uncategorized and not modified. Only the recognized pitch contours are modified based on the six pitch contour cluster using the proposed pitch contour formulation named as *two-steps* formula.

The grammar-based rule is language-dependent which cannot be generalized to other languages. To use grammar-based rule, a language need to do speech analysis based on grammar information of the specified language. The steps and instructions are provided in this research for the guideline.

## 7.6 Future Research Enhancement

Although this research presented the potential model in explicit control to develop storytelling speech synthesis, further research remains to be done. In this research, the storytelling speech synthesis is built using explicit control. Instead of explicit control, there is other two other expressive approaches in the literature such as implicit control and playback approach. This other expressive approach may be used in the future research to compare the most effective approach for Malay storytelling speech synthesis.

The developed storytelling speech synthesis needs to acquire more speech syllables in the datasets for analysis and synthesis. The variation of the speech syllable will be increased and able to synthesize more variations of the user text input. Therefore, more story or tales should be recorded and included in the datasets. The quality of the recorded speech should also be improved. The speech recording should be improved with high-quality recording devices with professional handling and soundproof recording studio.

The number of synthesized stories and subjects used for evaluation need to be increased for better result. The selection of storytelling model is based on a group of children. The selection method can be enhanced by conducting the survey using bigger group of children.

Naturally, storytelling speech presented is of type descriptive mode, dialogue mode, narrative mode, emotion, suspense and climax. This research only handled narrative mode. To produce a real presentation of storytelling speech, all the elements need to be included in the future to the storytelling speech synthesis.

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# APPENDICES

# APPENDIX A

## Script For The Stories

### Si Angsa Yang Bertelur Emas (Story 1)

1. Suatu masa dahulu, tinggal seorang petani yang memelihara seekor angsa.
2. Pada suatu hari, ketika itu dia ingin mengambil telur angsanya.
3. Si petani mendapati telur itu kelihatan aneh.
4. Warnanya kuning keemasan dan berat!
5. Dia menyangka jirannya cuba bergurau lalu bercadang untuk membuang telur itu.
6. Namun selepas berfikir, dia membawa telur itu pulang ke rumah untuk diperiksa.
7. Si petani berasa terkejut apabila mendapati itu adalah telur emas!
8. Si petani sungguh gembira.
9. Hari demi hari selepas itu, si angsa terus bertelur emas.
10. Si petani mula menjadi tamak.
11. Si petani mengambil pisau dan menyembelih angsa bertuahnya.
12. Apabila mendapati tiada sebiji pun telur emas di dalam perut angsa itu, si petani mula menyedari kesilapannya dan berasa sangat menyesal.

### Anjing Dan Bayang-Bayang (Story 2)

1. Suatu hari seekor anjing terjumpa seketul daging.
2. Dia menggonggong daging itu di mulut untuk memakannya di tempat yang selamat.
3. Dalam perjalanan, dia lalu di tepi anak sungai.
4. Semasa berjalan anjing itu melihat ke dalam air.
5. Ada seekor anjing lain dengan daging di mulutnya di dalam air itu.
6. Dia tidak tahu itu ialah bayang-bayangnya sendiri.
7. Dia mahu mendapatkan daging itu.
8. Dia pun menyalak kepada anjing di dalam air.
9. Sebaik saja dia membuka mulut, daging di mulutnya terjatuh ke dalam air.

**Semut Dan Merpati (Story 3)**

1. Seekor semut yang kehausan ingin meminum air dari air terjun yang berhampiran.
2. Namun, nasibnya malang apabila kakinya tergelincir dan terjatuh di dalam air terjun yang deras.
3. Apabila dia hampir-hampir lemas, seekor merpati yang bertenggek tidak jauh dari pokok itu menjatuhkan sehelai daun.
4. Semut itu pun memanjat ke atas daun tersebut dan akhirnya tiba dengan selamat di tebing sungai.
5. Beberapa hari kemudian, seorang pemburu melihat seekor merpati dan ingin menembaknya.
6. Namun, semut terlihat akan perlakuan pemburu itu.
7. Semut pun lantas menggigit kaki pemburu itu dan tembakannya tersasar.
8. Merpati yang terdengar jeritan pemburu itu segera terbang beredar dari situ.

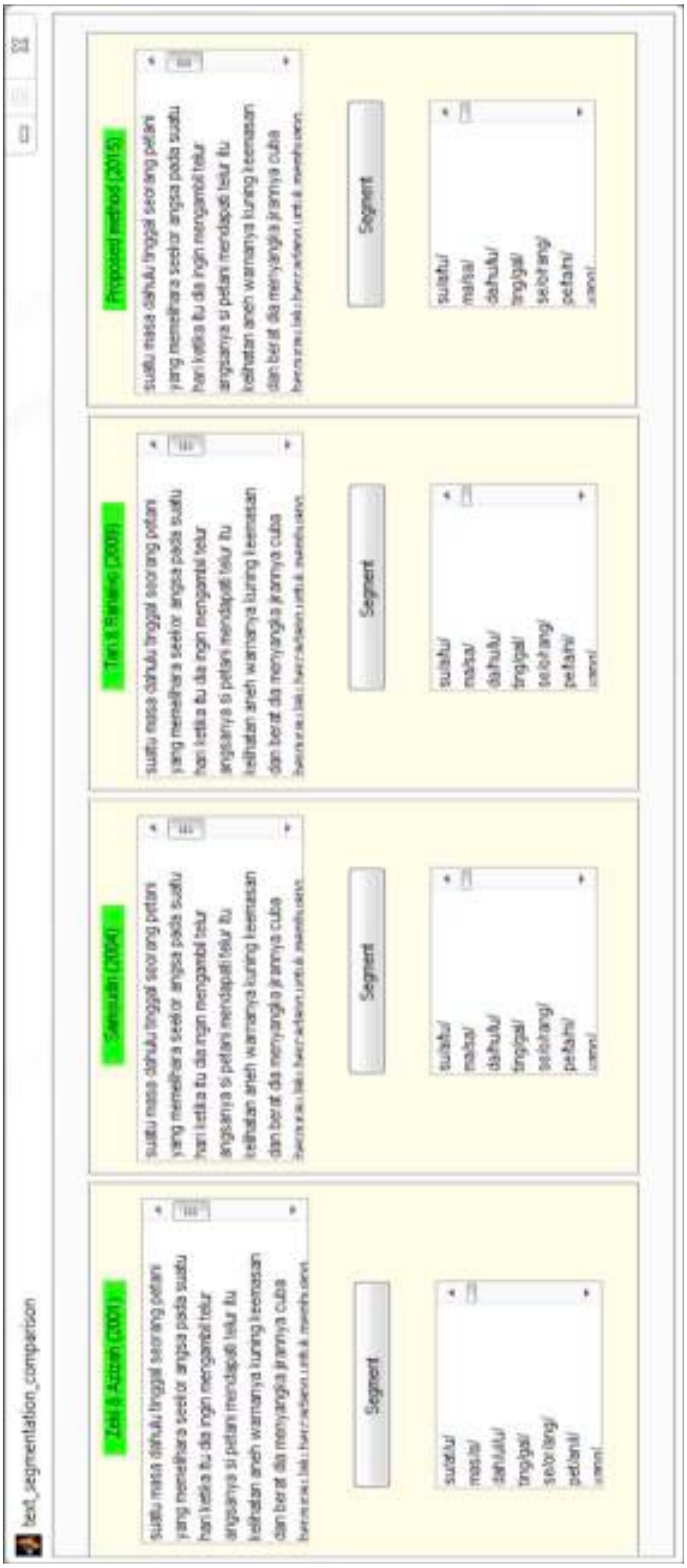
# APPENDIX B

### Syllable In Txt_Data

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 31. | gem | 61. | kir | 91. | mu | 121. | pir | 141. | se |
| 2. | ah | 32. | gi | 62. | kok | 92. | mun | 122. | po | 142. | sen |
| 3. | ak | 33. | ging | 63. | kor | 93. | mut | 123. | pu | 143. | si |
| 4. | an | 34. | git | 64. | ku | 94. | na | 124. | pun | 144. | sib |
| 5. | ang | 35. | gong | 65. | la | 95. | nak | 125. | ra | 145. | su |
| 6. | ba | 36. | gu | 66. | lah | 96. | nan | 126. | ran | 146. | sung |
| 7. | bak | 37. | guh | 67. | lai | 97. | neh | 127. | rang | 147. | ta |
| 8. | bang | 38. | ha | 68. | lak | 98. | nem | 128. | ras | 148. | tan |
| 9. | be | 39. | ham | 69. | lam | 99. | ngai | 129. | rat | 149. | tas |
| 10. | ber | 40. | hat | 70. | lan | 100. | ngam | 130. | rau | 150. | te |
| 11. | bi | 41. | hau | 71. | lang | 101. | ngan | 131. | ri | 151. | tem |
| 12. | bil | 42. | he | 72. | le | 102. | ngar | 132. | rik | 152. | teng |
| 13. | bing | 43. | hir | 73. | li | 103. | ngat | 133. | ru | 153. | ter |
| 14. | bu | 44. | hu | 74. | lih | 104. | ngin | 134. | rus | 154. | ti |
| 15. | but | 45. | i | 75. | lin | 105. | ni | 135. | rut | 155. | ting |
| 16. | ca | 46. | ik | 76. | lu | 106. | ning | 136. | sa | 156. | tu |
| 17. | cir | 47. | in | 77. | lur | 107. | num | 137. | sal | 157. | tuh |
| 18. | cu | 48. | ir | 78. | lut | 108. | nya | 138. | san | 158. | tuk |
| 19. | da | 49. | ja | 79. | ma | 109. | nyang | 139. | sar | 159. | tul |
| 20. | dak | 50. | jat | 80. | mah | 110. | nye | 1310. | sau | 160. | uh |
| 21. | dan | 51. | je | 81. | mak | 111. | nyem | 131. | pir | 161. | un |
| 22. | dang | 52. | ji | 82. | man | 112. | o | 132. | po | 162. | wa |
| 23. | dar | 53. | jing | 83. | mas | 113. | pa | 133. | pu | 163. | war |
| 24. | de | 54. | jum | 84. | mat | 114. | pan | 134. | pun | 164. | yang |
| 25. | di | 55. | jun | 85. | me | 115. | pas | 135. | ra | | |
| 26. | e | 56. | jut | 86. | mem | 116. | pat | 136. | ran | | |
| 27. | fi | 57. | ka | 87 | men | 117. | pe | 137. | rang | | |
| 28. | gal | 58. | kan | 88. | meng | 118. | pem | 138. | ras | | |
| 29. | ge | 59. | ke | 89. | mer | 119. | per | 139. | rat | | |
| 30. | gek | 60. | ki | 90. | mi | 120. | pi | 140. | rau | | |

# APPENDIX C

## Text Segmentation Comparison



# APPENDIX D

## Pause (Phrase & Sentence Level)

## Male Professional Speaker (MSt3)

| | Pauses (Phrase & Sentence level) | | |
|---|---|---|---|
| | Story 1: Si angsa yang bertelur emas | | Speaker: Prof Khalil |
| | Neutral speech | | |
| | Pause (phase level) | Pause (sentence level) | Total of word |
| Sentence 1 | 0.66 | 1.27 | 10 |
| Sentence 2 | 0.56 | 1.12 | 10 |
| Sentence 3 | x | 1.02 | 7 |
| Sentence 4 | x | 1.20 | 5 |
| Sentence 5 | x | 0.77 | 11 |
| Sentence 6 | 0.43 | 0.83 | 12 |
| Sentence 7 | x | 0.67 | 10 |
| Sentence 8 | x | 0.80 | 4 |
| Sentence 9 | 0.36 | 0.59 | 10 |
| Sentence 10 | x | 0.75 | 5 |
| Sentence 11 | x | 0.65 | 8 |
| Sentence 12 | 0.33 | x | 21 |
| Average | 0.47 | 0.88 | 113 |

| | Storytelling speech | | |
|---|---|---|---|
| | Pause (phase level) | Pause (sentence level) | Total of word |
| Sentence 1 | 0.54 | 0.76 | 10 |
| Sentence 2 | 0.46 | 0.52 | 10 |
| Sentence 3 | x | 0.68 | 7 |
| Sentence 4 | x | 0.63 | 5 |
| Sentence 5 | x | 0.72 | 11 |
| Sentence 6 | 0.56 | 0.64 | 12 |
| Sentence 7 | x | 0.56 | 10 |
| Sentence 8 | x | 0.65 | 4 |
| Sentence 9 | 0.26 | 0.47 | 10 |
| Sentence 10 | x | 0.49 | 5 |
| Sentence 11 | x | 0.51 | 8 |
| Sentence 12 | 0.30 | x | 21 |
| Average | 0.42 | 0.60 | 113 |

| | Pauses (Phrase & Sentence level) | | |
|---|---|---|---|
| | Story 2: Anjing dan bayang-bayang | | Speaker: Prof Khalil |
| | Neutral speech | | |
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.83 | 7 |
| Sentence 2 | x | 0.55 | 12 |
| Sentence 3 | 0.12 | 0.52 | 8 |
| Sentence 4 | x | 0.49 | 8 |
| Sentence 5 | x | 0.62 | 12 |
| Sentence 6 | x | 0.53 | 8 |
| Sentence 7 | x | 0.51 | 5 |
| Sentence 8 | x | 0.42 | 8 |
| Sentence 9 | 0.27 | x | 12 |
| Average | 0.19 | 0.56 | 80 |

| | Storytelling speech | | |
|---|---|---|---|
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.51 | 7 |
| Sentence 2 | x | 0.58 | 12 |
| Sentence 3 | 0.25 | 0.44 | 8 |
| Sentence 4 | x | 0.57 | 8 |
| Sentence 5 | x | 0.54 | 12 |
| Sentence 6 | x | 0.51 | 8 |
| Sentence 7 | x | 0.45 | 5 |
| Sentence 8 | x | 0.39 | 8 |
| Sentence 9 | 0.33 | x | 12 |
| Average | 0.29 | 0.50 | 80 |

| | Pauses (Phrase & Sentence level) | | |
|---|---|---|---|
| | Story 3: Semut dan merpati | | Speaker: Prof Khalil |
| | Neutral speech | | |
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.64 | 12 |
| Sentence 2 | 0.28 | 0.67 | 14 |
| Sentence 3 | 0.28 | 0.51 | 17 |
| Sentence 4 | x | 0.67 | 16 |
| Sentence 5 | 0.24 | 0.52 | 11 |
| Sentence 6 | 0.18 | 0.73 | 7 |
| Sentence 7 | x | 0.47 | 10 |
| Sentence 8 | x | x | 11 |
| Average | 0.25 | 0.60 | 98 |

| | Storytelling speech | | |
|---|---|---|---|
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.61 | 12 |
| Sentence 2 | 0.38 | 0.54 | 14 |
| Sentence 3 | 0.34 | 0.53 | 17 |
| Sentence 4 | x | 0.62 | 16 |
| Sentence 5 | 0.42 | 0.58 | 11 |
| Sentence 6 | 0.26 | 0.47 | 7 |
| Sentence 7 | x | 0.34 | 10 |
| Sentence 8 | x | x | 11 |
| Average | 0.35 | 0.53 | 98 |

## Rate-Of-Speech (Ros)

## Male Professional Speaker (MSt3)

| Rate of speech (ROS) |
|---|
| Story 1: Si angsa yang bertelur emas |
| Speaker: Prof Khalil |

| | Neutral speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 8.32 | 2.77 | 5.55 | 27 | 4.87 |
| Sentence 2 | 7.54 | 2.09 | 5.45 | 24 | 4.41 |
| Sentence 3 | 6.19 | 1.93 | 4.26 | 18 | 4.22 |
| Sentence 4 | 4.99 | 2.08 | 2.91 | 12 | 4.12 |
| Sentence 5 | 8.85 | 2.06 | 6.78 | 27 | 3.98 |
| Sentence 6 | 9.14 | 2.36 | 6.79 | 28 | 4.13 |
| Sentence 7 | 8.98 | 2.35 | 6.63 | 27 | 4.07 |
| Sentence 8 | 3.54 | 1.04 | 2.50 | 9 | 3.60 |
| Sentence 9 | 7.12 | 1.62 | 5.50 | 21 | 3.82 |
| Sentence 10 | 3.70 | 1.09 | 2.61 | 11 | 4.22 |
| Sentence 11 | 6.65 | 1.44 | 5.21 | 20 | 3.84 |
| Sentence 12 | 15.31 | 3.14 | 12.18 | 52 | 4.27 |
| Sum | 90.32 | 23.96 | 66.37 | 276 | 4.13 |
| | | | | | Average |

| | Storytelling speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 7.11 | 0.95 | 6.16 | 27 | 4.38 |
| Sentence 2 | 5.18 | 0.52 | 4.66 | 24 | 5.15 |
| Sentence 3 | 4.18 | 0.98 | 3.20 | 18 | 5.62 |
| Sentence 4 | 3.84 | 0.87 | 2.97 | 12 | 4.04 |
| Sentence 5 | 6.58 | 1.68 | 4.91 | 27 | 5.50 |
| Sentence 6 | 6.95 | 1.58 | 5.37 | 28 | 5.21 |
| Sentence 7 | 5.71 | 1.15 | 4.55 | 27 | 5.93 |
| Sentence 8 | 2.18 | 0.65 | 1.54 | 9 | 5.85 |
| Sentence 9 | 5.41 | 1.01 | 4.41 | 21 | 4.77 |
| Sentence 10 | 2.32 | 0.63 | 1.69 | 11 | 6.50 |
| Sentence 11 | 4.74 | 0.51 | 4.23 | 20 | 4.73 |
| Sentence 12 | 12.13 | 1.59 | 10.54 | 52 | 4.93 |
| Sum | 66.34 | 12.11 | 54.23 | 276 | 5.22 |
| | | | | | Average |

## Rate of speech (ROS)

Story 2: Anjing dan bayang-bayang

Speaker: Prof Khalil

| | Neutral speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 7.20 | 1.66 | 5.54 | 18 | 3.25 |
| Sentence 2 | 8.82 | 1.39 | 7.43 | 25 | 3.36 |
| Sentence 3 | 5.60 | 0.98 | 4.63 | 17 | 3.67 |
| Sentence 4 | 6.10 | 1.29 | 4.81 | 18 | 3.74 |
| Sentence 5 | 7.89 | 1.22 | 6.67 | 24 | 3.60 |
| Sentence 6 | 5.64 | 0.92 | 4.72 | 19 | 4.03 |
| Sentence 7 | 4.15 | 0.92 | 3.24 | 12 | 3.71 |
| Sentence 8 | 5.15 | 0.72 | 4.43 | 16 | 3.61 |
| Sentence 9 | 7.62 | 0.63 | 6.99 | 26 | 3.72 |
| Sum | 58.17 | 9.72 | 48.45 | 175 | 3.63 |
| | | | | | Average |

| | Storytelling speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 5.74 | 1.03 | 4.71 | 18 | 3.82 |
| Sentence 2 | 6.94 | 1.14 | 5.80 | 25 | 4.31 |
| Sentence 3 | 4.21 | 0.69 | 3.52 | 17 | 4.83 |
| Sentence 4 | 4.41 | 0.76 | 3.65 | 18 | 4.94 |
| Sentence 5 | 5.58 | 0.76 | 4.83 | 24 | 4.97 |
| Sentence 6 | 4.08 | 0.72 | 3.36 | 19 | 5.65 |
| Sentence 7 | 2.27 | 0.45 | 1.82 | 12 | 6.58 |
| Sentence 8 | 2.94 | 0.39 | 2.55 | 16 | 6.26 |
| Sentence 9 | 5.68 | 0.62 | 5.06 | 26 | 5.14 |
| Sum | 41.86 | 6.56 | 35.30 | 175 | 5.17 |
| | | | | | Average |

| Rate of speech (ROS) |
|---|
| Story 3: Semut dan merpati |
| Speaker: Prof Khalil |

| | Neutral speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 10.64 | 2.12 | 8.53 | 28 | 3.28 |
| Sentence 2 | 11.84 | 2.50 | 9.34 | 32 | 3.43 |
| Sentence 3 | 13.29 | 2.01 | 11.28 | 41 | 3.63 |
| Sentence 4 | 11.26 | 2.10 | 9.16 | 32 | 3.49 |
| Sentence 5 | 9.91 | 1.55 | 8.36 | 32 | 3.83 |
| Sentence 6 | 6.42 | 1.43 | 4.99 | 18 | 3.61 |
| Sentence 7 | 8.69 | 1.24 | 7.45 | 23 | 3.09 |
| Sentence 8 | 8.38 | 0.76 | 7.62 | 26 | 3.41 |
| Sum | 80.43 | 13.71 | 66.73 | 232 | 3.47 |
| | | | | | Average |

| | Storytelling speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 8.19 | 1.60 | 6.59 | 28 | 4.25 |
| Sentence 2 | 8.82 | 1.47 | 7.34 | 32 | 4.36 |
| Sentence 3 | 9.47 | 1.19 | 8.28 | 41 | 4.95 |
| Sentence 4 | 7.92 | 1.39 | 6.53 | 32 | 4.90 |
| Sentence 5 | 6.74 | 1.37 | 5.36 | 32 | 5.97 |
| Sentence 6 | 4.25 | 1.01 | 3.25 | 18 | 5.55 |
| Sentence 7 | 6.65 | 0.90 | 5.75 | 23 | 4.00 |
| Sentence 8 | 5.17 | 0.25 | 4.93 | 26 | 5.28 |
| Sum | 57.21 | 9.19 | 48.03 | 232 | 4.91 |
| | | | | | Average |

# APPENDIX E

## Pause (Phrase & Sentence Level)

## Female Storyteller (FSt5)

| | Pauses (Phrase & Sentence level) | | |
|---|---|---|---|
| | Story 1: Si angsa yang bertelur emas | | Speaker: Cikgu Dila |
| | Neutral speech | | |
| | Pause (phase level) | Pause (sentence level) | Total of word |
| Sentence 1 | 0.52 | 0.71 | 10 |
| Sentence 2 | 0.52 | 0.74 | 10 |
| Sentence 3 | x | 0.98 | 7 |
| Sentence 4 | x | 0.84 | 5 |
| Sentence 5 | x | 0.95 | 11 |
| Sentence 6 | 0.16 | 1.32 | 12 |
| Sentence 7 | x | 0.62 | 10 |
| Sentence 8 | x | 0.82 | 4 |
| Sentence 9 | 0.33 | 0.75 | 10 |
| Sentence 10 | x | 0.51 | 5 |
| Sentence 11 | x | 0.84 | 8 |
| Sentence 12 | 0.49 | x | 21 |
| Average | 0.40 | 0.83 | 113 |

| | Storytelling speech | | |
|---|---|---|---|
| | Pause (phase level) | Pause (sentence level) | Total of word |
| Sentence 1 | 0.23 | 0.73 | 10 |
| Sentence 2 | 0.21 | 0.70 | 10 |
| Sentence 3 | x | 0.67 | 7 |
| Sentence 4 | x | 0.80 | 5 |
| Sentence 5 | x | 0.53 | 11 |
| Sentence 6 | 0.32 | 0.74 | 12 |
| Sentence 7 | x | 0.71 | 10 |
| Sentence 8 | x | 0.51 | 4 |
| Sentence 9 | 0.14 | 0.57 | 10 |
| Sentence 10 | x | 0.78 | 5 |
| Sentence 11 | x | 0.71 | 8 |
| Sentence 12 | 0.40 | x | 21 |
| Average | 0.26 | 0.68 | 113 |

| | Pauses (Phrase & Sentence level) | | |
|---|---|---|---|
| | Story 2: Anjing dan bayang-bayang | | Speaker: Cikgu Dila |
| | Neutral speech | | |
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.78 | 7 |
| Sentence 2 | x | 0.74 | 12 |
| Sentence 3 | 0.20 | 0.66 | 8 |
| Sentence 4 | x | 0.91 | 8 |
| Sentence 5 | x | 0.88 | 12 |
| Sentence 6 | x | 0.78 | 8 |
| Sentence 7 | x | 0.63 | 5 |
| Sentence 8 | x | 0.78 | 8 |
| Sentence 9 | 0.36 | x | 12 |
| Average | 0.28 | 0.77 | 80 |

| | Storytelling speech | | |
|---|---|---|---|
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.60 | 7 |
| Sentence 2 | x | 0.67 | 12 |
| Sentence 3 | 0.14 | 0.59 | 8 |
| Sentence 4 | x | 0.64 | 8 |
| Sentence 5 | x | 0.88 | 12 |
| Sentence 6 | x | 0.51 | 8 |
| Sentence 7 | x | 0.56 | 5 |
| Sentence 8 | x | 0.51 | 8 |
| Sentence 9 | 0.35 | x | 12 |
| Average | 0.25 | 0.62 | 80 |

| | Pauses (Phrase & Sentence level) | | |
|---|---|---|---|
| | Story 3: Semut dan merpati | | Speaker: Cikgu Dila |
| | Neutral speech | | |
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.69 | 12 |
| Sentence 2 | 0.12 | 0.80 | 14 |
| Sentence 3 | 0.42 | 0.91 | 17 |
| Sentence 4 | x | 0.73 | 16 |
| Sentence 5 | 0.40 | 0.94 | 11 |
| Sentence 6 | x | 0.81 | 7 |
| Sentence 7 | x | 0.82 | 10 |
| Sentence 8 | x | x | 11 |
| Average | 0.31 | 0.81 | 98 |

| | Storytelling speech | | |
|---|---|---|---|
| | Pause (phrase level) | Pause (sentence level) | Total of word |
| Sentence 1 | x | 0.57 | 12 |
| Sentence 2 | 0.29 | 0.75 | 14 |
| Sentence 3 | 0.40 | 0.55 | 17 |
| Sentence 4 | x | 0.63 | 16 |
| Sentence 5 | 0.32 | 0.59 | 11 |
| Sentence 6 | 0.23 | 0.51 | 7 |
| Sentence 7 | x | 0.43 | 10 |
| Sentence 8 | x | x | 11 |
| Average | 0.31 | 0.57 | 98 |

**Rate-Of-Speech (Ros)**

**Female Storyteller (FSt5)**

## Rate of speech (ROS)

Story 1: Si angsa yang bertelur emas

Speaker: Cikgu Dila

| | Neutral speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 7.78 | 1.62 | 6.16 | 27 | 4.38 |
| Sentence 2 | 7.21 | 1.43 | 5.78 | 24 | 4.15 |
| Sentence 3 | 5.64 | 1.78 | 3.86 | 18 | 4.67 |
| Sentence 4 | 4.32 | 1.17 | 3.15 | 12 | 3.81 |
| Sentence 5 | 8.41 | 1.47 | 6.95 | 27 | 3.89 |
| Sentence 6 | 8.92 | 2.11 | 6.81 | 28 | 4.11 |
| Sentence 7 | 7.78 | 1.52 | 6.26 | 27 | 4.32 |
| Sentence 8 | 3.05 | 0.82 | 2.24 | 9 | 4.02 |
| Sentence 9 | 6.44 | 1.20 | 5.24 | 21 | 4.01 |
| Sentence 10 | 3.80 | 0.76 | 3.04 | 11 | 3.62 |
| Sentence 11 | 6.45 | 1.45 | 5.00 | 20 | 4.00 |
| Sentence 12 | 14.60 | 2.02 | 12.58 | 52 | 4.13 |
| Sum | 84.40 | 17.33 | 67.07 | 276 | 4.09 |
| | | | | | Average |

| | Storytelling speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 7.09 | 1.22 | 5.87 | 27 | 4.60 |
| Sentence 2 | 5.73 | 0.91 | 4.82 | 24 | 4.98 |
| Sentence 3 | 4.07 | 1.06 | 3.02 | 18 | 5.97 |
| Sentence 4 | 3.65 | 0.93 | 2.72 | 12 | 4.41 |
| Sentence 5 | 6.73 | 1.03 | 5.70 | 27 | 4.73 |
| Sentence 6 | 7.25 | 1.26 | 5.99 | 28 | 4.67 |
| Sentence 7 | 6.70 | 1.20 | 5.49 | 27 | 4.92 |
| Sentence 8 | 2.39 | 0.51 | 1.88 | 9 | 4.79 |
| Sentence 9 | 4.83 | 0.82 | 4.02 | 21 | 5.23 |
| Sentence 10 | 2.98 | 0.78 | 2.20 | 11 | 5.00 |
| Sentence 11 | 5.12 | 0.94 | 4.18 | 20 | 4.78 |
| Sentence 12 | 11.77 | 1.72 | 10.05 | 52 | 5.17 |
| Sum | 68.31 | 12.36 | 55.95 | 276 | 4.94 |
| | | | | | Average |

| Rate of speech (ROS) |
|---|
| Story 2: Anjing dan bayang-bayang |
| Speaker: Cikgu Dila |

| | Neutral speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 6.28 | 1.43 | 4.85 | 18 | 3.71 |
| Sentence 2 | 8.66 | 1.15 | 7.51 | 25 | 3.33 |
| Sentence 3 | 5.73 | 0.95 | 4.78 | 17 | 3.56 |
| Sentence 4 | 5.67 | 1.12 | 4.56 | 18 | 3.95 |
| Sentence 5 | 7.02 | 1.00 | 6.02 | 24 | 3.98 |
| Sentence 6 | 5.79 | 1.09 | 4.70 | 19 | 4.04 |
| Sentence 7 | 3.95 | 0.63 | 3.32 | 12 | 3.62 |
| Sentence 8 | 5.06 | 1.12 | 3.94 | 16 | 4.06 |
| Sentence 9 | 7.40 | 0.69 | 6.71 | 26 | 3.87 |
| Sum | 55.58 | 9.17 | 46.40 | 175 | 3.79 |
| | | | | | Average |

| | Storytelling speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 5.22 | 0.69 | 4.53 | 18 | 3.97 |
| Sentence 2 | 6.93 | 0.95 | 5.98 | 25 | 4.18 |
| Sentence 3 | 4.11 | 0.73 | 3.38 | 17 | 5.03 |
| Sentence 4 | 4.31 | 0.64 | 3.67 | 18 | 4.90 |
| Sentence 5 | 5.26 | 0.62 | 4.65 | 24 | 5.16 |
| Sentence 6 | 4.98 | 0.72 | 4.25 | 19 | 4.47 |
| Sentence 7 | 2.51 | 0.56 | 1.95 | 12 | 6.15 |
| Sentence 8 | 3.54 | 0.51 | 3.03 | 16 | 5.28 |
| Sentence 9 | 5.21 | 0.45 | 4.76 | 26 | 5.46 |
| Sum | 42.08 | 5.87 | 36.21 | 175 | 4.96 |
| | | | | | Average |

| Rate of speech (ROS) |
|---|
| Story 3: Semut dan merpati |
| Speaker: Cikgu Dila |

| | Neutral speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 9.55 | 1.66 | 7.89 | 28 | 3.55 |
| Sentence 2 | 10.02 | 1.52 | 8.50 | 32 | 3.77 |
| Sentence 3 | 12.80 | 1.94 | 10.86 | 41 | 3.77 |
| Sentence 4 | 10.28 | 1.82 | 8.46 | 32 | 3.78 |
| Sentence 5 | 9.62 | 1.62 | 7.99 | 32 | 4.00 |
| Sentence 6 | 5.52 | 1.20 | 4.32 | 18 | 4.17 |
| Sentence 7 | 8.07 | 1.74 | 6.34 | 23 | 3.63 |
| Sentence 8 | 7.87 | 0.99 | 6.88 | 26 | 3.78 |
| Sum | 73.73 | 12.48 | 61.25 | 232 | 3.81 |
| | | | | | Average |

| | Storytelling speech | | | | |
|---|---|---|---|---|---|
| Sentence | Sentence duration (Sec) | Pause (sec) | Sentence - pause (Sec) | Syllable | ROS (Syl/sec) |
| Sentence 1 | 7.12 | 0.91 | 6.21 | 28 | 4.51 |
| Sentence 2 | 8.75 | 1.32 | 7.43 | 32 | 4.31 |
| Sentence 3 | 9.14 | 1.16 | 7.98 | 41 | 5.14 |
| Sentence 4 | 8.77 | 1.29 | 7.48 | 32 | 4.28 |
| Sentence 5 | 7.75 | 1.17 | 6.58 | 32 | 4.86 |
| Sentence 6 | 4.88 | 0.75 | 4.13 | 18 | 4.35 |
| Sentence 7 | 6.29 | 0.99 | 5.31 | 23 | 4.33 |
| Sentence 8 | 6.02 | 0.15 | 5.87 | 26 | 4.43 |
| Sum | 58.73 | 7.74 | 50.99 | 232 | 4.53 |
| | | | | | Average |

# APPENDIX F

## Prominent Syllables Detection By A Linguistic

## Si angsa yang bertelur emas (Story 1)

1. Suatu masa dahu**lu**, tinggal seorang peta**ni** yang memeliha**ra** seekor ang**sa**.
2. Pada suatu ha**ri**, ketika itu dia ingin mengambil telur angsa**nya**.
3. Si peta**ni** mendapati telur itu kelihatan a**neh**.
4. Warnanya kuning keema**san** dan **be**rat!
5. Dia menyang**ka** jirannya cuba bergu**rau** lalu bercadang untuk membu**ang** telur itu.
6. Namun selepas berfi**kir**, dia memba**wa** telur i**tu** pulang ke rumah untuk diperik**sa**.
7. Si petani berasa terke**jut** apabila mendapati i**tu** adalah telur e**mas**!
8. Si petani **sung**guh gembi**ra**.
9. Hari demi hari selepas itu, si angsa **te**rus bertelur e**mas**.
10. Si petani mula menjadi ta**mak**.
11. Si petani mengambil pisau dan menyembe**lih** angsa bertuah**nya**.
12. Apabila mendapa**ti** tiada sebiji pun telur e**mas** di dalam perut angsa i**tu**, si petani mula menyedari kesilapannya dan berasa **sa**ngat menye**sal**.

## Anjing dan bayang-bayang (Story 2)

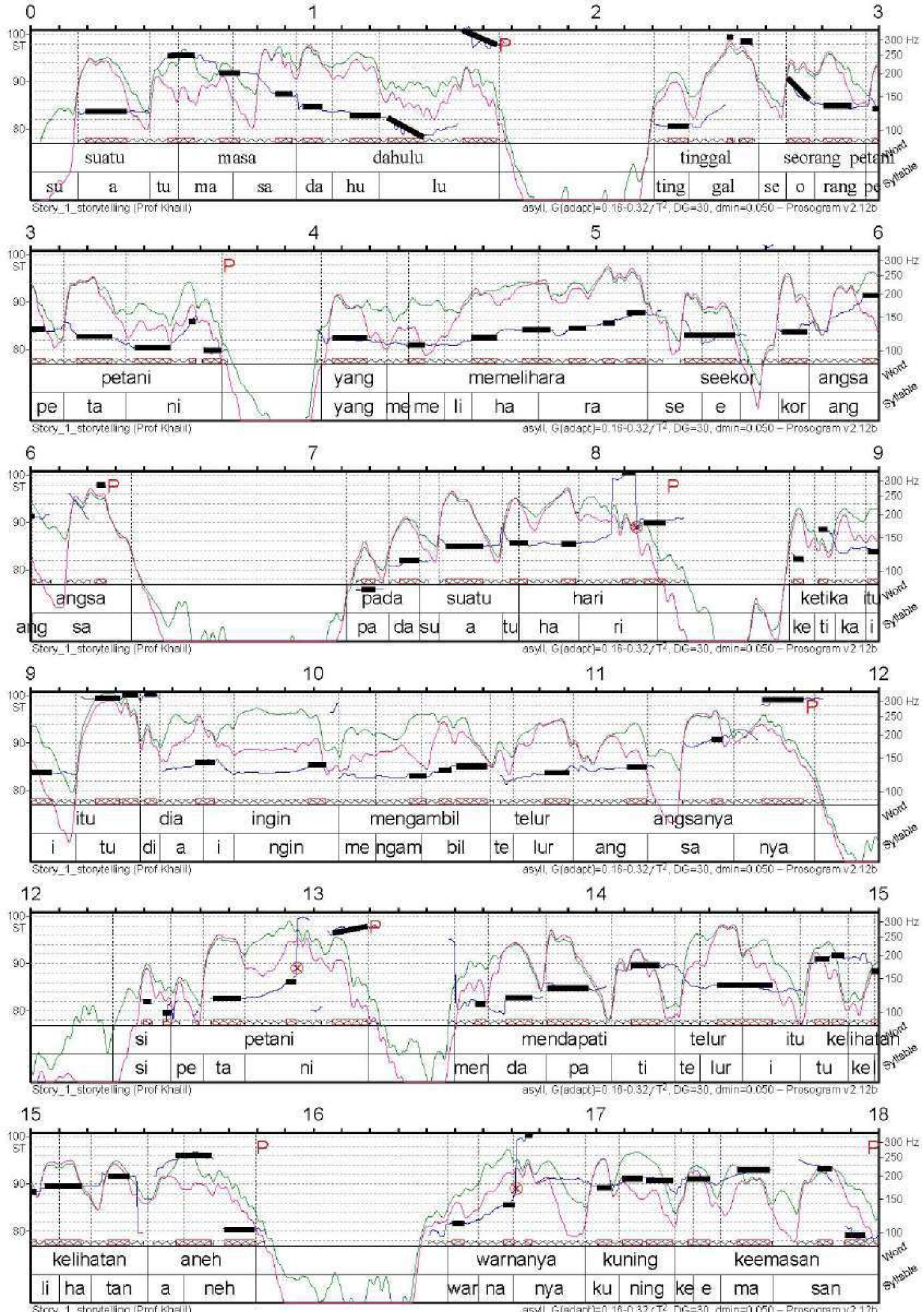
1. Suatu ha**ri** seekor an**jing** terjum**pa** seketul da**ging**.
2. Dia menggonggong daging i**tu** di mu**lut** untuk memakannya di tempat yang sela**mat**.
3. Dalam perjala**nan**, dia lalu di tepi anak sun**gai**.
4. Semasa berja**lan** anjing itu melihat ke dalam a**ir**.
5. Ada seekor anjing la**in** dengan daging di mulut**nya** di dalam air itu.
6. Dia tidak ta**hu** itu ialah bayang-bayangnya sendi**ri**.
7. Dia ma**hu** mendapatkan daging itu.
8. Dia pun menya**lak** kepada anjing di dalam air.
9. Seba**ik** saja dia membuka mu**lut**, daging di mulut**nya** terja**tuh** ke dalam air.

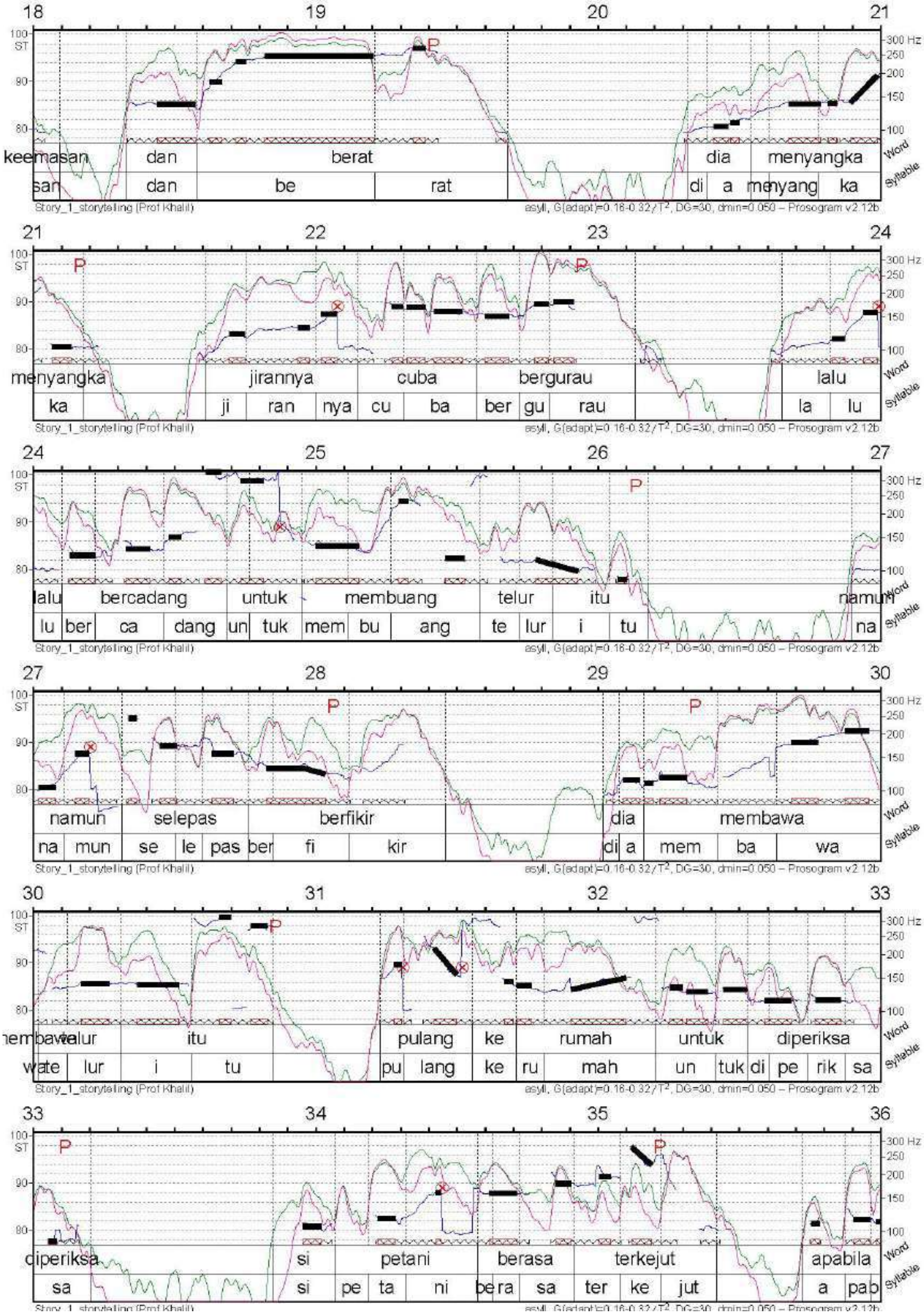
# APPENDIX G

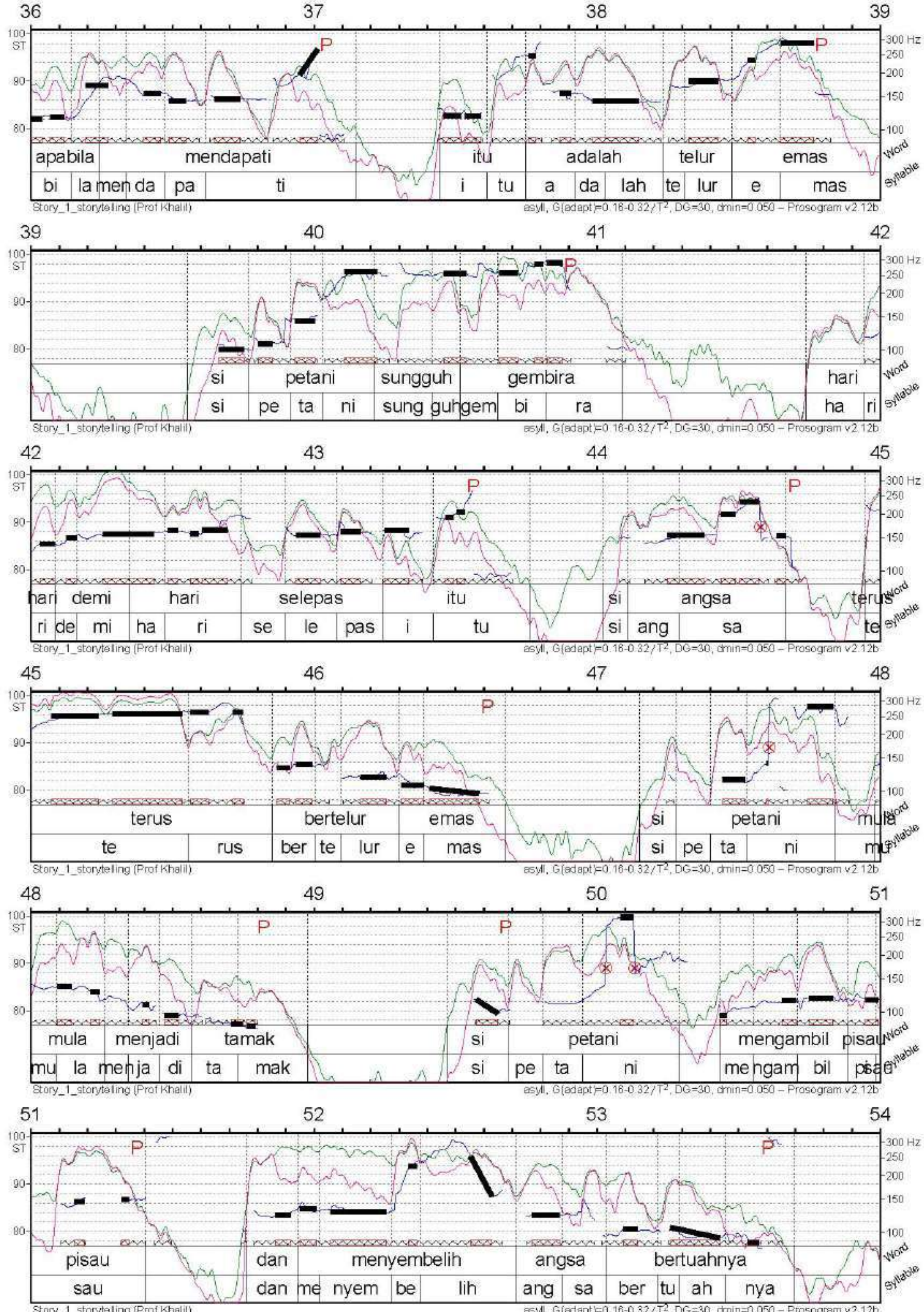
## Prominent Syllable Detection By Prosogram

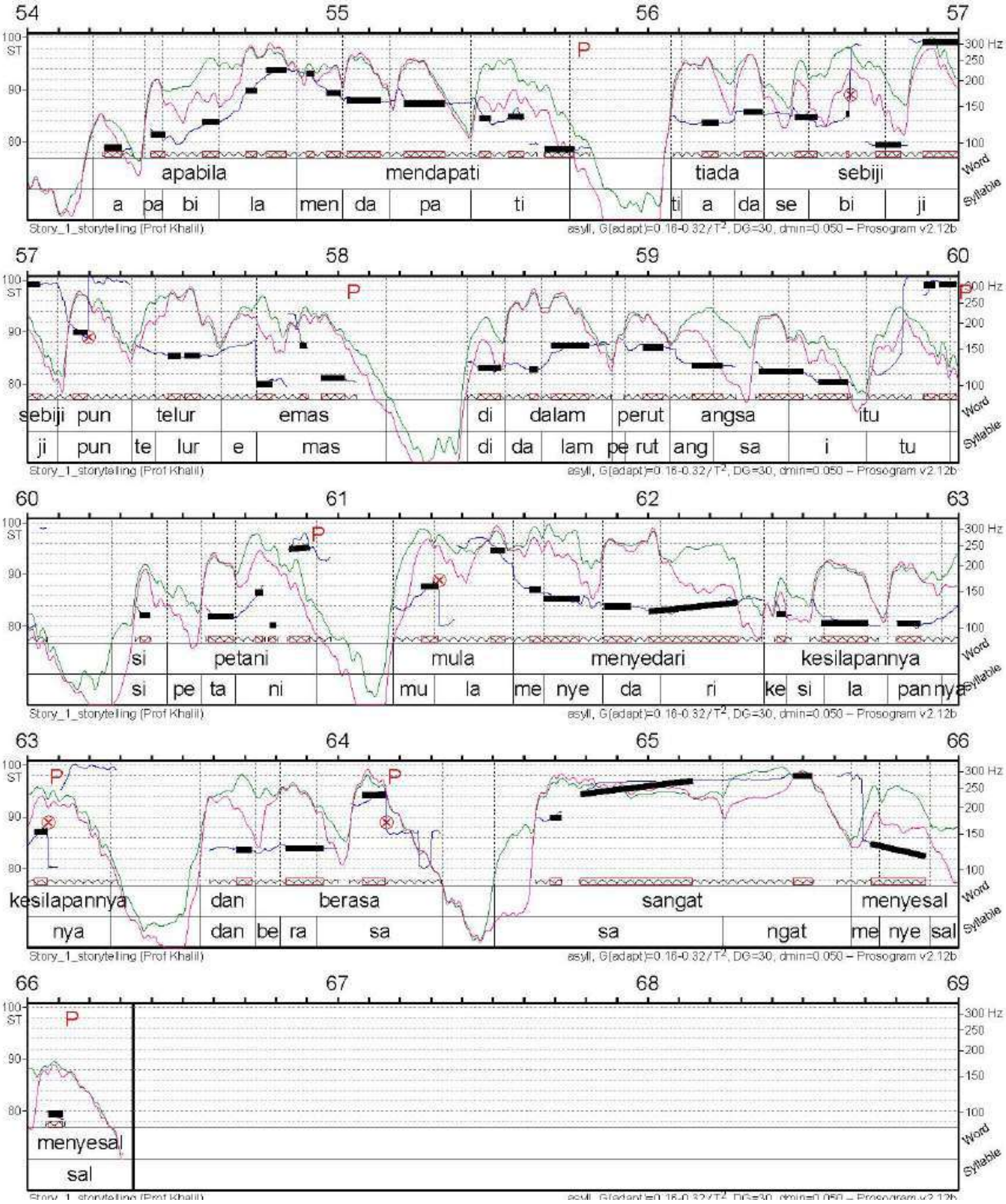
### Male Storyteller 3 (MST3)

### Si Angsa Yang Bertelur Emas (Story 1)



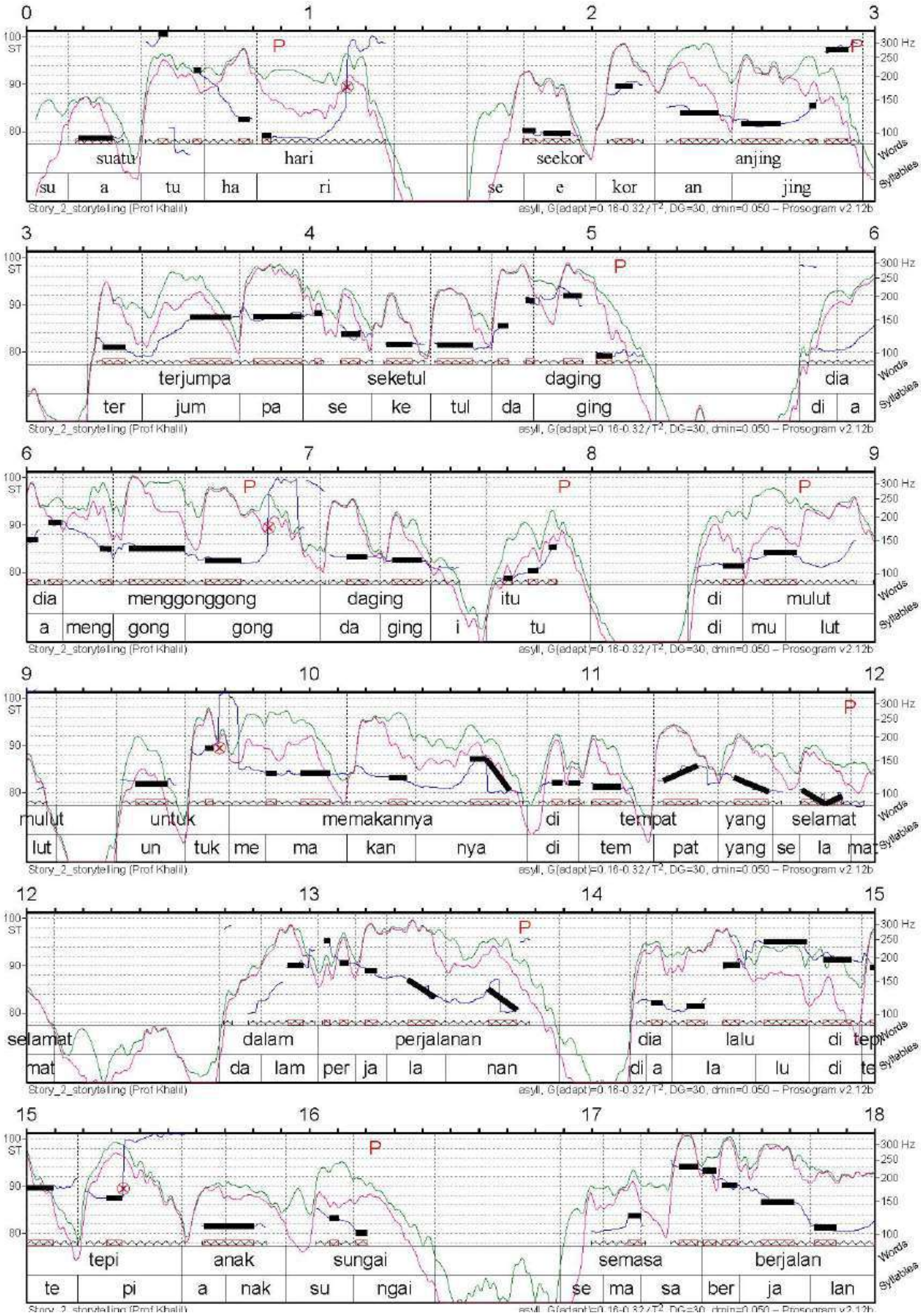

18 19 20 21
keemasan dan berat dia menyangka
san dan be rat di a me nyang ka
Story_1_storytelling (Prof Khalil)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b
21 22 23 24
menyangka jirannya cuba bergurau lalu
ka ji ran nya cu ba ber gu rau la lu
24 25 26 27
lalu bercadang untuk membuang telur itu namun
lu ber ca dang un tuk mem bu ang te lur i tu na
27 28 29 30
namun selepas berfikir dia membawa
na mun se le pas ber fi kir di a mem ba wa
30 31 32 33
membawa telur itu pulang ke rumah untuk diperiksa
wa te lur i tu pu lang ke ru mah un tuk di pe rik sa
33 34 35 36
diperiksa si petani berasa terkejut apabila
sa si pe ta ni be ra sa ter ke jut a pab

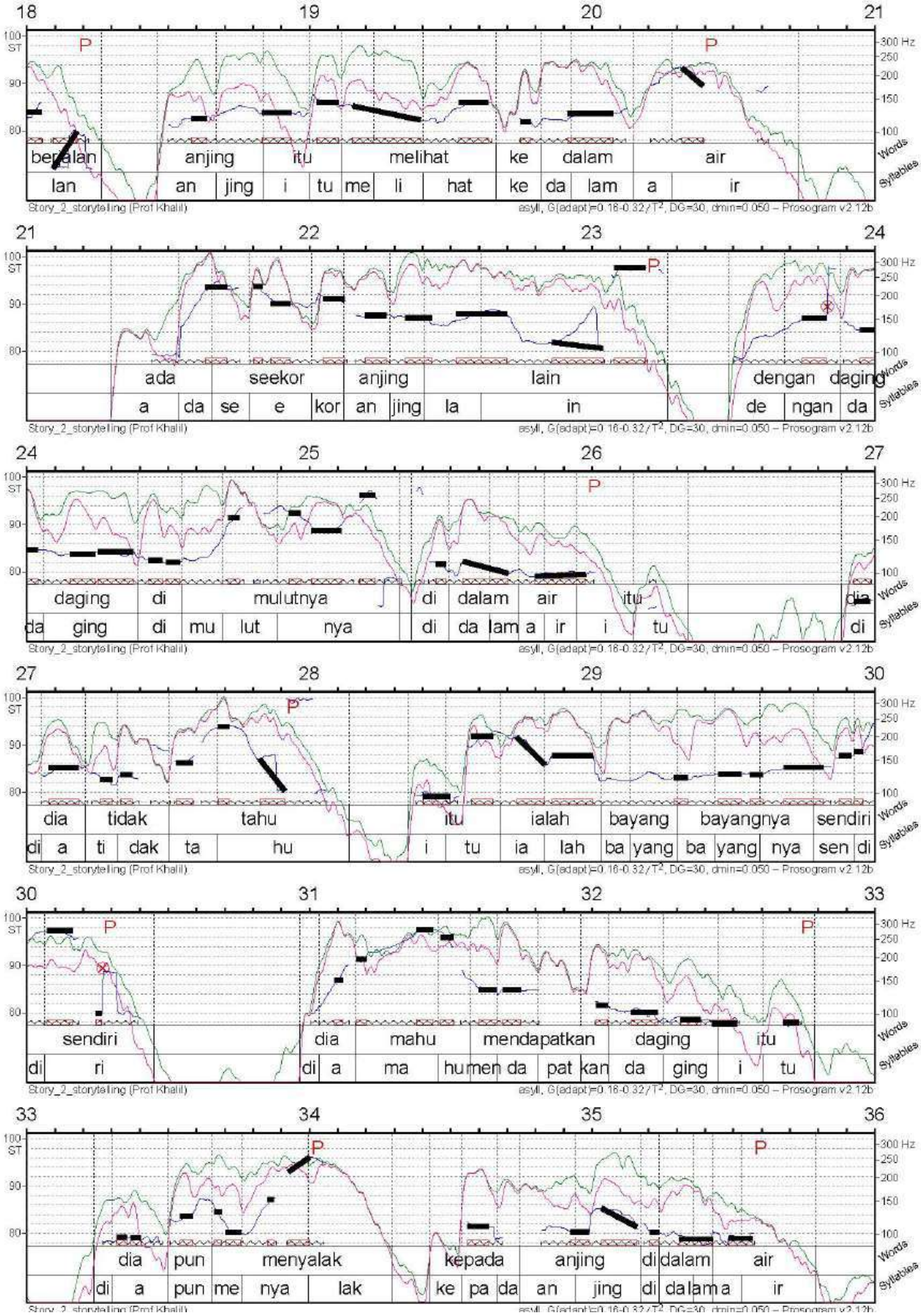

36 37 38 39
apabila mendapati itu adalah telur emas
bi la men da pa ti i tu a da lah te lur e mas
Story_1_storytelling (Prof Khalil)
39 40 41 42
si petani sungguh gembira hari
si pe ta ni sung guh gem bi ra ha ri
Story_1_storytelling (Prof Khalil)
42 43 44 45
hari demi hari selepas itu si angsa terus
ri de mi ha ri se le pas i tu si ang sa te
Story_1_storytelling (Prof Khalil)
45 46 47 48
terus bertelur emas si petani mula
te rus ber te lur e mas si pe ta ni mu
Story_1_storytelling (Prof Khalil)
48 49 50 51
mula menjadi tamak si petani mengambil pisau
mu la men ja di ta mak si pe ta ni me ngam bil pi
Story_1_storytelling (Prof Khalil)
51 52 53 54
pisau dan menyembelih angsa bertuahnya
sau dan me nyem be lih ang sa ber tu ah nya
Story_1_storytelling (Prof Khalil)


54 55 56 57
apabila mendapati tiada sebiji
a pa bi la men da pa ti ti a da se bi ji
Story_1_storytelling (Prof Khalil)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b
57 58 59 60
sebiji pun telur emas di dalam perut angsa itu
ji pun te lur e mas di da lam pe rut ang sa i tu
60 61 62 63
si petani mula menyedari kesilapannya
si pe ta ni mu la me nye da ri ke si la pan nya
63 64 65 66
kesilapannya dan berasa sangat menyesal
nya dan be ra sa sa ngat me nye sal
66 67 68 69
menyesal
sal

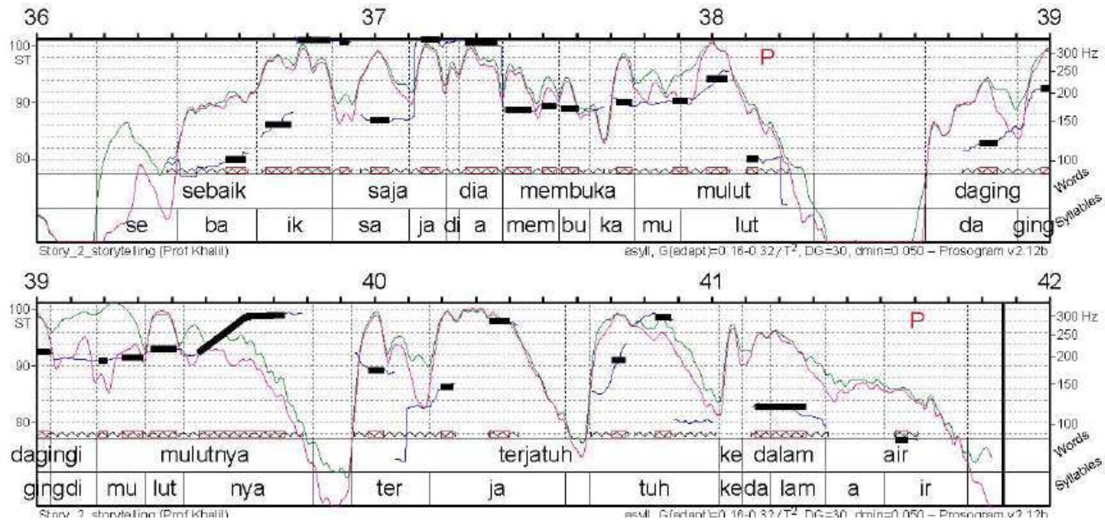
## Male Storyteller 3 (MST3)

## Anjing Dengan Bayang-Bayang (Story 2)



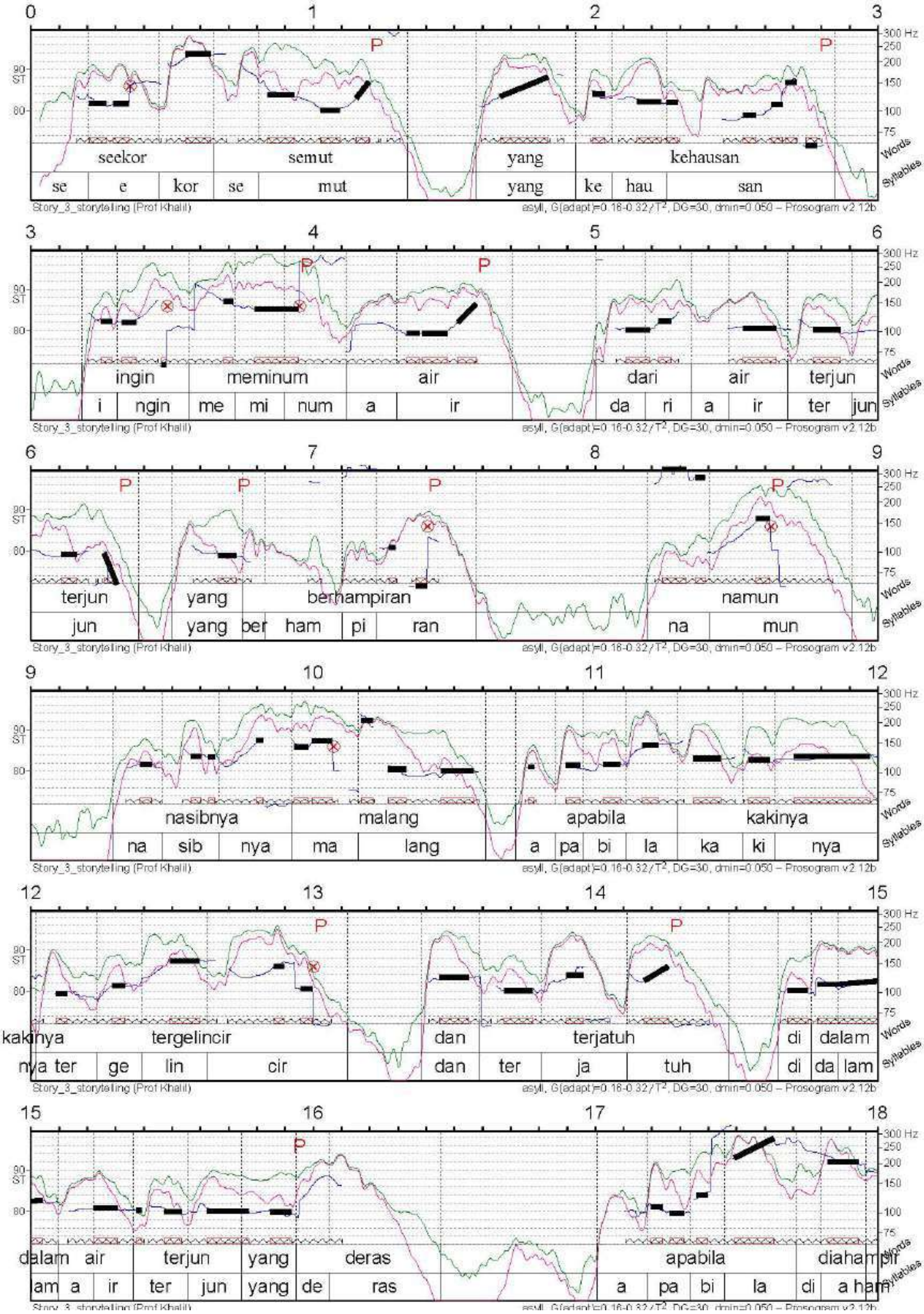


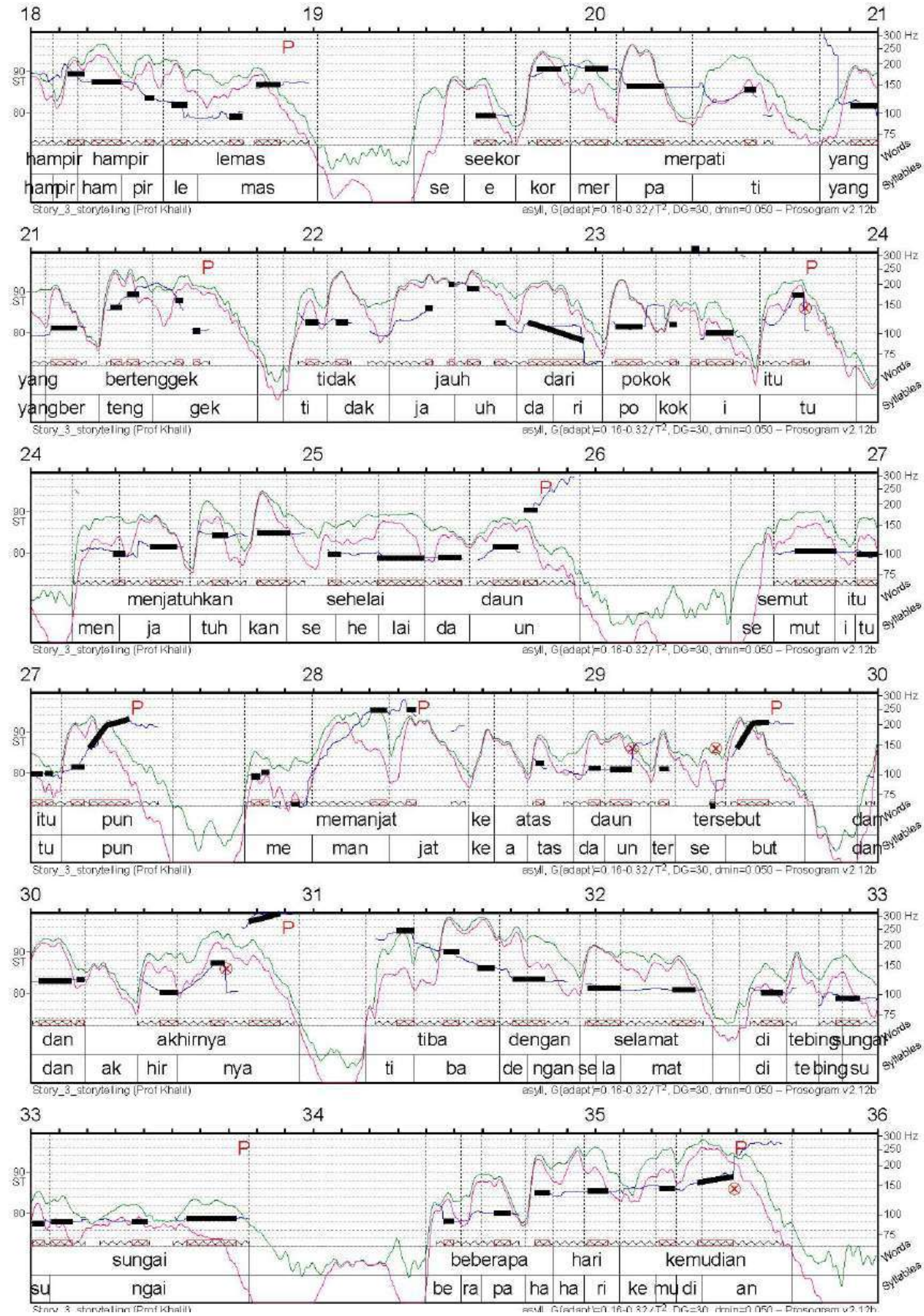
berjalan anjing itu melihat ke dalam air
lan an jing i tu me li hat ke da lam a ir
ada seekor anjing lain dengan daging
a da se e kor an jing la in de ngan da
daging di mulutnya di dalam air itu dia
da ging di mu lut nya di da lam a ir i tu di
dia tidak tahu itu ialah bayang bayangnya sendiri
di a ti dak ta hu i tu ia lah ba yang ba yang nya sen di
sendiri dia mahu mendapatkan daging itu
di ri di a ma hu men da pat kan da ging i tu
dia pun menyalak kepada anjing di dalam air
di a pun me nya lak ke pa da an jing di da lam a ir
Story_2_storytelling (Prof Khalil)

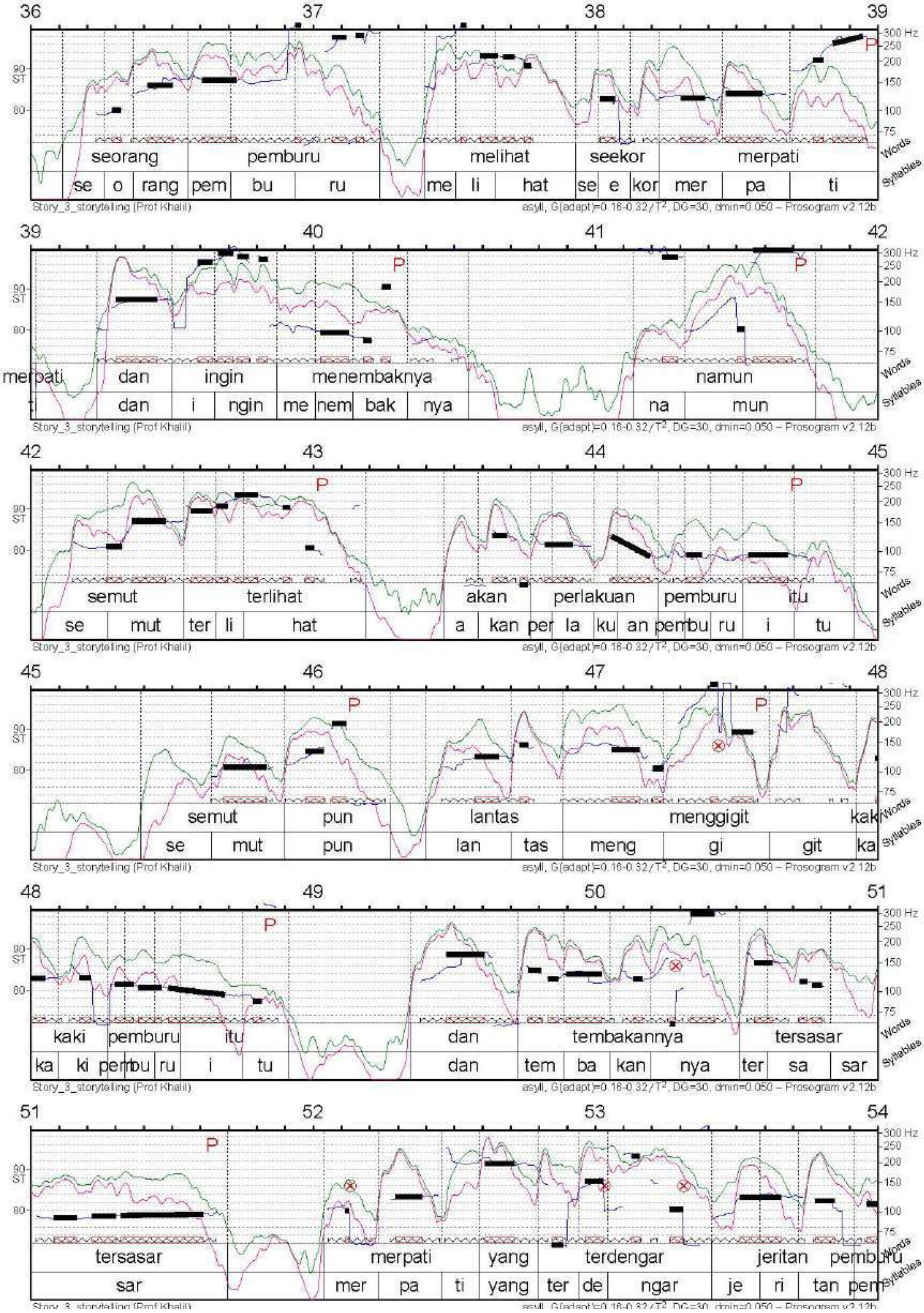

36
37
38
39
sebaik
saja
dia
membuka
mulut
daging
se
ba
ik
sa
ja
di
a
mem
bu
ka
mu
lut
da
ging
P
Words
Syllables
Story_2_storytelling (Prof Khalil)
Prosogram v2.12b
39
40
41
42
daging
di
mulutnya
terjatuh
ke
dalam
air
gi
ng
di
mu
lut
nya
ter
ja
tuh
ke
da
lam
a
ir
P
Words
Syllables

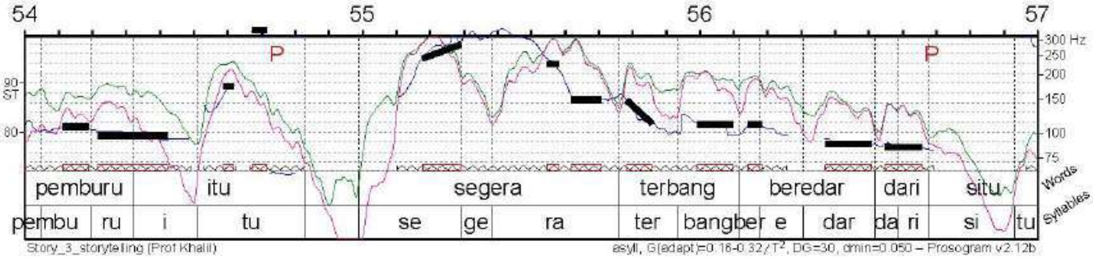
**Male Storyteller 3 (MST3)**

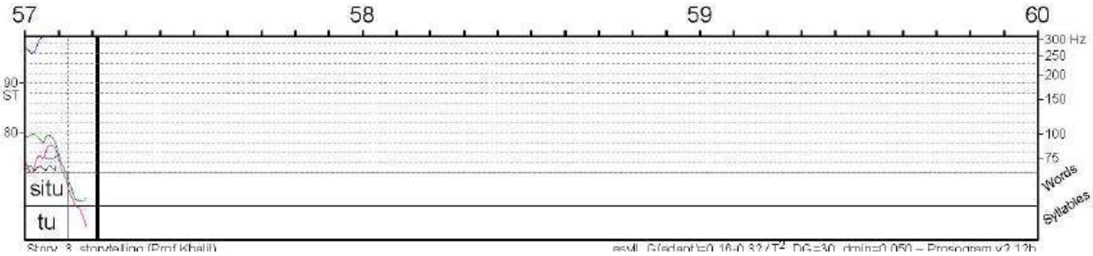
**Semut Dan Merpati (Story 3)**




hampir hampir lemas seekor merpati yang
ham pir ham pir le mas se e kor mer pa ti yang
yang bertenggek tidak jauh dari pokok itu
yang ber teng gek ti dak ja uh da ri po kok i tu
menjatuhkan sehelai daun semut itu
men ja tuh kan se he lai da un se mut i tu
itu pun memanjat ke atas daun tersebut dan
tu pun me man jat ke a tas da un ter se but dan
dan akhirnya tiba dengan selamat di tebing sungai
dan ak hir nya ti ba de ngan se la mat di te bing su
sungai beberapa hari kemudian
su ngai be ra pa ha ha ri ke mu di an
Story_3_storytelling (Prof Khalil)

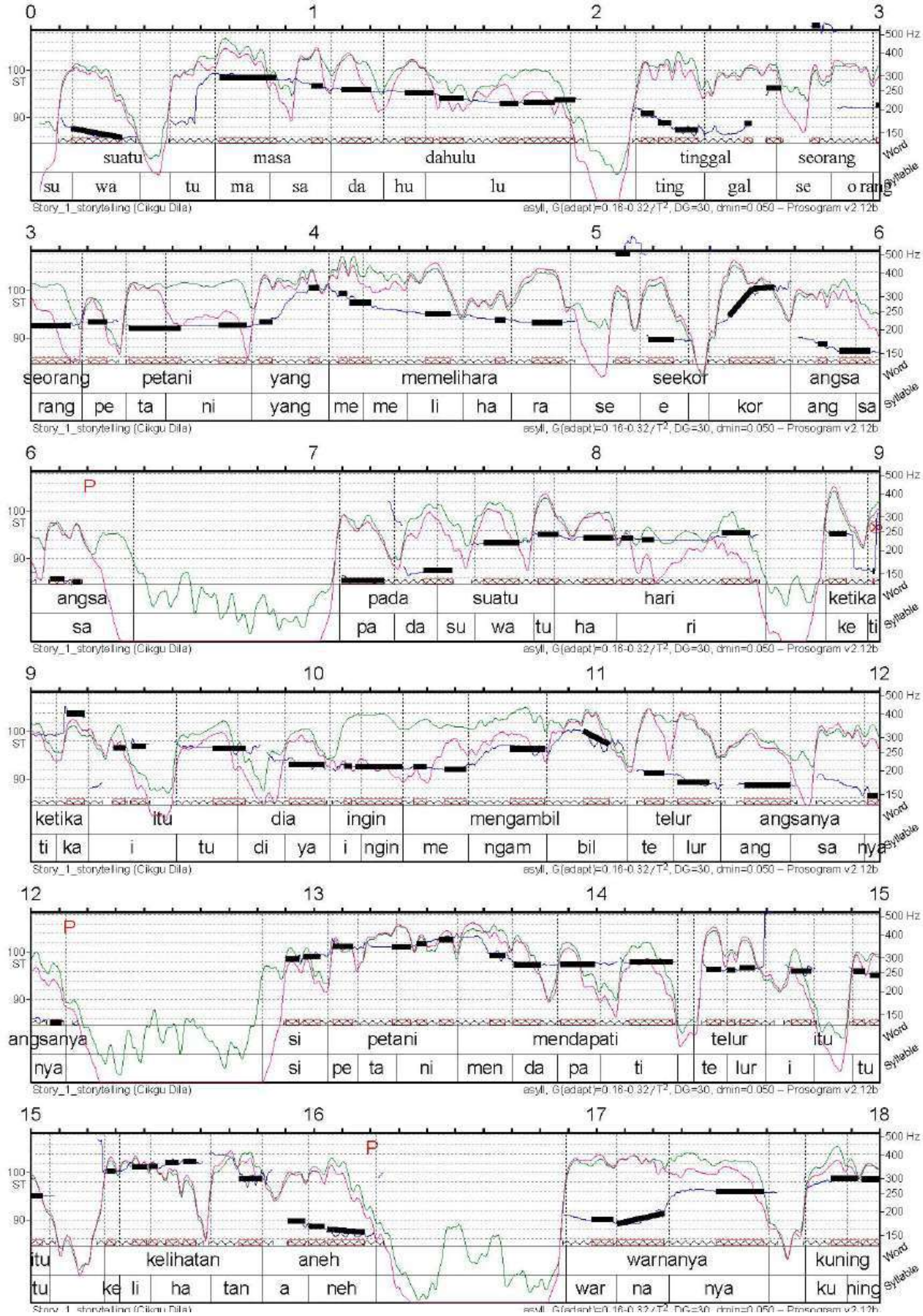

36 37 38 39
seorang pemburu melihat seekor merpati
se o rang pem bu ru me li hat se e kor mer pa ti
Story_3_storytelling (Prof Khalil)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b
39 40 41 42
merpati dan ingin menembaknya namun
t dan i ngin me nem bak nya na mun
42 43 44 45
semut terlihat akan perlakuan pemburu itu
se mut ter li hat a kan per la ku an pem bu ru i tu
45 46 47 48
semut pun lantas menggigit kak
se mut pun lan tas meng gi git ka
48 49 50 51
kaki pemburu itu dan tembakannya tersasar
ka ki pem bu ru i tu dan tem ba kan nya ter sa sar
51 52 53 54
tersasar merpati yang terdengar jeritan pemburu
sar mer pa ti yang ter de ngar je ri tan pem
300 Hz 250 200 150 100 75
90 ST 80
Words Syllables
P

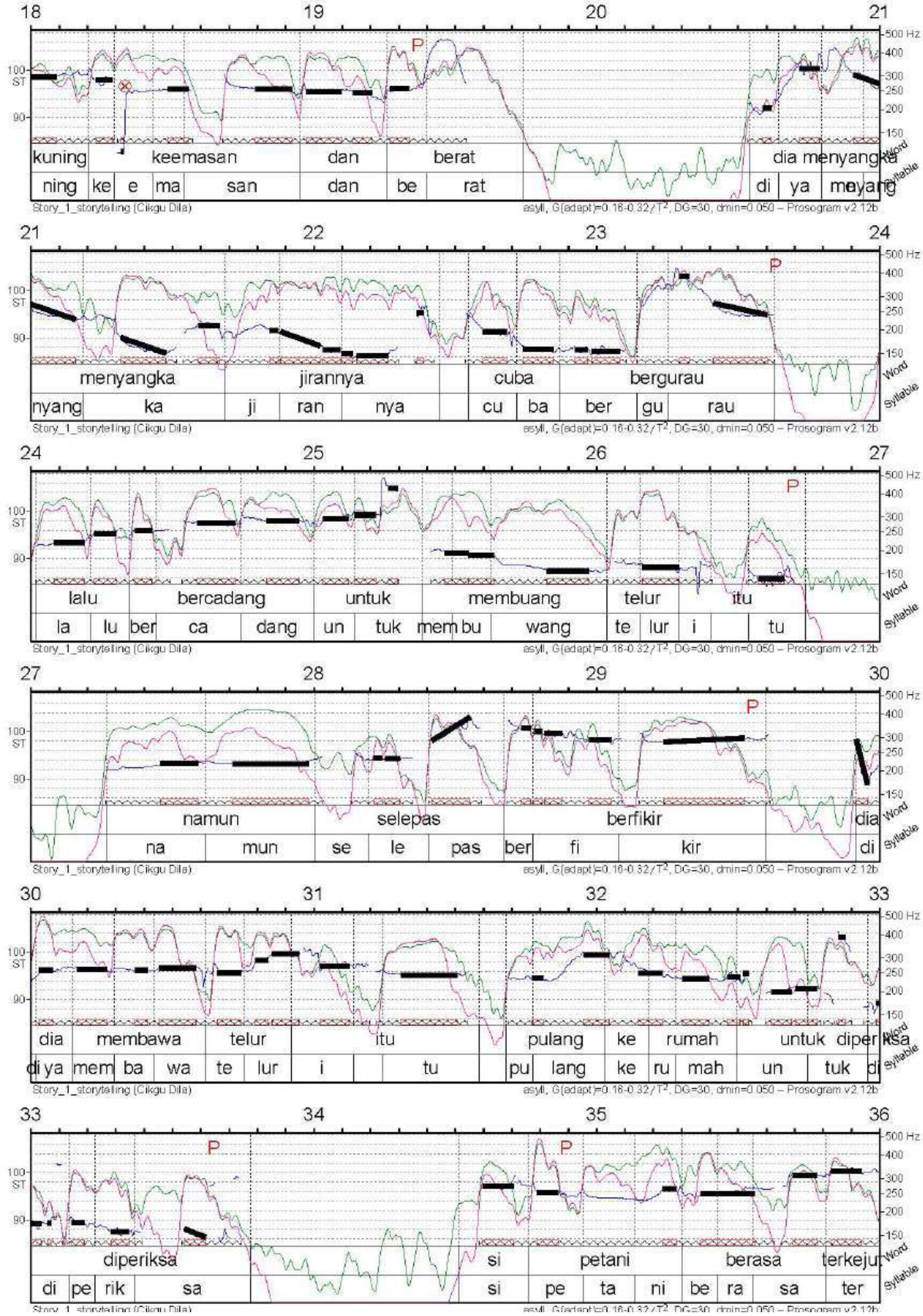

54
55
56
57
P
P
90
ST
80
300 Hz
250
200
150
100
75
Words
Syllables
pemburu itu segera terbang beredar dari situ
pembu ru i tu se ge ra ter bang ber e dar da ri si tu
Story_3_storytelling (Prof Khalil)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b

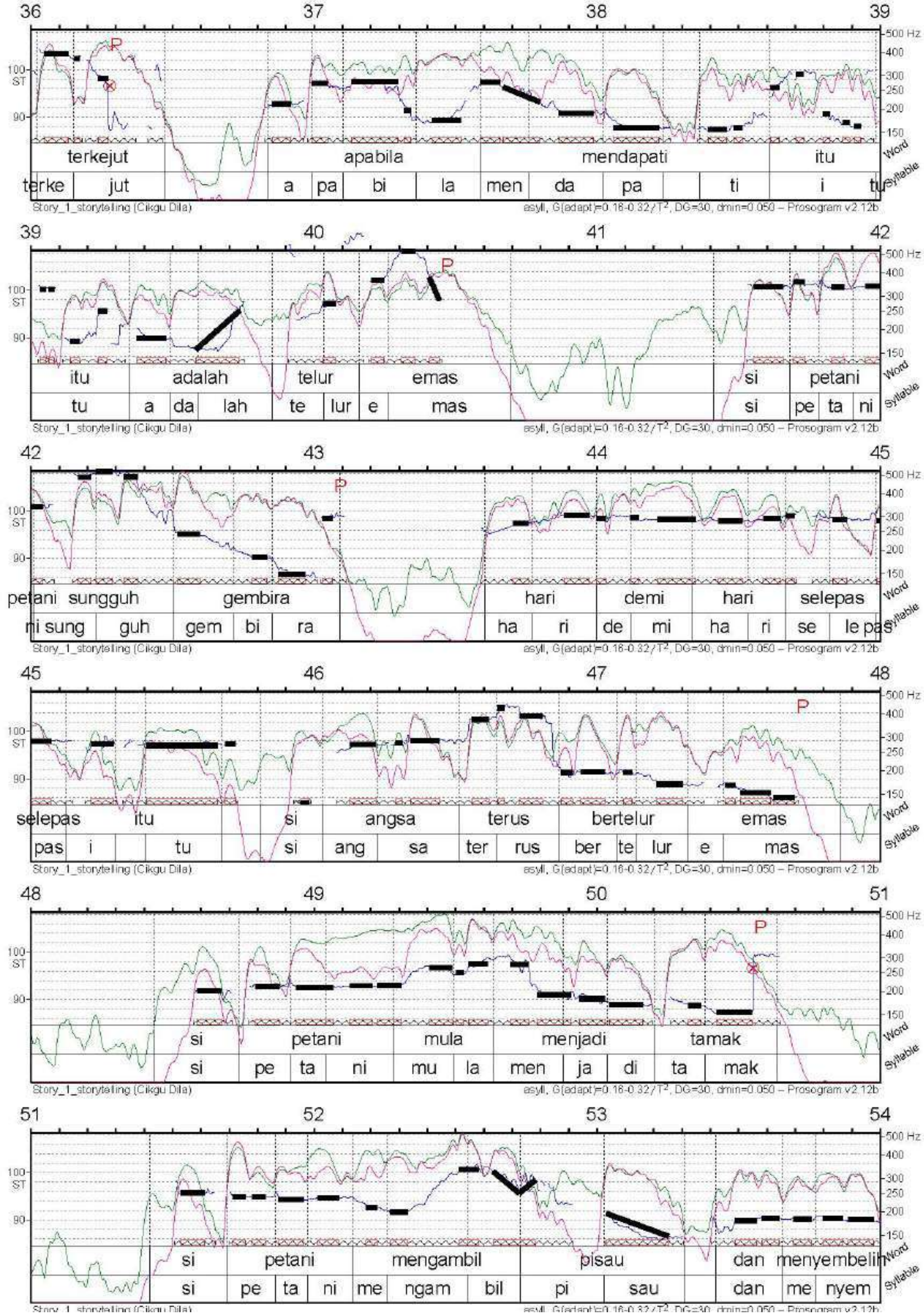

57
58
59
60
90
ST
80
300 Hz
250
200
150
100
75
Words
Syllables
situ
tu
Story_3_storytelling (Prof Khalil)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b

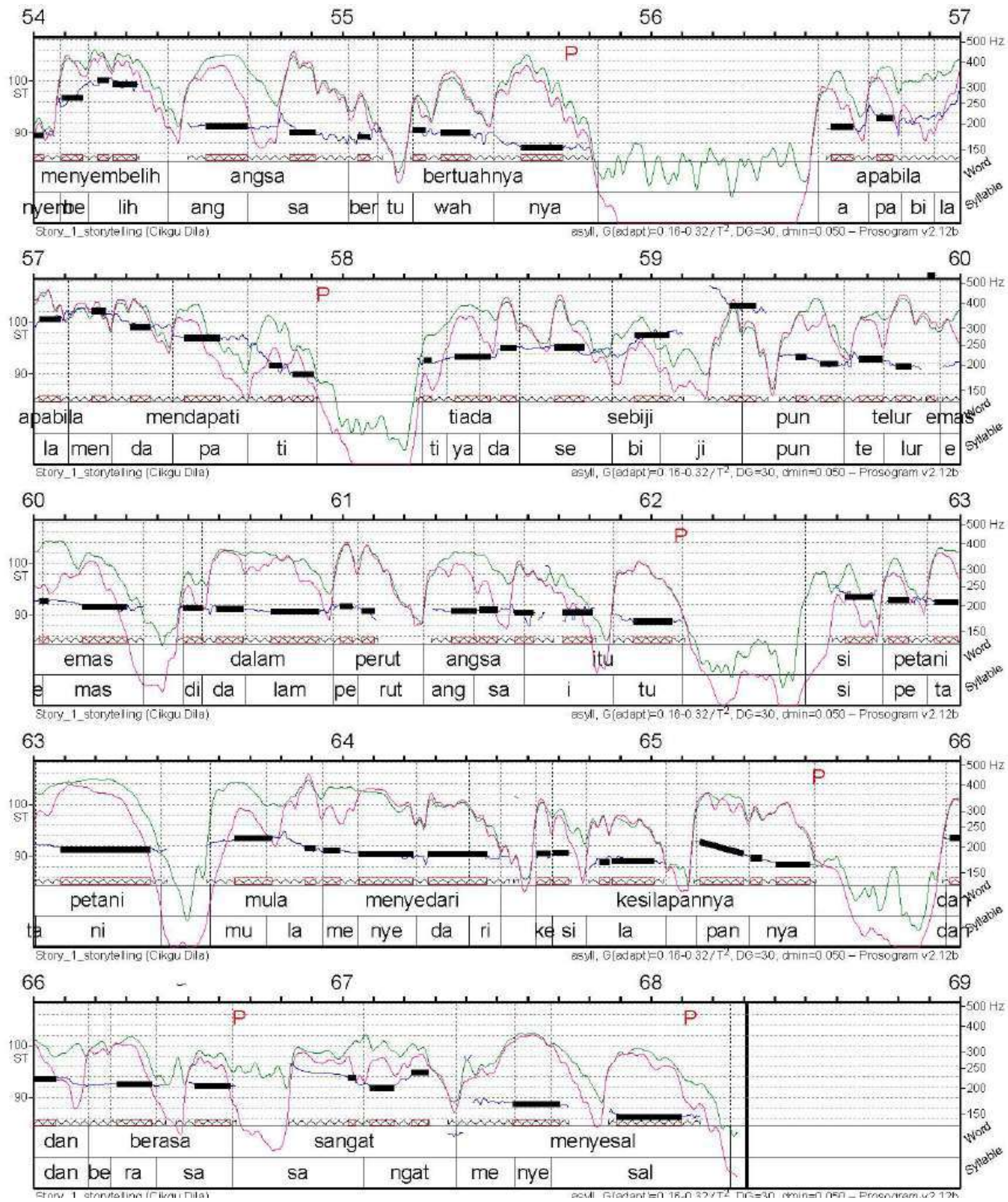
**Female Storyteller 5 (FST5)**

**Si Angsa Yang Bertelur Emas (Story 1)**



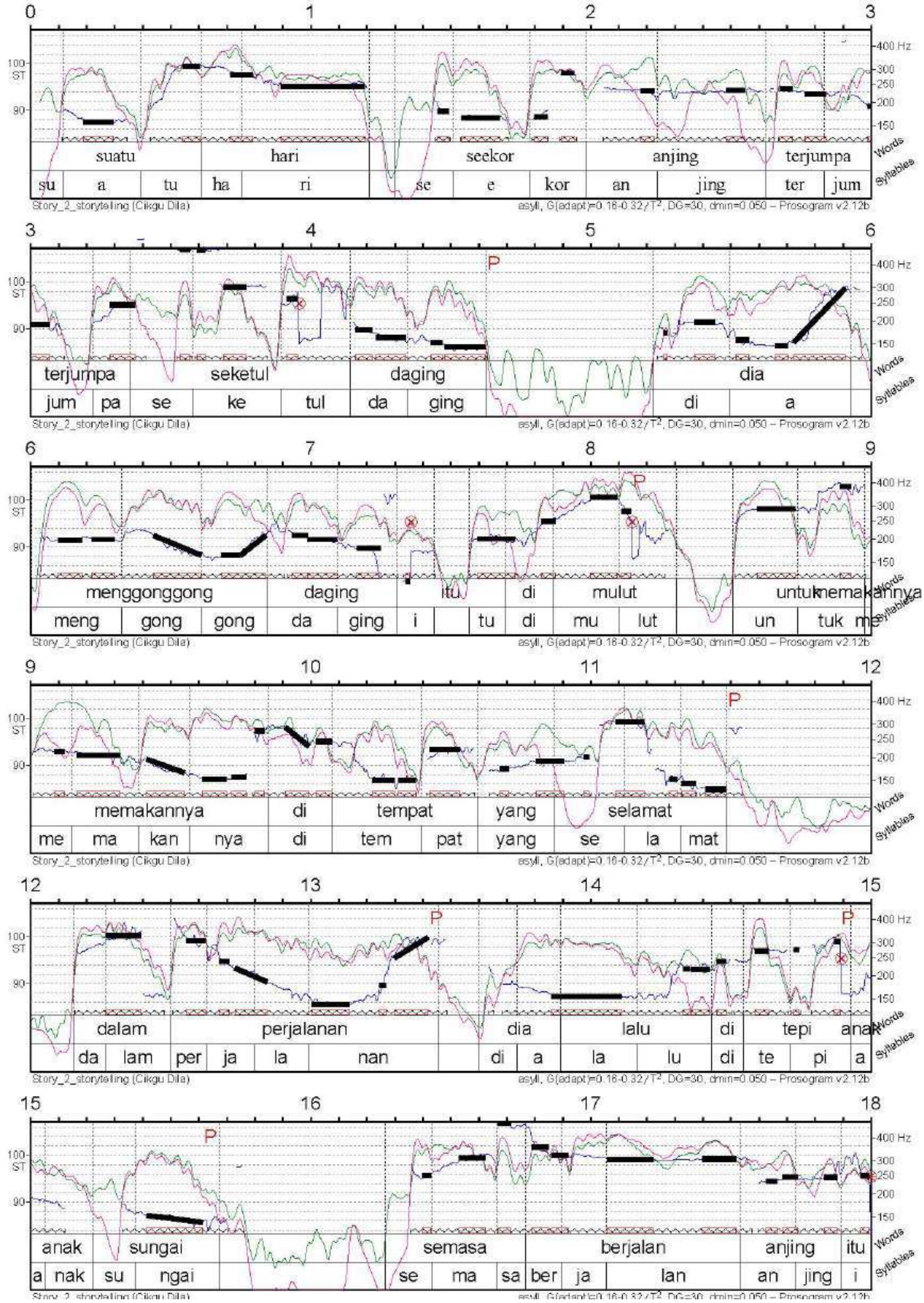

kuning keemasan dan berat dia menyangka
ning ke e ma san dan be rat di ya menyang
menyangka jirannya cuba bergurau
nyang ka ji ran nya cu ba ber gu rau
lalu bercadang untuk membuang telur itu
la lu ber ca dang un tuk mem bu wang te lur i tu
namun selepas berfikir dia
na mun se le pas ber fi kir di
dia membawa telur itu pulang ke rumah untuk diperiksa
di ya mem ba wa te lur i tu pu lang ke ru mah un tuk di
diperiksa si petani berasa terkejut
di pe rik sa si pe ta ni be ra sa ter
Story_1_storytelling (Cikgu Dila)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b

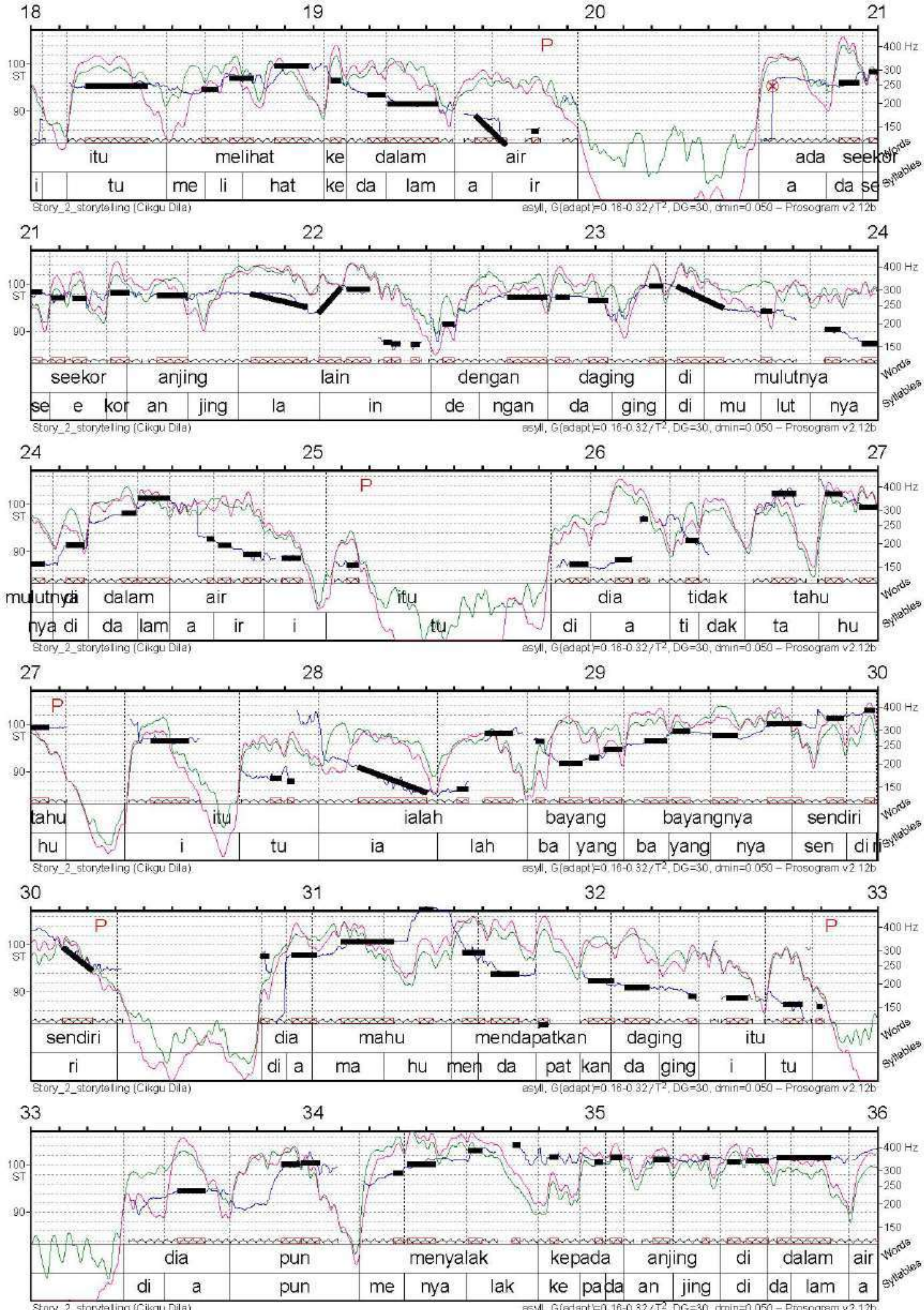

36 37 38 39
terkejut apabila mendapati itu
terke jut a pa bi la men da pa ti i tu
Story_1_storytelling (Cikgu Dila)
39 40 41 42
itu adalah telur emas si petani
tu a da lah te lur e mas si pe ta ni
42 43 44 45
petani sungguh gembira hari demi hari selepas
ni sung guh gem bi ra ha ri de mi ha ri se le pas
45 46 47 48
selepas itu si angsa terus bertelur emas
pas i tu si ang sa ter rus ber te lur e mas
48 49 50 51
si petani mula menjadi tamak
si pe ta ni mu la men ja di ta mak
51 52 53 54
si petani mengambil pisau dan menyembelih
si pe ta ni me ngam bil pi sau dan me nyem

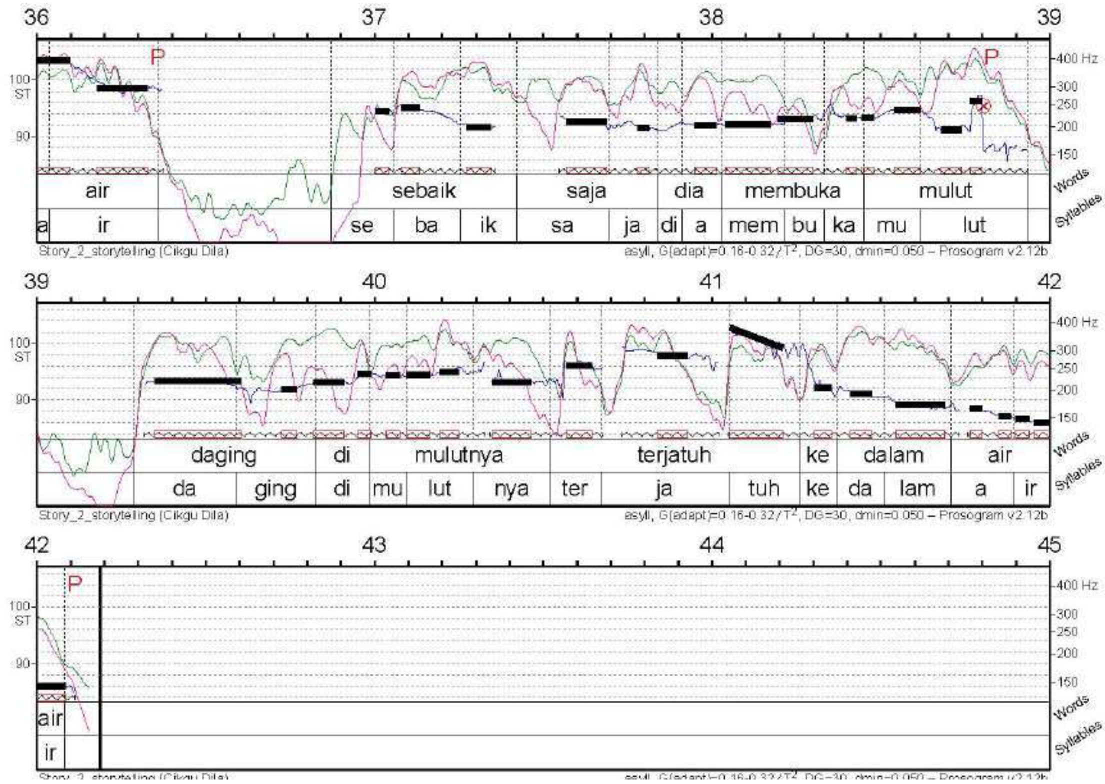

54 55 56 57
menyembelih angsa bertuahnya apabila
nyem be lih ang sa ber tu wah nya a pa bi la
Story_1_storytelling (Cikgu Dila)
57 58 59 60
apabila mendapati tiada sebiji pun telur emas
la men da pa ti ti ya da se bi ji pun te lur e
60 61 62 63
emas dalam perut angsa itu si petani
e mas di da lam pe rut ang sa i tu si pe ta
63 64 65 66
petani mula menyedari kesilapannya dan
ta ni mu la me nye da ri ke si la pan nya dan
66 67 68 69
dan berasa sangat menyesal
dan be ra sa sa ngat me nye sal
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b

## FEMALE STORYTELLER 5 (FST5)

## ANJING DENGAN BAYANG-BAYANG (STORY 2)

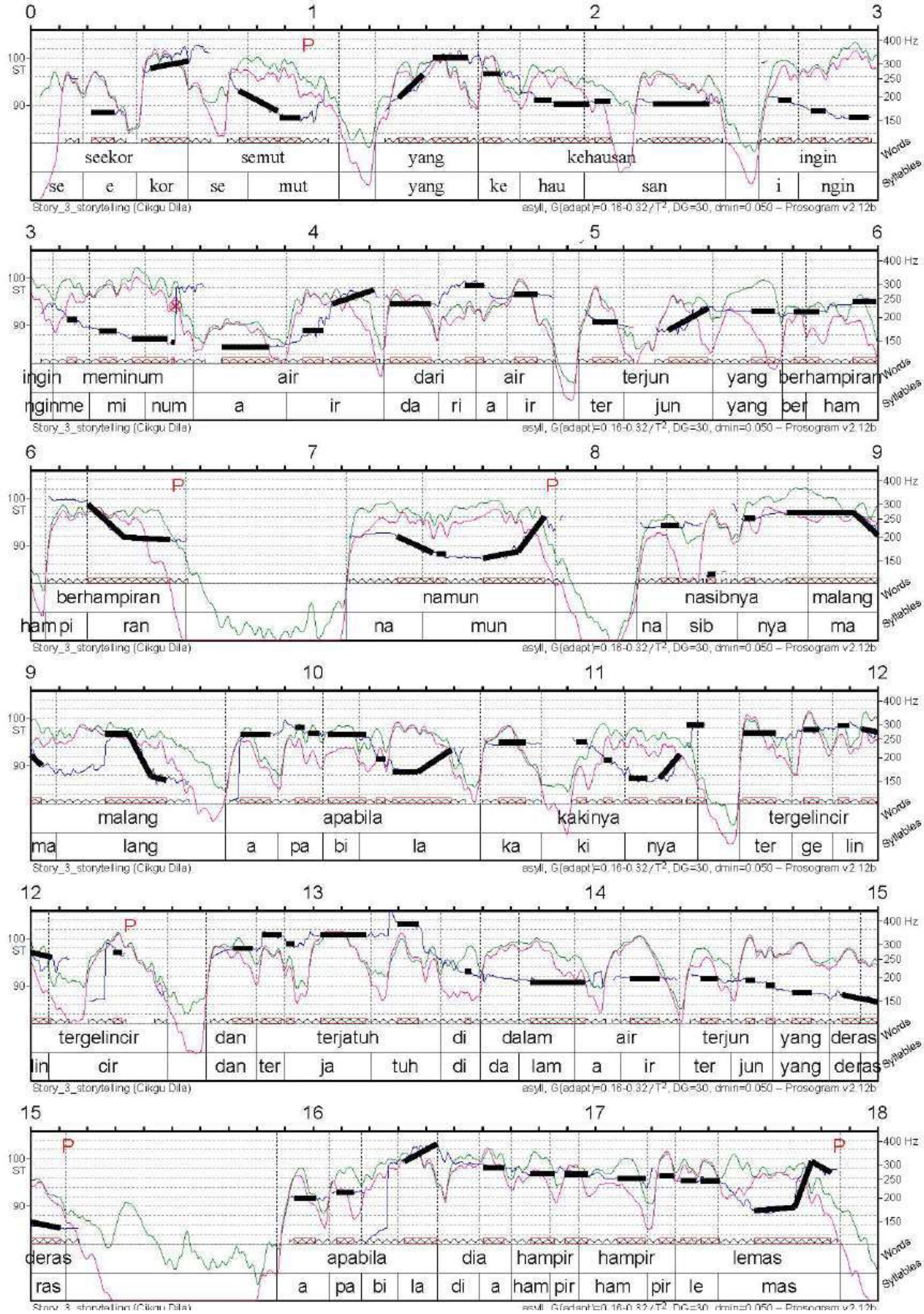


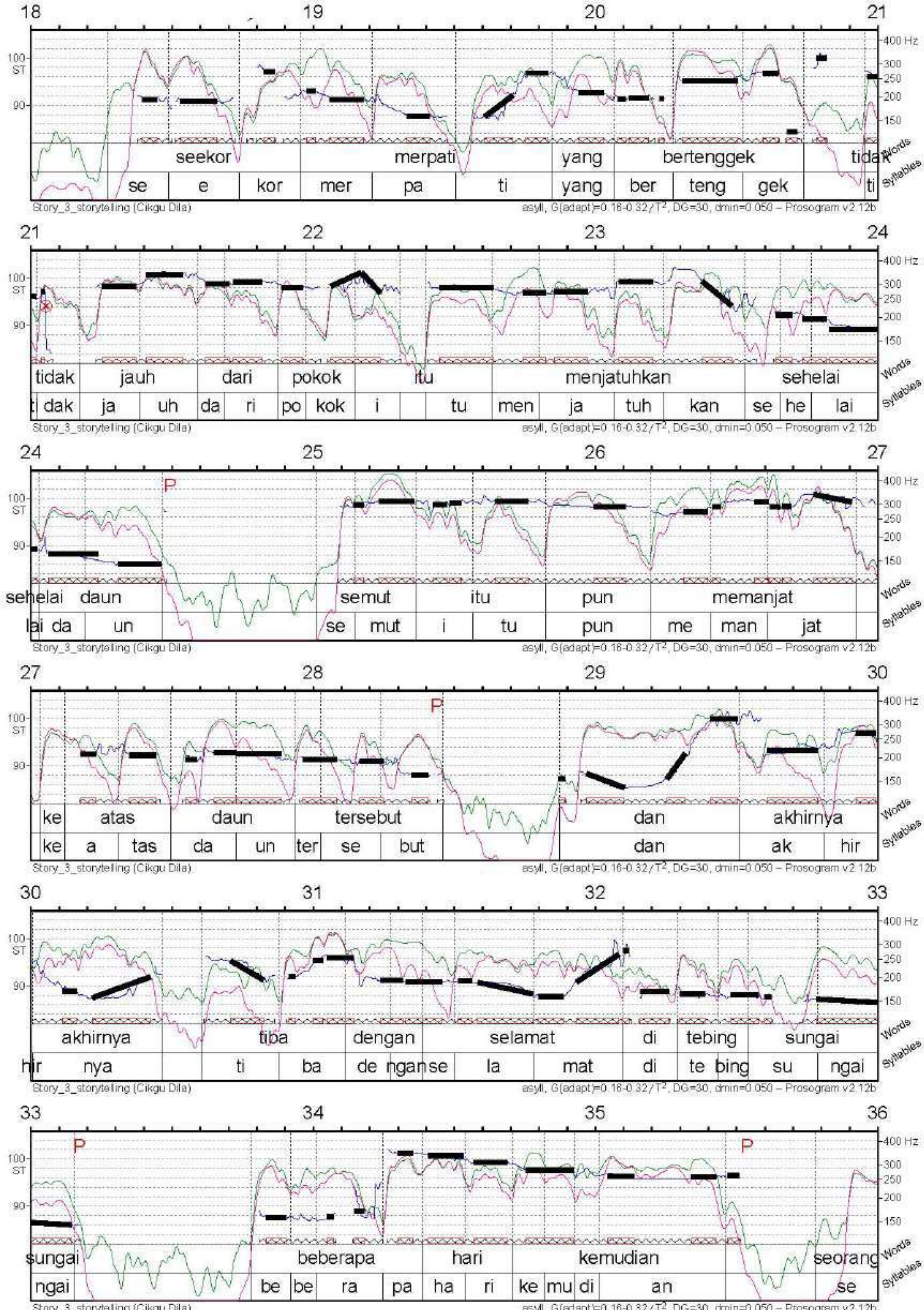

18 19 20 21
itu melihat ke dalam air ada seekor
i tu me li hat ke da lam a ir a da se
21 22 23 24
seekor anjing lain dengan daging di mulutnya
se e kor an jing la in de ngan da ging di mu lut nya
24 25 26 27
mulutnya di dalam air itu dia tidak tahu
nya di da lam a ir i tu di a ti dak ta hu
27 28 29 30
tahu itu ialah bayang bayangnya sendiri
hu i tu ia lah ba yang ba yang nya sen di ri
30 31 32 33
sendiri dia mahu mendapatkan daging itu
ri di a ma hu men da pat kan da ging i tu
33 34 35 36
dia pun menyalak kepada anjing di dalam air
di a pun me nya lak ke pa da an jing di da lam a
Story_2_storytelling (Cikgu Dila)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b
Words
Syllables
100 ST
90
400 Hz
300
250
200
150
P

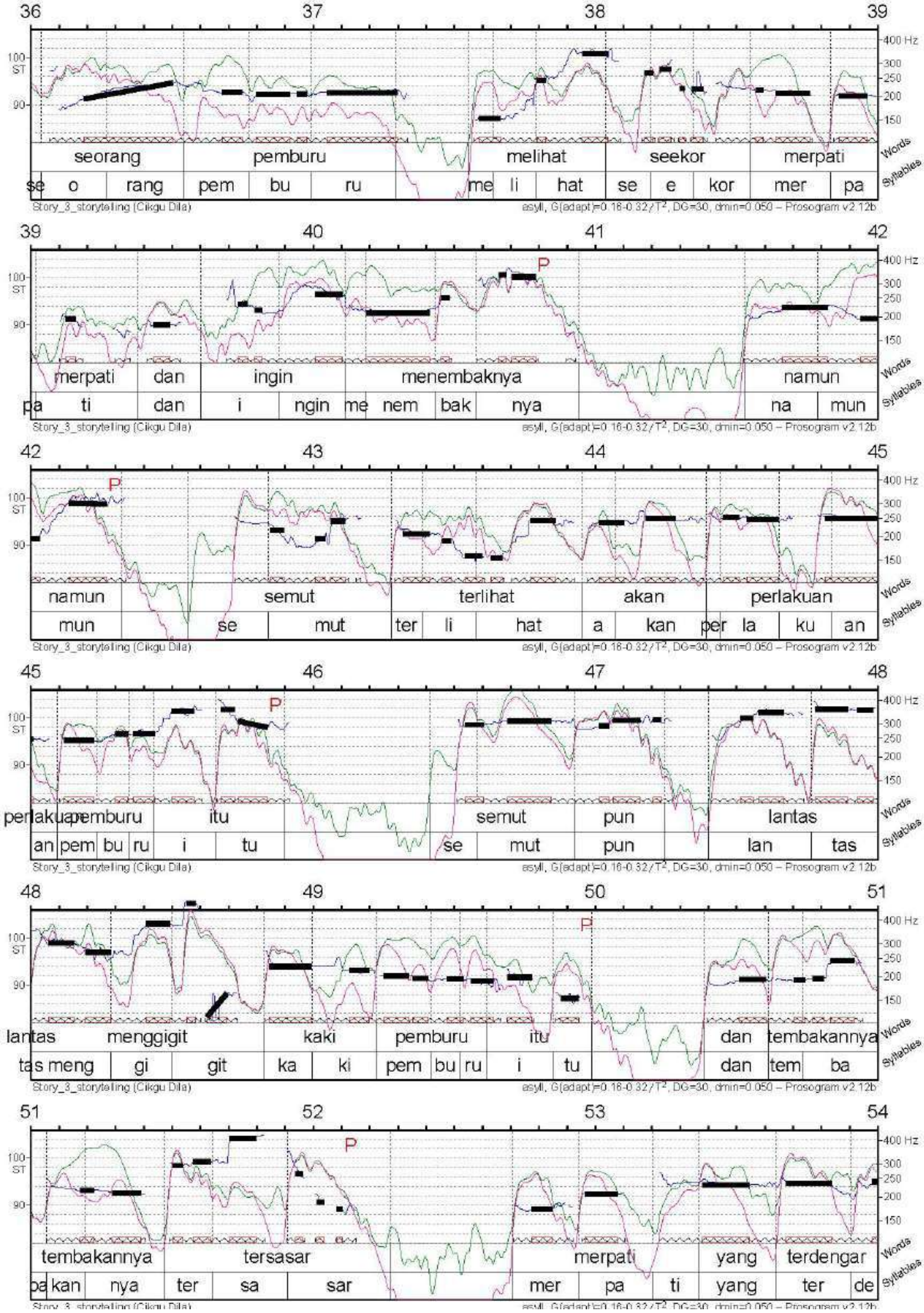

36 37 38 39
air sebaik saja dia membuka mulut
a ir se ba ik sa ja di a mem bu ka mu lut
Story_2_storytelling (Cikgu Dila)
39 40 41 42
daging di mulutnya terjatuh ke dalam air
da ging di mu lut nya ter ja tuh ke da lam a ir
Story_2_storytelling (Cikgu Dila)
42 43 44 45
air
ir
Words
Syllables

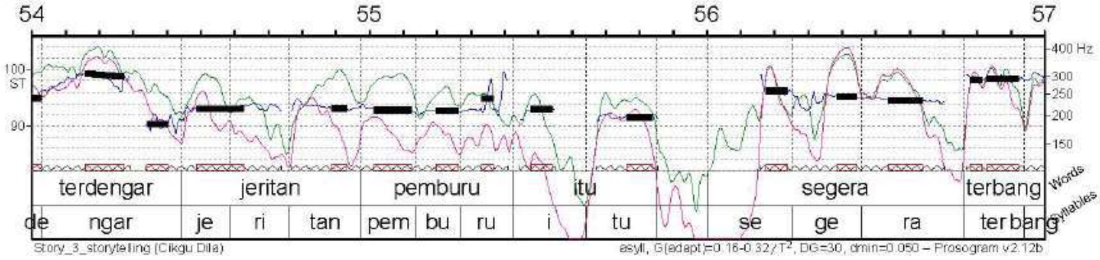
## Female Storyteller 5 (FST5)

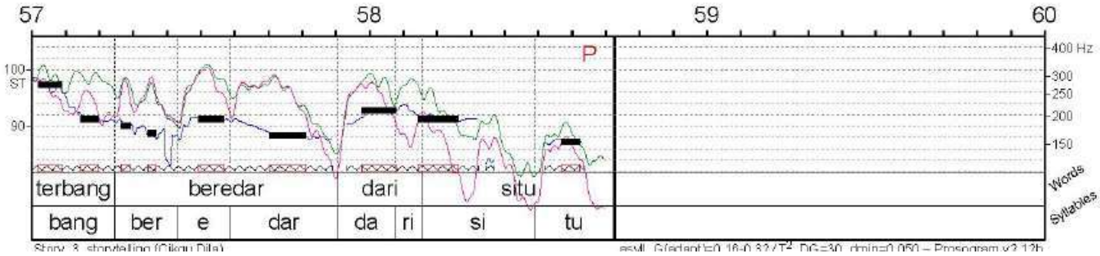
## Semut Dan Merpati (Story 3)




18 19 20 21
seekor merpati yang bertenggek tidak
se e kor mer pa ti yang ber teng gek ti
Story_3_storytelling (Cikgu Dila)
21 22 23 24
tidak jauh dari pokok itu menjatuhkan sehelai
ti dak ja uh da ri po kok i tu men ja tuh kan se he lai
Story_3_storytelling (Cikgu Dila)
24 25 26 27
sehelai daun semut itu pun memanjat
lai da un se mut i tu pun me man jat
Story_3_storytelling (Cikgu Dila)
27 28 29 30
ke atas daun tersebut dan akhirnya
ke a tas da un ter se but dan ak hir
Story_3_storytelling (Cikgu Dila)
30 31 32 33
akhirnya tiba dengan selamat di tebing sungai
hir nya ti ba de ngan se la mat di te bing su ngai
Story_3_storytelling (Cikgu Dila)
33 34 35 36
sungai beberapa hari kemudian seorang
ngai be be ra pa ha ri ke mu di an se
Story_3_storytelling (Cikgu Dila)


36 37 38 39
seorang pemburu melihat seekor merpati
se o rang pem bu ru me li hat se e kor mer pa
Story_3_storytelling (Cikgu Dila)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b
39 40 41 42
merpati dan ingin menembaknya namun
pa ti dan i ngin me nem bak nya na mun
42 43 44 45
namun semut terlihat akan perlakuan
mun se mut ter li hat a kan per la ku an
45 46 47 48
perlakuan pemburu itu semut pun lantas
an pem bu ru i tu se mut pun lan tas
48 49 50 51
lantas menggigit kaki pemburu itu dan tembakannya
tas meng gi git ka ki pem bu ru i tu dan tem ba
51 52 53 54
tembakannya tersasar merpati yang terdengar
ba kan nya ter sa sar mer pa ti yang ter de
Words
Syllables
ST
Hz


54
55
56
57
100 ST
90
400 Hz
300
250
200
150
terdengar
jeritan
pemburu
itu
segera
terbang
Words
de
ngar
je
ri
tan
pem
bu
ru
i
tu
se
ge
ra
ter
bang
Syllables
Story_3_storytelling (Cikgu Dila)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b


57
58
59
60
100 ST
90
400 Hz
300
250
200
150
P
terbang
beredar
dari
situ
Words
bang
ber
e
dar
da
ri
si
tu
Syllables
Story_3_storytelling (Cikgu Dila)
asyll, G(adapt)=0.16-0.32/T², DG=30, dmin=0.050 – Prosogram v2.12b

# APPENDIX H

## Result PESQ (MOS) of Variation DMF & PMF

## Male model

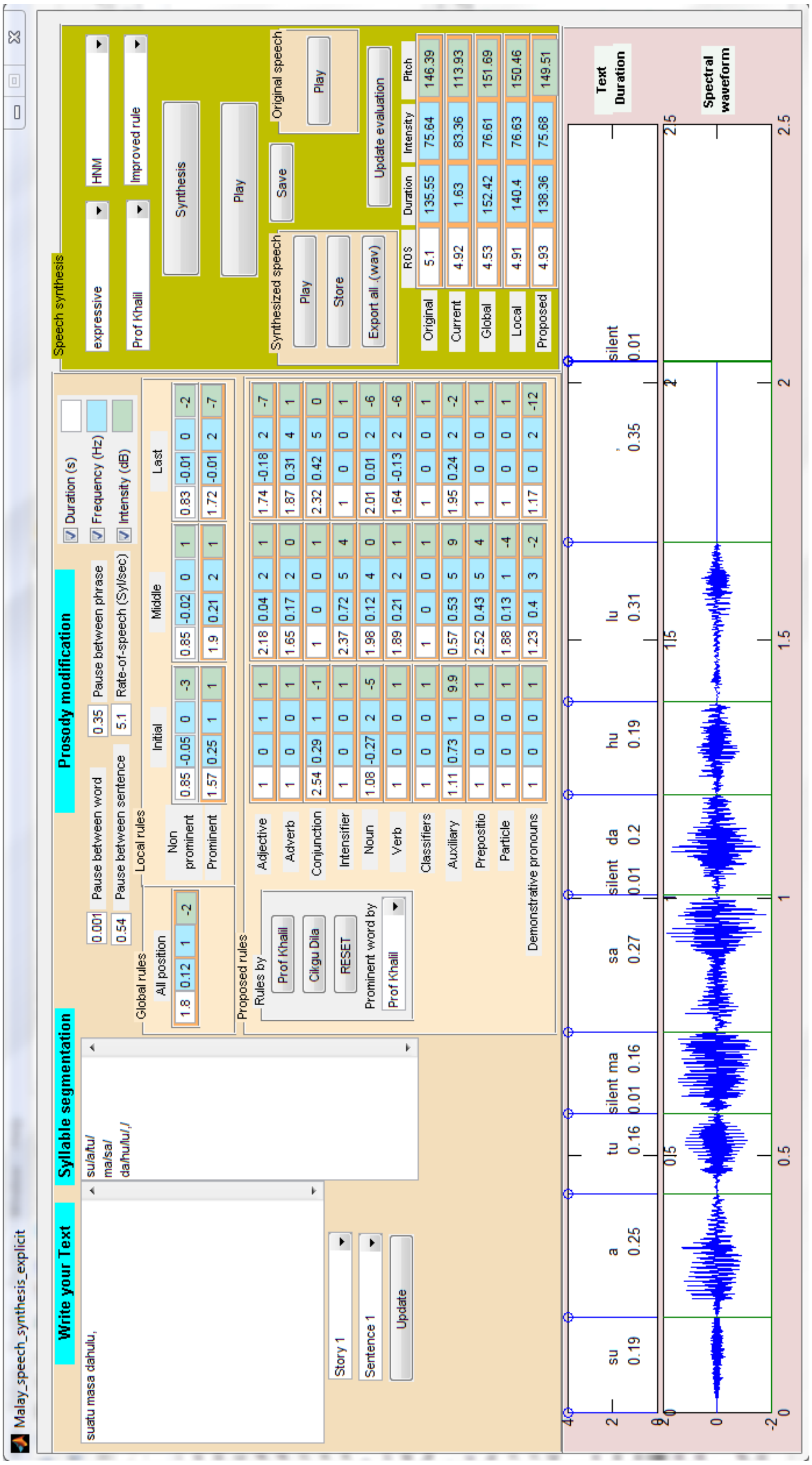
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DMF | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 |
| PESQ-MOS | 4.50 | 3.73 | 3.42 | 3.27 | 3.19 | 3.12 | 3.07 | 3.01 | 2.99 | 2.97 |
| PMF | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
| PESQ-MOS | 4.50 | 4.11 | 3.52 | 3.30 | 3.23 | 3.14 | 3.05 | 2.95 | 2.77 | 2.31 |

## Female model

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DMF | 1.00 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 |
| PESQ-MOS | 4.50 | 3.83 | 3.52 | 3.33 | 3.17 | 3.05 | 2.99 | 2.94 | 2.92 | 2.89 |
| PMF | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
| PESQ-MOS | 4.50 | 4.01 | 3.40 | 3.16 | 3.09 | 3.07 | 3.01 | 2.85 | 2.62 | 2.04 |

# APPENDIX I

## Storytelling Speech Synthesis Program



# APPENDIX J

## Perception Evaluation Result

### Subject 1

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 3 | 4 | 3 | 2 | 4 | 2 | 4 | 4 | 3 |
| | 2 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 3 | 4 | 5 | 3 | 4 | 5 | 3 | 5 | 5 | 4 |
| | 4 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 5 | 3 | 4 | 3 | 2 | 4 | 3 | 4 | 4 | 4 |
| | 6 | 3 | 4 | 3 | 2 | 4 | 3 | 4 | 5 | 4 |
| | 7 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 8 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 9 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 4 |
| | 10 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 11 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 12 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| FSt2 | 1 | 3 | 4 | 3 | 3 | 4 | 3 | 5 | 4 | 3 |
| | 2 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 |
| | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 | 4 |
| | 4 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 3 |
| | 5 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 7 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 5 |
| | 8 | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 4 | 5 |
| | 9 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 10 | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 4 | 4 |
| | 11 | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 4 | 4 |
| | 12 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 |
| MSt3 | 1 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 2 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 3 | 4 | 4 | 3 | 5 | 5 | 4 | 5 | 5 | 5 |
| | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 5 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 7 | 4 | 4 | 3 | 4 | 4 | 3 | 5 | 4 | 4 |
| | 8 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 4 |
| | 9 | 4 | 4 | 3 | 4 | 4 | 3 | 5 | 4 | 4 |
| | 10 | 5 | 4 | 3 | 5 | 5 | 3 | 5 | 5 | 4 |
| | 11 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 12 | 3 | 4 | 3 | 4 | 4 | 3 | 5 | 4 | 4 |
| MSt1 | 1 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 5 | 4 | 4 |
| | 4 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 6 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 7 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 8 | 4 | 5 | 3 | 4 | 5 | 4 | 5 | 5 | 5 |
| | 9 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| | 10 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 | 4 |
| | 11 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 12 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 |

## Subject 2

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 3 | 3 | 3 | 3 | 3 | 2 | 4 | 4 | 5 |
| | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 4 | 5 | 5 |
| | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 4 | 3 | 2 | 2 | 3 | 3 | 2 | 4 | 5 | 4 |
| | 5 | 2 | 3 | 3 | 3 | 2 | 2 | 5 | 4 | 5 |
| | 6 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 4 |
| | 7 | 2 | 3 | 3 | 2 | 2 | 3 | 5 | 5 | 4 |
| | 8 | 2 | 3 | 2 | 3 | 3 | 3 | 5 | 4 | 4 |
| | 9 | 2 | 2 | 2 | 3 | 2 | 2 | 4 | 4 | 5 |
| | 10 | 2 | 2 | 3 | 3 | 3 | 2 | 5 | 5 | 4 |
| | 11 | 2 | 3 | 3 | 3 | 2 | 3 | 5 | 5 | 4 |
| | 12 | 2 | 2 | 3 | 3 | 3 | 3 | 5 | 5 | 4 |
| FSt2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 2 | 2 | 4 | 3 | 3 | 3 | 2 | 5 | 4 | 4 |
| | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 4 |
| | 4 | 3 | 4 | 2 | 2 | 3 | 4 | 4 | 4 | 5 |
| | 5 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 6 | 2 | 3 | 3 | 3 | 2 | 2 | 4 | 4 | 5 |
| | 7 | 4 | 2 | 2 | 2 | 3 | 2 | 4 | 4 | 4 |
| | 8 | 3 | 3 | 2 | 3 | 2 | 3 | 5 | 4 | 4 |
| | 9 | 4 | 2 | 2 | 4 | 3 | 3 | 4 | 5 | 4 |
| | 10 | 3 | 2 | 2 | 3 | 4 | 3 | 4 | 3 | 4 |
| | 11 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 4 |
| | 12 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 5 |
| MSt3 | 1 | 3 | 2 | 4 | 3 | 3 | 3 | 3 | 4 | 4 |
| | 2 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 4 |
| | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| | 5 | 3 | 4 | 3 | 2 | 3 | 3 | 4 | 3 | 4 |
| | 6 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 7 | 3 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 |
| | 8 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| | 9 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 10 | 4 | 3 | 3 | 2 | 4 | 3 | 4 | 4 | 3 |
| | 11 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 12 | 3 | 3 | 2 | 3 | 3 | 4 | 5 | 4 | 4 |
| MSt1 | 1 | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 5 | 4 |
| | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 |
| | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 4 |
| | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 6 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 7 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 5 |
| | 8 | 3 | 4 | 4 | 4 | 5 | 4 | 3 | 3 | 4 |
| | 9 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 10 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 11 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 12 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 |

## Subject 3

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 4 | 5 | 4 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 5 | 3 |
| | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 3 |
| | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| | 6 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 3 |
| | 7 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 3 |
| | 8 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| | 9 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 3 |
| | 10 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 11 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 12 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| FSt2 | 1 | 3 | 5 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 2 | 4 | 5 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 4 | 4 | 5 | 3 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 5 | 5 | 4 |
| | 6 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 5 | 4 |
| | 7 | 3 | 4 | 3 | 4 | 4 | 3 | 5 | 5 | 4 |
| | 8 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 9 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 10 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 11 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 12 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| MSt3 | 1 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 3 | 4 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 5 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 6 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 7 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 8 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 9 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 10 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 11 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 12 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 | 4 |
| MSt1 | 1 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 2 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| | 5 | 3 | 4 | 3 | 3 | 4 | 2 | 4 | 4 | 3 |
| | 6 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 7 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 4 |
| | 8 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 9 | 4 | 4 | 3 | 4 | 4 | 2 | 4 | 4 | 4 |
| | 10 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 11 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 3 |
| | 12 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 5 | 4 |

## Subject 4

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 5 | 4 | 3 | 4 | 3 | 4 | 5 | 5 | 4 |
| | 2 | 4 | 4 | 3 | 4 | 3 | 3 | 5 | 4 | 4 |
| | 3 | 4 | 5 | 3 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 5 | 5 | 4 |
| | 5 | 5 | 4 | 3 | 4 | 5 | 4 | 5 | 5 | 4 |
| | 6 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 7 | 3 | 3 | 3 | 4 | 5 | 3 | 4 | 5 | 4 |
| | 8 | 4 | 5 | 3 | 4 | 5 | 3 | 4 | 5 | 3 |
| | 9 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 10 | 4 | 5 | 3 | 4 | 5 | 3 | 5 | 5 | 4 |
| | 11 | 4 | 5 | 3 | 3 | 5 | 3 | 5 | 5 | 4 |
| | 12 | 4 | 5 | 3 | 4 | 5 | 4 | 5 | 5 | 4 |
| FSt2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 2 | 3 | 3 | 4 | 3 | 4 | 3 | 5 | 5 | 5 |
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 4 | 3 | 3 | 2 | 2 | 4 | 3 | 4 | 5 | 4 |
| | 5 | 2 | 3 | 3 | 2 | 3 | 3 | 4 | 5 | 4 |
| | 6 | 2 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 5 |
| | 7 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 8 | 2 | 4 | 3 | 3 | 4 | 3 | 5 | 5 | 5 |
| | 9 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 5 |
| | 10 | 2 | 2 | 2 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 11 | 2 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 |
| | 12 | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 5 | 4 |
| MSt3 | 1 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 2 | 3 | 4 | 4 | 3 | 4 | 4 | 5 | 5 | 4 |
| | 3 | 2 | 4 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 4 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 4 | 3 |
| | 5 | 3 | 4 | 3 | 2 | 4 | 3 | 4 | 5 | 4 |
| | 6 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 5 | 4 |
| | 7 | 3 | 3 | 2 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 8 | 3 | 3 | 3 | 3 | 4 | 3 | 5 | 5 | 4 |
| | 9 | 2 | 3 | 2 | 3 | 4 | 3 | 4 | 5 | 5 |
| | 10 | 2 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |
| | 11 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 12 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 5 | 4 |
| MSt1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 5 | 5 | 4 |
| | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 4 | 4 | 4 | 3 | 2 | 3 | 3 | 4 | 5 | 4 |
| | 5 | 3 | 3 | 3 | 2 | 4 | 3 | 4 | 5 | 4 |
| | 6 | 3 | 3 | 3 | 3 | 4 | 3 | 5 | 5 | 5 |
| | 7 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 4 |
| | 8 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 9 | 2 | 3 | 3 | 4 | 4 | 3 | 4 | 5 | 5 |
| | 10 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 11 | 2 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 4 |
| | 12 | 2 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 4 |

## Subject 5

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 4 | 5 | 3 | 4 | 5 | 3 | 4 | 5 | 4 |
| | 2 | 3 | 5 | 3 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 3 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 4 | 3 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| | 5 | 3 | 5 | 3 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 6 | 3 | 5 | 3 | 3 | 5 | 3 | 4 | 5 | 4 |
| | 7 | 3 | 5 | 4 | 3 | 5 | 3 | 3 | 5 | 3 |
| | 8 | 3 | 5 | 4 | 3 | 5 | 4 | 3 | 5 | 4 |
| | 9 | 3 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 4 |
| | 10 | 3 | 5 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 11 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 12 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| FSt2 | 1 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 2 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 4 | 4 | 5 | 3 | 4 | 5 | 3 | 3 | 4 | 3 |
| | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 6 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 7 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 8 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 9 | 3 | 5 | 3 | 3 | 4 | 4 | 3 | 4 | 4 |
| | 10 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 11 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 12 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 4 |
| MSt3 | 1 | 3 | 5 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 2 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 3 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 3 |
| | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 6 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 7 | 3 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| | 8 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 9 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| | 10 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 11 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 12 | 4 | 5 | 4 | 3 | 5 | 4 | 3 | 4 | 4 |
| MSt1 | 1 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 2 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 3 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 5 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| | 6 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 7 | 3 | 4 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| | 8 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 9 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 10 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 11 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 12 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |

## Subject 6

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 2 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 |
| | 3 | 3 | 4 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 5 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |
| | 7 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 |
| | 8 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 9 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 |
| | 10 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 11 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 12 | 3 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| FSt2 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 2 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 6 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 7 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 8 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 9 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 10 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 11 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 12 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| MSt3 | 1 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 2 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 3 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 6 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 7 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 8 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 9 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 10 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 11 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 12 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| MSt1 | 1 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 2 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 4 |
| | 3 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 3 | 5 | 4 |
| | 5 | 3 | 4 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| | 6 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 7 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 |
| | 8 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 9 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 10 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| | 11 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 12 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |

**Subject 7**

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 3 |
| | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 |
| | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 |
| | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 5 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 6 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 7 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 |
| | 8 | 3 | 4 | 3 | 2 | 4 | 3 | 4 | 4 | 4 |
| | 9 | 3 | 4 | 3 | 3 | 2 | 2 | 4 | 4 | 3 |
| | 10 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| | 11 | 2 | 3 | 2 | 3 | 3 | 2 | 4 | 4 | 3 |
| | 12 | 2 | 4 | 2 | 3 | 4 | 3 | 4 | 4 | 4 |
| FSt2 | 1 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 |
| | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 |
| | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 5 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 6 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 4 |
| | 7 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 |
| | 8 | 3 | 4 | 3 | 2 | 4 | 3 | 4 | 4 | 4 |
| | 9 | 3 | 3 | 3 | 3 | 2 | 2 | 4 | 4 | 3 |
| | 10 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| | 11 | 2 | 3 | 2 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 12 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 |
| MSt3 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 3 |
| | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 |
| | 3 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 5 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 6 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 4 |
| | 7 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 |
| | 8 | 3 | 4 | 3 | 2 | 4 | 2 | 4 | 4 | 4 |
| | 9 | 3 | 4 | 3 | 3 | 4 | 2 | 4 | 4 | 4 |
| | 10 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| | 11 | 2 | 4 | 2 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 12 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| MSt1 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 3 |
| | 2 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 3 |
| | 3 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 3 |
| | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| | 5 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 6 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 |
| | 7 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 |
| | 8 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 9 | 3 | 4 | 3 | 3 | 4 | 2 | 4 | 4 | 4 |
| | 10 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 4 | 3 |
| | 11 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 12 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 |

## Subject 8

**N=Naturalness    I=Intensity    S=Similarity**

| Storyteller | Sentence | Global N | Global I | Global S | Local N | Local I | Local S | Proposed N | Proposed I | Proposed S |
|---|---|---|---|---|---|---|---|---|---|---|
| FSt5 | 1 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 5 |
| | 2 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 5 |
| | 3 | 4 | 5 | 3 | 4 | 4 | 5 | 4 | 4 | 5 |
| | 4 | 5 | 4 | 3 | 4 | 5 | 5 | 4 | 5 | 5 |
| | 5 | 4 | 5 | 4 | 3 | 4 | 3 | 5 | 3 | 4 |
| | 6 | 3 | 4 | 4 | 3 | 4 | 5 | 4 | 4 | 5 |
| | 7 | 4 | 5 | 4 | 3 | 4 | 4 | 4 | 5 | 5 |
| | 8 | 4 | 4 | 5 | 4 | 3 | 5 | 4 | 5 | 5 |
| | 9 | 3 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 4 |
| | 10 | 4 | 5 | 5 | 3 | 5 | 4 | 5 | 4 | 5 |
| | 11 | 3 | 4 | 4 | 4 | 4 | 3 | 5 | 4 | 5 |
| | 12 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| FSt2 | 1 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | 2 | 4 | 5 | 5 | 4 | 4 | 5 | 3 | 5 | 4 |
| | 3 | 3 | 3 | 4 | 4 | 5 | 4 | 3 | 4 | 4 |
| | 4 | 3 | 4 | 4 | 3 | 5 | 4 | 3 | 4 | 3 |
| | 5 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 |
| | 6 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 4 | 4 |
| | 7 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 8 | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| | 9 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 10 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 4 |
| | 11 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |
| | 12 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 3 |
| MSt3 | 1 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 |
| | 2 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 5 |
| | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 3 | 4 | 4 |
| | 4 | 4 | 5 | 5 | 3 | 4 | 4 | 4 | 4 | 5 |
| | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 6 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 5 |
| | 7 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 5 | 3 |
| | 8 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| | 9 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| | 10 | 4 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 5 |
| | 11 | 4 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 |
| | 12 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 |
| MSt1 | 1 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 4 |
| | 2 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 |
| | 3 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 5 |
| | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 |
| | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 6 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 5 |
| | 7 | 4 | 5 | 5 | 4 | 4 | 5 | 3 | 4 | 4 |
| | 8 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| | 9 | 3 | 4 | 4 | 3 | 5 | 4 | 3 | 5 | 5 |
| | 10 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 5 |
| | 11 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 5 |
| | 12 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 5 |

**Subject 9**

**N=Naturalness  I=Intensity  S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 |
| | 2 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 5 | 5 |
| | 3 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 4 | 4 |
| | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 7 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 |
| | 8 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 9 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 10 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 11 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 12 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 5 | 5 |
| FSt2 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 2 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 3 | 4 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 5 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 5 | 4 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 6 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 |
| | 7 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 8 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 9 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 |
| | 10 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 11 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 12 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5 |
| MSt3 | 1 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 2 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 |
| | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 5 |
| | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 |
| | 7 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 |
| | 8 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 9 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 5 | 4 |
| | 10 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 11 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 |
| | 12 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | 5 | 5 |
| MSt1 | 1 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 2 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 |
| | 3 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 |
| | 5 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 6 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 |
| | 7 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 |
| | 8 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 9 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 10 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 5 |
| | 11 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5 |
| | 12 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | 4 | 5 |

## Subject 10 (Professional)

**N=Naturalness I=Intensity S=Similarity**

| Storyteller | | Global | | | Local | | | Proposed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sentence | N | I | S | N | I | S | N | I | S |
| FSt5 | 1 | 4 | 5 | 3 | 4 | 3 | 3 | 4 | 4 | 3 |
| | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 3 |
| | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 5 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 6 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 7 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 8 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 9 | 4 | 3 | 3 | 2 | 2 | 3 | 4 | 3 | 3 |
| | 10 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 11 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 4 |
| | 12 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| FSt2 | 1 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 3 |
| | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 3 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 |
| | 5 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 6 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 7 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 3 |
| | 8 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 |
| | 9 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 10 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 11 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 4 |
| | 12 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| MSt3 | 1 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 3 |
| | 2 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 |
| | 3 | 4 | 4 | 3 | 4 | 4 | 2 | 4 | 4 | 3 |
| | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 3 |
| | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 6 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 7 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 3 |
| | 8 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 3 |
| | 9 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| | 10 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 11 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | 12 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 |
| MSt1 | 1 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 |
| | 2 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 |
| | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 5 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 |
| | 6 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 |
| | 7 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |
| | 8 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 3 |
| | 9 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 |
| | 10 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 3 |
| | 11 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 3 |
| | 12 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 |

# APPENDIX K

## The Ground Truth of Prominent Syllables

| No. | Syllables | Syllable type |
|---|---|---|
| 1 | su | |
| 2 | a | |
| 3 | tu | |
| 4 | ma | |
| 5 | sa | |
| 6 | da | |
| 7 | hu | |
| 8 | lu | Prominent syllable |
| 9 | ting | |
| 10 | gal | |
| 11 | se | |
| 12 | o | |
| 13 | rang | |
| 14 | pe | |
| 15 | ta | |
| 16 | ni | Prominent syllable |
| 17 | yang | |
| 18 | me | |
| 19 | me | |
| 20 | li | |
| 21 | ha | |
| 22 | ra | Prominent syllable |
| 23 | se | |
| 24 | e | |
| 25 | kor | |
| 26 | ang | |
| 27 | sa | Prominent syllable |
| 28 | pa | |
| 29 | da | |
| 30 | su | |
| 31 | a | |
| 32 | tu | |
| 33 | ha | |
| 34 | ri | Prominent syllable |
| 35 | ke | |
| 36 | ti | |
| 37 | ka | |
| 38 | i | |
| 39 | tu | |
| 40 | di | |
| 41 | a | |
| 42 | i | |
| 43 | ngin | |
| 44 | me | |
| 45 | ngam | |
| 46 | bil | |
| 47 | te | |
| 48 | lur | |
| 49 | ang | |
| 50 | sa | |
| 51 | nya | Prominent syllable |
| 52 | si | |
| 53 | pe | |
| 54 | ta | |
| 55 | ni | Prominent syllable |
| 56 | men | |
| 57 | da | |
| 58 | pa | |
| 59 | ti | |
| 139 | ta | |
| 140 | ni | |
| 141 | be | |
| 142 | ra | |
| 143 | sa | |
| 144 | ter | |
| 145 | ke | |
| 146 | jut | Prominent syllable |
| 147 | a | |
| 148 | pa | |
| 149 | bi | |
| 150 | la | |
| 151 | men | |
| 152 | da | |
| 153 | pa | |
| 154 | ti | Prominent syllable |
| 155 | i | |
| 156 | tu | Prominent syllable |
| 157 | a | |
| 158 | da | |
| 159 | lah | |
| 160 | te | |
| 161 | lur | |
| 162 | e | |
| 163 | mas | Prominent syllable |
| 164 | si | |
| 165 | pe | |
| 166 | ta | |
| 167 | ni | |
| 168 | sung | Prominent syllable |
| 169 | guh | |
| 170 | gem | |
| 171 | bi | |
| 172 | ra | Prominent syllable |
| 173 | ha | |
| 174 | ri | |
| 175 | de | |
| 176 | mi | |
| 177 | ha | |
| 178 | ri | |
| 179 | se | |
| 180 | le | |
| 181 | pas | |
| 182 | i | |
| 183 | tu | Prominent syllable |
| 184 | si | |
| 185 | ang | |
| 186 | sa | Prominent syllable |
| 187 | te | |
| 188 | rus | |
| 189 | ber | |
| 190 | te | |
| 191 | lur | |
| 192 | e | |
| 193 | mas | Prominent syllable |
| 194 | si | |
| 195 | pe | |
| 196 | ta | |
| 197 | ni | |
| 198 | mu | |

| | | |
|---|---|---|
| 60 | te | |
| 61 | lur | |
| 62 | i | |
| 63 | tu | |
| 64 | ke | |
| 65 | li | |
| 66 | ha | |
| 67 | tan | |
| 68 | a | |
| 69 | neh | Prominent syllable |
| 70 | war | |
| 71 | na | |
| 72 | nya | |
| 73 | ku | |
| 74 | ning | |
| 75 | ke | |
| 76 | e | |
| 77 | ma | |
| 78 | san | Prominent syllable |
| 79 | dan | |
| 80 | be | |
| 81 | rat | Prominent syllable |
| 82 | di | |
| 83 | a | |
| 84 | me | |
| 85 | nyang | |
| 86 | ka | Prominent syllable |
| 87 | ji | |
| 88 | ran | |
| 89 | nya | |
| 90 | cu | |
| 91 | ba | |
| 92 | ber | |
| 93 | gu | |
| 94 | rau | Prominent syllable |
| 95 | la | |
| 96 | lu | |
| 97 | ber | |
| 98 | ca | |
| 99 | dang | |
| 100 | un | |
| 101 | tuk | |
| 102 | mem | |
| 103 | bu | |
| 104 | ang | Prominent syllable |
| 105 | te | |
| 106 | lur | |
| 107 | i | |
| 108 | tu | Prominent syllable |
| 109 | na | |
| 110 | mun | |
| 111 | se | |
| 112 | le | |
| 113 | pas | |
| 114 | ber | |
| 115 | fi | |
| 116 | kir | Prominent syllable |
| 117 | di | |
| 118 | a | |
| 119 | mem | |
| 120 | ba | |
| 121 | wa | Prominent syllable |
| 122 | te | |
| 123 | lur | |
| 124 | i | |
| 125 | tu | Prominent syllable |
| 126 | pu | |
| 127 | lang | |

| | | |
|---|---|---|
| 199 | la | |
| 200 | men | |
| 201 | ja | |
| 202 | di | |
| 203 | ta | |
| 204 | mak | Prominent syllable |
| 205 | si | Prominent syllable |
| 206 | pe | |
| 207 | ta | |
| 208 | ni | |
| 209 | me | |
| 210 | ngam | |
| 211 | bil | |
| 212 | pi | |
| 213 | sau | Prominent syllable |
| 214 | dan | |
| 215 | me | |
| 216 | nyem | |
| 217 | be | |
| 218 | lih | Prominent syllable |
| 219 | ang | |
| 220 | sa | |
| 221 | ber | |
| 222 | tu | |
| 223 | ah | |
| 224 | nya | Prominent syllable |
| 225 | a | |
| 226 | pa | |
| 227 | bi | |
| 228 | la | |
| 229 | men | |
| 230 | da | |
| 231 | pa | |
| 232 | ti | Prominent syllable |
| 233 | **ti** | |
| 234 | **a** | |
| 235 | **da** | |
| 236 | se | |
| 237 | bi | |
| 238 | ji | |
| 239 | pun | |
| 240 | te | |
| 241 | lur | |
| 242 | e | |
| 243 | mas | Prominent syllable |
| 244 | di | |
| 245 | da | |
| 246 | lam | |
| 247 | pe | |
| 248 | rut | |
| 249 | ang | |
| 250 | sa | |
| 251 | i | |
| 252 | tu | Prominent syllable |
| 253 | si | |
| 254 | pe | |
| 255 | ta | |
| 256 | ni | Prominent syllable |
| 257 | mu | |
| 258 | la | |
| 259 | me | |
| 260 | nye | |
| 261 | da | |
| 262 | ri | |
| 263 | ke | |
| 264 | si | |
| 265 | la | |
| 266 | pan | |

| | | |
|---|---|---|
| 128 | ke | |
| 129 | ru | |
| 130 | mah | |
| 131 | un | |
| 132 | tuk | |
| 133 | di | |
| 134 | pe | |
| 135 | rik | |
| 136 | sa | Prominent syllable |
| 137 | si | |
| 138 | pe | |

| | | |
|---|---|---|
| 267 | nya | Prominent syllable |
| 268 | dan | |
| 269 | be | |
| 270 | ra | |
| 271 | sa | Prominent syllable |
| 272 | sa | Prominent syllable |
| 273 | ngat | |
| 274 | me | |
| 275 | nye | |
| 276 | sal | Prominent syllable |

# APPENDIX L

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data Male Storyteller 1 (Mst1)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.32 | 63.44 | 134.65 | 0.20 | 61.42 | x |
| 2 | a | 0.20 | 69.86 | 133.37 | 0.41 | 67.05 | 130.78 |
| 3 | tu | 0.09 | 75.40 | 183.76 | 0.12 | 70.35 | 174.14 |
| 4 | ma | 0.16 | 74.59 | 157.11 | 0.16 | 72.05 | 171.49 |
| 5 | sa | 0.18 | 70.09 | 148.21 | 0.19 | 69.25 | 168.69 |
| 6 | da | 0.17 | 71.01 | 139.96 | 0.17 | 72.01 | 162.32 |
| 7 | hu | 0.15 | 65.70 | 135.30 | 0.15 | 76.55 | 158.47 |
| 8 | lu | 0.22 | 66.26 | 125.57 | 0.39 | 73.67 | 129.18 |
| 9 | ting | 0.15 | 71.14 | 133.53 | 0.22 | 71.56 | 148.45 |
| 10 | gal | 0.23 | 73.67 | 153.56 | 0.14 | 76.05 | 179.04 |
| 11 | se | 0.07 | 71.48 | 136.79 | 0.20 | 71.59 | 151.67 |
| 12 | o | 0.11 | 74.03 | 131.25 | 0.13 | 76.02 | 133.65 |
| 13 | rang | 0.24 | 68.94 | 137.84 | 0.19 | 69.80 | 131.96 |
| 14 | pe | 0.16 | 57.42 | 132.90 | 0.16 | 65.99 | 132.95 |
| 15 | ta | 0.13 | 72.43 | 132.73 | 0.20 | 72.97 | 133.48 |
| 16 | ni | 0.20 | 69.42 | 136.66 | 0.25 | 70.09 | 127.45 |
| 17 | yang | 0.20 | 70.58 | 130.70 | 0.12 | 68.08 | 134.12 |
| 18 | me | 0.07 | 72.43 | 126.61 | 0.13 | 72.31 | 140.70 |
| 19 | me | 0.14 | 71.89 | 126.56 | 0.12 | 72.67 | 141.31 |
| 20 | li | 0.14 | 71.79 | 125.98 | 0.12 | 75.54 | 144.41 |
| 21 | ha | 0.23 | 71.93 | 127.49 | 0.17 | 72.61 | 147.38 |
| 22 | ra | 0.15 | 72.07 | 130.58 | 0.10 | 74.75 | 189.57 |
| 23 | se | 0.14 | 65.95 | 271.73 | 0.18 | 70.13 | 403.17 |
| 24 | e | 0.24 | 66.26 | 209.31 | 0.17 | 65.19 | 432.50 |
| 25 | kor | 0.06 | 67.32 | 270.08 | 0.09 | 67.73 | 282.32 |
| 26 | ang | 0.21 | 69.48 | 195.78 | 0.11 | 66.88 | 214.93 |
| 27 | sa | 0.25 | 63.76 | 122.77 | 0.32 | 62.94 | 102.31 |
| 28 | pa | 0.16 | 73.85 | 127.51 | 0.31 | 74.84 | 126.14 |
| 29 | da | 0.08 | 73.18 | 158.53 | 0.13 | 68.97 | 137.35 |
| 30 | su | 0.12 | 68.69 | 177.47 | 0.09 | 69.80 | 155.47 |
| 31 | a | 0.17 | 71.58 | 140.39 | 0.14 | 66.32 | 175.28 |
| 32 | tu | 0.12 | 72.66 | 137.90 | 0.06 | 67.47 | 180.93 |
| 33 | ha | 0.20 | 74.23 | 131.23 | 0.22 | 71.96 | 170.74 |
| 34 | ri | 0.17 | 67.41 | 122.30 | 0.34 | 72.83 | 156.34 |
| 35 | ke | 0.13 | 68.50 | 129.68 | 0.10 | 70.29 | 141.28 |
| 36 | ti | 0.16 | 65.01 | 135.45 | 0.15 | 67.94 | 190.88 |
| 37 | ka | 0.15 | 72.55 | 172.35 | 0.15 | 65.59 | 191.51 |
| 38 | i | 0.21 | 61.27 | 197.37 | 0.28 | 64.14 | 247.85 |
| 39 | tu | 0.20 | 64.59 | 124.42 | 0.21 | 69.68 | 126.01 |
| 40 | di | 0.06 | 64.73 | 134.98 | 0.06 | 66.28 | 137.46 |
| 41 | a | 0.11 | 77.09 | 195.26 | 0.08 | 76.62 | 157.51 |
| 42 | i | 0.10 | 74.42 | 245.71 | 0.13 | 71.88 | 152.41 |
| 43 | ngin | 0.17 | 73.21 | 136.68 | 0.21 | 72.97 | 141.17 |
| 44 | me | 0.08 | 73.86 | 130.46 | 0.15 | 71.36 | 133.11 |
| 45 | ngam | 0.17 | 72.54 | 125.20 | 0.16 | 72.56 | 131.10 |
| 46 | bil | 0.25 | 74.10 | 127.60 | 0.17 | 67.29 | 136.72 |
| 47 | te | 0.08 | 68.11 | 123.73 | 0.11 | 72.23 | 134.42 |
| 48 | lur | 0.19 | 74.13 | 121.57 | 0.11 | 75.33 | 166.97 |
| 49 | ang | 0.28 | 68.39 | 128.93 | 0.20 | 70.35 | 156.68 |
| 50 | sa | 0.15 | 74.52 | 145.41 | 0.17 | 70.27 | 187.38 |
| 51 | nya | 0.22 | 67.65 | 108.84 | 0.35 | 71.94 | 137.79 |
| 52 | si | 0.30 | 66.68 | 156.95 | 0.29 | 67.17 | 201.65 |
| 53 | pe | 0.15 | 69.18 | 150.56 | 0.14 | 72.81 | 163.92 |
| 54 | ta | 0.18 | 73.35 | 137.71 | 0.17 | 73.72 | 123.10 |
| 55 | ni | 0.12 | 70.93 | 141.05 | 0.24 | 69.49 | 115.39 |
| 56 | men | 0.14 | 69.79 | 135.68 | 0.19 | 69.32 | 133.65 |
| 57 | da | 0.16 | 69.38 | 129.52 | 0.15 | 72.90 | 138.27 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 58 | pa | 0.22 | 65.81 | 127.90 | 0.09 | 71.77 | 127.79 |
| 59 | ti | 0.20 | 61.26 | 135.73 | 0.23 | 63.22 | 135.80 |
| 60 | te | 0.11 | 67.70 | 138.01 | 0.12 | 66.03 | 137.41 |
| 61 | lur | 0.10 | 74.58 | 169.58 | 0.16 | 71.93 | 235.17 |
| 62 | i | 0.16 | 65.79 | 406.35 | 0.17 | 65.38 | 184.58 |
| 63 | tu | 0.17 | 65.97 | 149.88 | 0.17 | 67.32 | 183.13 |
| 64 | ke | 0.07 | 68.49 | 127.64 | 0.09 | 67.30 | 130.73 |
| 65 | li | 0.07 | 73.29 | 124.23 | 0.08 | 73.65 | 124.20 |
| 66 | ha | 0.12 | 64.74 | 120.14 | 0.15 | 66.61 | 120.68 |
| 67 | tan | 0.16 | 69.25 | 121.06 | 0.19 | 66.90 | 138.00 |
| 68 | a | 0.13 | 68.18 | 147.58 | 0.12 | 70.05 | 189.74 |
| 69 | neh | 0.30 | 67.79 | 113.86 | 0.22 | 67.46 | 134.73 |
| 70 | war | 0.24 | 73.49 | 129.91 | 0.15 | 76.38 | 143.97 |
| 71 | na | 0.14 | 74.11 | 150.57 | 0.21 | 73.80 | 164.14 |
| 72 | nya | 0.23 | 64.46 | 162.11 | 0.23 | 69.00 | 166.85 |
| 73 | ku | 0.13 | 69.00 | 142.43 | 0.19 | 68.21 | 169.26 |
| 74 | ning | 0.27 | 69.23 | 135.51 | 0.23 | 69.30 | 160.37 |
| 75 | ke | 0.11 | 69.23 | 133.03 | 0.12 | 69.81 | 383.30 |
| 76 | e | 0.09 | 70.92 | 131.61 | 0.11 | 72.98 | 156.46 |
| 77 | ma | 0.12 | 71.44 | 135.23 | 0.14 | 71.58 | 157.19 |
| 78 | san | 0.29 | 68.45 | 139.85 | 0.34 | 67.82 | 158.45 |
| 79 | dan | 0.22 | 70.83 | 125.43 | 0.16 | 78.55 | 188.13 |
| 80 | be | 0.12 | 73.67 | 137.82 | 0.17 | 72.96 | 126.45 |
| 81 | rat | 0.19 | 66.84 | 101.78 | 0.25 | 69.71 | 106.00 |
| 82 | di | 0.04 | 71.53 | 140.98 | 0.06 | 70.83 | 148.70 |
| 83 | a | 0.12 | 79.63 | 153.53 | 0.13 | 77.38 | 186.96 |
| 84 | me | 0.09 | 76.92 | 149.85 | 0.14 | 75.70 | 153.86 |
| 85 | nyang | 0.30 | 68.10 | 137.95 | 0.28 | 68.68 | 117.44 |
| 86 | ka | 0.16 | 72.02 | 159.93 | 0.27 | 67.46 | 227.39 |
| 87 | ji | 0.16 | 70.45 | 138.80 | 0.15 | 68.50 | 141.88 |
| 88 | ran | 0.16 | 73.54 | 142.87 | 0.15 | 75.70 | 163.28 |
| 89 | nya | 0.15 | 69.38 | 151.43 | 0.18 | 68.69 | 172.85 |
| 90 | cu | 0.18 | 67.28 | 142.39 | 0.22 | 69.63 | 169.05 |
| 91 | ba | 0.20 | 69.77 | 140.50 | 0.13 | 76.60 | 175.63 |
| 92 | ber | 0.14 | 73.22 | 131.10 | 0.21 | 72.80 | 120.10 |
| 93 | gu | 0.13 | 72.88 | 131.03 | 0.12 | 73.27 | 136.58 |
| 94 | rau | 0.29 | 69.62 | 116.10 | 0.31 | 71.53 | 122.20 |
| 95 | la | 0.13 | 69.30 | 119.23 | 0.18 | 74.79 | 135.31 |
| 96 | lu | 0.21 | 71.56 | 133.18 | 0.16 | 77.23 | 154.18 |
| 97 | ber | 0.08 | 73.84 | 132.96 | 0.11 | 73.65 | 147.52 |
| 98 | ca | 0.21 | 67.51 | 128.26 | 0.22 | 71.06 | 155.81 |
| 99 | dang | 0.16 | 68.16 | 151.09 | 0.17 | 70.88 | 166.37 |
| 100 | un | 0.19 | 62.39 | 133.46 | 0.19 | 67.45 | 153.34 |
| 101 | tuk | 0.09 | 68.40 | 283.01 | 0.10 | 70.43 | 310.69 |
| 102 | mem | 0.11 | 68.81 | 223.65 | 0.13 | 71.55 | 191.92 |
| 103 | bu | 0.12 | 72.98 | 124.29 | 0.10 | 68.15 | 135.10 |
| 104 | ang | 0.22 | 69.99 | 126.10 | 0.22 | 71.98 | 128.45 |
| 105 | te | 0.05 | 66.59 | 122.30 | 0.09 | 69.82 | 126.10 |
| 106 | lur | 0.18 | 71.69 | 123.64 | 0.10 | 71.83 | 121.44 |
| 107 | i | 0.14 | 69.46 | 346.72 | 0.25 | 63.83 | 112.37 |
| 108 | tu | 0.23 | 66.44 | 159.63 | 0.24 | 67.28 | 104.17 |
| 109 | na | 0.16 | 74.19 | 134.36 | 0.26 | 75.81 | 153.30 |
| 110 | mun | 0.15 | 71.53 | 159.32 | 0.32 | 67.45 | 129.31 |
| 111 | se | 0.23 | 68.16 | 149.28 | 0.23 | 64.08 | 149.50 |
| 112 | le | 0.16 | 72.07 | 149.05 | 0.18 | 73.19 | 148.95 |
| 113 | pas | 0.19 | 71.97 | 220.49 | 0.19 | 72.23 | 214.78 |
| 114 | ber | 0.14 | 74.96 | 150.18 | 0.11 | 75.16 | 150.21 |
| 115 | fi | 0.20 | 67.08 | 141.22 | 0.25 | 67.50 | 142.76 |
| 116 | kir | 0.27 | 63.04 | 118.26 | 0.28 | 62.53 | 118.02 |
| 117 | di | 0.08 | 64.88 | 136.95 | 0.11 | 55.16 | 130.98 |
| 118 | a | 0.11 | 74.58 | 146.63 | 0.10 | 76.53 | 160.39 |
| 119 | mem | 0.15 | 73.10 | 139.48 | 0.21 | 74.66 | 162.03 |
| 120 | ba | 0.17 | 77.94 | 136.51 | 0.12 | 79.75 | 136.93 |
| 121 | wa | 0.12 | 73.62 | 151.51 | 0.26 | 71.79 | 142.98 |
| 122 | te | 0.09 | 67.48 | 145.03 | 0.09 | 72.00 | 145.93 |
| 123 | lur | 0.18 | 72.36 | 135.03 | 0.11 | 75.17 | 136.96 |
| 124 | i | 0.28 | 59.97 | 128.43 | 0.22 | 68.26 | 180.87 |
| 125 | tu | 0.19 | 63.77 | 128.73 | 0.17 | 65.56 | 138.05 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 126 | pu | 0.10 | 70.88 | 134.50 | 0.08 | 70.27 | 145.01 |
| 127 | lang | 0.25 | 68.79 | 129.34 | 0.21 | 72.45 | 142.02 |
| 128 | ke | 0.09 | 66.86 | 137.60 | 0.11 | 67.12 | 142.62 |
| 129 | ru | 0.13 | 73.53 | 140.02 | 0.19 | 71.86 | 133.47 |
| 130 | mah | 0.23 | 68.64 | 135.92 | 0.21 | 68.50 | 132.49 |
| 131 | un | 0.15 | 61.93 | 136.37 | 0.17 | 64.11 | 148.32 |
| 132 | tuk | 0.13 | 72.97 | 133.14 | 0.13 | 72.10 | 409.99 |
| 133 | di | 0.13 | 67.14 | 137.63 | 0.13 | 69.22 | 211.50 |
| 134 | pe | 0.07 | 72.64 | 145.61 | 0.05 | 72.58 | 180.42 |
| 135 | rik | 0.15 | 72.00 | 391.63 | 0.10 | 71.33 | 168.71 |
| 136 | sa | 0.30 | 66.90 | 129.10 | 0.35 | 66.50 | 130.50 |
| 137 | si | 0.44 | 68.39 | 154.80 | 0.29 | 67.44 | 213.92 |
| 138 | pe | 0.19 | 68.43 | 149.49 | 0.14 | 73.55 | 165.49 |
| 139 | ta | 0.14 | 75.55 | 132.12 | 0.14 | 75.21 | 137.00 |
| 140 | ni | 0.17 | 72.00 | 145.58 | 0.25 | 71.00 | 128.18 |
| 141 | be | 0.11 | 73.04 | 136.62 | 0.06 | 69.25 | 147.06 |
| 142 | ra | 0.14 | 74.67 | 127.81 | 0.15 | 74.38 | 180.27 |
| 143 | sa | 0.23 | 64.96 | 144.22 | 0.15 | 70.08 | 223.34 |
| 144 | ter | 0.08 | 68.76 | 142.18 | 0.19 | 69.90 | 177.18 |
| 145 | ke | 0.17 | 69.95 | 137.93 | 0.14 | 72.04 | 132.74 |
| 146 | jut | 0.23 | 69.51 | 262.92 | 0.21 | 66.19 | 124.82 |
| 147 | a | 0.18 | 55.80 | x | 0.11 | 63.41 | x |
| 148 | pa | 0.06 | 70.89 | 127.04 | 0.11 | 69.38 | 133.64 |
| 149 | bi | 0.13 | 71.92 | 128.36 | 0.08 | 74.11 | 141.47 |
| 150 | la | 0.17 | 75.01 | 142.81 | 0.14 | 77.18 | 156.29 |
| 151 | men | 0.12 | 71.37 | 137.26 | 0.20 | 73.39 | 152.60 |
| 152 | da | 0.14 | 71.76 | 126.69 | 0.15 | 67.83 | 140.43 |
| 153 | pa | 0.19 | 67.72 | 121.83 | 0.21 | 65.40 | 133.90 |
| 154 | ti | 0.18 | 59.25 | 122.47 | 0.17 | 68.26 | 153.66 |
| 155 | i | 0.12 | 66.54 | 191.73 | 0.17 | 61.63 | 132.18 |
| 156 | tu | 0.17 | 65.00 | 133.83 | 0.07 | 65.07 | 191.40 |
| 157 | a | 0.12 | 69.85 | 124.05 | 0.10 | 71.49 | 408.45 |
| 158 | da | 0.09 | 70.24 | 127.68 | 0.08 | 73.25 | 135.44 |
| 159 | lah | 0.21 | 70.94 | 129.78 | 0.28 | 68.46 | 131.26 |
| 160 | te | 0.10 | 71.07 | 126.65 | 0.07 | 72.55 | 150.54 |
| 161 | lur | 0.13 | 73.72 | 127.23 | 0.16 | 73.79 | 298.78 |
| 162 | e | 0.06 | 71.65 | 139.57 | 0.12 | 69.83 | 284.67 |
| 163 | mas | 0.37 | 65.67 | 117.90 | 0.42 | 65.88 | 207.70 |
| 164 | si | 0.37 | 68.69 | 167.80 | 0.24 | 66.49 | 184.73 |
| 165 | pe | 0.15 | 73.44 | 155.64 | 0.20 | 71.53 | 185.51 |
| 166 | ta | 0.14 | 75.07 | 141.50 | 0.10 | 75.82 | 178.76 |
| 167 | ni | 0.09 | 73.38 | 150.50 | 0.11 | 69.32 | 176.18 |
| 168 | sung | 0.33 | 72.14 | 154.41 | 0.54 | 71.11 | 187.86 |
| 169 | guh | 0.18 | 71.04 | 141.75 | 0.16 | 74.90 | 190.87 |
| 170 | gem | 0.14 | 74.28 | 126.38 | 0.17 | 71.32 | 129.99 |
| 171 | bi | 0.12 | 70.90 | 118.97 | 0.19 | 72.83 | 120.40 |
| 172 | ra | 0.19 | 64.46 | 102.84 | 0.27 | 68.28 | 104.75 |
| 173 | ha | 0.26 | 66.87 | 137.65 | 0.23 | 68.52 | 146.87 |
| 174 | ri | 0.13 | 75.85 | 172.79 | 0.15 | 74.12 | 191.44 |
| 175 | de | 0.10 | 75.95 | 163.90 | 0.09 | 79.11 | 197.16 |
| 176 | mi | 0.13 | 75.52 | 151.86 | 0.14 | 76.10 | 176.22 |
| 177 | ha | 0.25 | 73.35 | 132.42 | 0.23 | 71.94 | 148.05 |
| 178 | ri | 0.14 | 72.39 | 130.97 | 0.24 | 66.63 | 127.27 |
| 179 | se | 0.17 | 65.37 | 145.42 | 0.18 | 65.85 | 146.88 |
| 180 | le | 0.18 | 70.12 | 131.64 | 0.18 | 70.54 | 149.20 |
| 181 | pas | 0.19 | 70.00 | 146.80 | 0.24 | 70.81 | 197.27 |
| 182 | i | 0.20 | 65.01 | 136.21 | 0.20 | 65.92 | 148.28 |
| 183 | tu | 0.16 | 66.96 | 134.43 | 0.19 | 70.77 | 132.67 |
| 184 | si | 0.20 | 63.89 | 146.55 | 0.23 | 67.22 | 345.74 |
| 185 | ang | 0.22 | 70.04 | 133.05 | 0.22 | 72.70 | 189.13 |
| 186 | sa | 0.28 | 64.37 | 147.46 | 0.32 | 64.61 | 168.63 |
| 187 | te | 0.13 | 72.41 | 145.63 | 0.26 | 76.63 | 178.90 |
| 188 | rus | 0.21 | 68.38 | 151.53 | 0.23 | 69.93 | 232.90 |
| 189 | ber | 0.17 | 67.61 | 130.75 | 0.14 | 70.78 | 132.55 |
| 190 | te | 0.06 | 73.57 | 133.13 | 0.10 | 74.57 | 131.75 |
| 191 | lur | 0.16 | 74.15 | 125.80 | 0.11 | 75.96 | 214.51 |
| 192 | e | 0.11 | 70.90 | 118.47 | 0.15 | 71.85 | 183.25 |
| 193 | mas | 0.35 | 65.24 | 101.65 | 0.35 | 63.66 | 105.28 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 194 | si | 0.27 | 70.24 | 166.60 | 0.33 | 69.01 | 195.12 |
| 195 | pe | 0.12 | 71.70 | 158.23 | 0.14 | 71.25 | 150.62 |
| 196 | ta | 0.12 | 76.86 | 148.17 | 0.15 | 75.64 | 131.25 |
| 197 | ni | 0.15 | 74.35 | 158.25 | 0.10 | 72.63 | 131.17 |
| 198 | mu | 0.18 | 77.03 | 154.19 | 0.23 | 71.20 | 134.04 |
| 199 | la | 0.18 | 76.48 | 154.89 | 0.13 | 70.18 | 137.53 |
| 200 | men | 0.10 | 73.35 | 132.72 | 0.12 | 68.79 | 135.74 |
| 201 | ja | 0.17 | 73.14 | 128.18 | 0.12 | 73.47 | 132.77 |
| 202 | di | 0.12 | 67.21 | 123.70 | 0.18 | 65.92 | 135.73 |
| 203 | ta | 0.11 | 73.08 | 127.78 | 0.10 | 75.14 | 190.12 |
| 204 | mak | 0.23 | 66.56 | 116.98 | 0.29 | 67.18 | 191.20 |
| 205 | si | 0.32 | 68.07 | 155.16 | 0.33 | 66.16 | 229.83 |
| 206 | pe | 0.15 | 72.55 | 151.37 | 0.13 | 74.67 | 197.83 |
| 207 | ta | 0.14 | 75.34 | 144.23 | 0.15 | 75.98 | 155.75 |
| 208 | ni | 0.13 | 75.45 | 153.82 | 0.10 | 74.24 | 151.90 |
| 209 | me | 0.13 | 73.85 | 142.83 | 0.16 | 74.30 | 152.67 |
| 210 | ngam | 0.17 | 72.88 | 129.87 | 0.17 | 73.32 | 143.57 |
| 211 | bil | 0.15 | 70.10 | 123.58 | 0.15 | 68.59 | 138.77 |
| 212 | pi | 0.10 | 70.15 | 140.71 | 0.12 | 71.40 | 148.14 |
| 213 | sau | 0.45 | 68.34 | 180.26 | 0.41 | 68.87 | 133.77 |
| 214 | dan | 0.24 | 69.70 | 131.57 | 0.15 | 73.07 | 158.21 |
| 215 | me | 0.10 | 73.65 | 133.48 | 0.14 | 73.90 | 167.77 |
| 216 | nyem | 0.14 | 72.92 | 132.42 | 0.18 | 71.49 | 166.62 |
| 217 | be | 0.13 | 73.08 | 136.26 | 0.12 | 74.04 | 171.23 |
| 218 | lih | 0.12 | 75.65 | 153.80 | 0.14 | 74.55 | 207.25 |
| 219 | ang | 0.20 | 68.01 | 144.35 | 0.20 | 68.38 | 149.94 |
| 220 | sa | 0.21 | 68.40 | 137.19 | 0.24 | 69.07 | 136.94 |
| 221 | ber | 0.19 | 72.10 | 131.14 | 0.18 | 72.96 | 131.11 |
| 222 | tu | 0.06 | 70.89 | 143.09 | 0.07 | 72.53 | 139.51 |
| 223 | ah | 0.15 | 76.43 | 148.16 | 0.18 | 72.51 | 125.04 |
| 224 | nya | 0.39 | 66.23 | 111.37 | 0.28 | 67.75 | 106.19 |
| 225 | a | 0.16 | 68.64 | 127.46 | 0.15 | 63.77 | 117.11 |
| 226 | pa | 0.12 | 73.88 | 140.14 | 0.14 | 71.34 | 140.89 |
| 227 | bi | 0.12 | 73.56 | 146.42 | 0.12 | 75.76 | 162.83 |
| 228 | la | 0.17 | 77.00 | 168.84 | 0.17 | 75.28 | 233.58 |
| 229 | men | 0.15 | 73.94 | 160.54 | 0.12 | 73.75 | 174.33 |
| 230 | da | 0.17 | 71.95 | 141.13 | 0.16 | 71.25 | 146.52 |
| 231 | pa | 0.13 | 70.24 | 139.05 | 0.09 | 71.00 | 145.26 |
| 232 | ti | 0.13 | 67.38 | 254.36 | 0.23 | 60.63 | 154.07 |
| 233 | ti | 0.05 | 66.80 | 170.68 | 0.08 | 69.68 | 144.47 |
| 234 | a | 0.16 | 73.71 | 137.60 | 0.10 | 74.24 | 142.17 |
| 235 | da | 0.17 | 75.76 | 150.63 | 0.08 | 72.47 | 166.18 |
| 236 | se | 0.27 | 65.69 | 144.41 | 0.28 | 68.69 | 153.69 |
| 237 | bi | 0.11 | 72.27 | 139.35 | 0.25 | 66.96 | 136.59 |
| 238 | ji | 0.28 | 65.63 | 204.52 | 0.27 | 63.06 | 148.71 |
| 239 | pun | 0.29 | 64.35 | 138.02 | 0.27 | 62.58 | 135.00 |
| 240 | te | 0.07 | 68.77 | 137.90 | 0.09 | 74.20 | 149.60 |
| 241 | lur | 0.24 | 74.50 | 140.09 | 0.19 | 74.30 | 230.83 |
| 242 | e | 0.03 | 66.75 | 141.50 | 0.16 | 71.87 | 145.04 |
| 243 | mas | 0.03 | 70.52 | 134.08 | 0.32 | 65.93 | 120.85 |
| 244 | di | 0.08 | 68.31 | 130.01 | 0.11 | 70.62 | 139.89 |
| 245 | da | 0.12 | 76.55 | 130.95 | 0.10 | 75.61 | 146.16 |
| 246 | lam | 0.19 | 70.61 | 134.27 | 0.18 | 72.79 | 158.18 |
| 247 | pe | 0.07 | 71.22 | 129.69 | 0.06 | 74.78 | 168.57 |
| 248 | rut | 0.12 | 69.12 | 133.13 | 0.09 | 74.55 | 162.53 |
| 249 | ang | 0.13 | 70.51 | 134.93 | 0.11 | 74.19 | 149.69 |
| 250 | sa | 0.27 | 67.14 | 248.91 | 0.29 | 69.21 | 191.54 |
| 251 | i | 0.20 | 63.68 | 219.79 | 0.18 | 66.62 | 167.72 |
| 252 | tu | 0.17 | 68.12 | 126.34 | 0.27 | 66.52 | 135.13 |
| 253 | si | 0.26 | 69.13 | 157.77 | 0.24 | 67.50 | 182.86 |
| 254 | pe | 0.17 | 72.39 | 150.74 | 0.12 | 70.44 | 175.95 |
| 255 | ta | 0.13 | 76.67 | 139.36 | 0.16 | 77.32 | 169.71 |
| 256 | ni | 0.19 | 73.71 | 143.82 | 0.28 | 70.36 | 169.96 |
| 257 | mu | 0.15 | 73.52 | 139.29 | 0.18 | 72.85 | 167.43 |
| 258 | la | 0.21 | 75.49 | 141.56 | 0.19 | 76.80 | 197.41 |
| 259 | me | 0.13 | 72.99 | 132.50 | 0.11 | 75.44 | 142.47 |
| 260 | nye | 0.15 | 71.58 | 131.97 | 0.16 | 71.38 | 136.32 |
| 261 | da | 0.14 | 75.64 | 132.34 | 0.14 | 77.90 | 135.48 |

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|---|---|---|---|---|---|---|---|
| 262 | ri | 0.17 | 65.02 | 145.27 | 0.15 | 67.12 | 131.39 |
| 263 | ke | 0.07 | 70.14 | 139.13 | 0.07 | 71.68 | 147.04 |
| 264 | si | 0.12 | 66.75 | 134.56 | 0.12 | 67.85 | 146.75 |
| 265 | la | 0.24 | 69.40 | 131.28 | 0.23 | 70.04 | 132.73 |
| 266 | pan | 0.15 | 73.78 | 141.48 | 0.09 | 74.68 | 132.80 |
| 267 | nya | 0.22 | 69.21 | 118.34 | 0.28 | 70.35 | 116.63 |
| 268 | dan | 0.17 | 75.17 | 135.73 | 0.16 | 74.77 | 147.42 |
| 269 | be | 0.08 | 73.94 | 138.84 | 0.11 | 78.19 | 156.20 |
| 270 | ra | 0.13 | 75.94 | 139.48 | 0.09 | 76.57 | 157.42 |
| 271 | sa | 0.14 | 69.96 | 144.42 | 0.15 | 69.20 | 155.40 |
| 272 | sa | 0.18 | 70.89 | 156.52 | 0.38 | 69.62 | 161.08 |
| 273 | ngat | 0.16 | 70.31 | 155.97 | 0.22 | 66.20 | 169.68 |
| 274 | me | 0.07 | 67.75 | 123.80 | 0.10 | 66.23 | 114.70 |
| 275 | nye | 0.14 | 69.49 | 118.18 | 0.11 | 68.26 | 114.57 |
| 276 | sal | 0.41 | 66.32 | 101.63 | 0.44 | 65.89 | 102.09 |
| 277 | su | 0.19 | 62.16 | x | 0.12 | 65.94 | x |
| 278 | a | 0.19 | 70.25 | 146.43 | 0.21 | 71.74 | 160.08 |
| 279 | tu | 0.09 | 72.74 | 179.80 | 0.09 | 70.06 | 230.87 |
| 280 | ha | 0.25 | 73.35 | 166.09 | 0.18 | 75.15 | 185.05 |
| 281 | ri | 0.21 | 70.65 | 128.63 | 0.30 | 68.51 | 129.03 |
| 282 | se | 0.20 | 63.70 | 305.07 | 0.20 | 68.09 | 154.67 |
| 283 | e | 0.19 | 65.42 | 134.52 | 0.14 | 69.78 | 151.63 |
| 284 | kor | 0.13 | 71.02 | 179.45 | 0.11 | 70.55 | 196.35 |
| 285 | an | 0.19 | 70.81 | 143.12 | 0.23 | 74.68 | 166.03 |
| 286 | jing | 0.20 | 64.79 | 148.07 | 0.19 | 63.71 | 137.58 |
| 287 | ter | 0.13 | 70.48 | 132.15 | 0.13 | 66.07 | 138.57 |
| 288 | jum | 0.27 | 64.05 | 130.12 | 0.26 | 67.67 | 161.43 |
| 289 | pa | 0.09 | 69.32 | 133.11 | 0.08 | 73.46 | 209.94 |
| 290 | se | 0.23 | 66.55 | 239.07 | 0.20 | 70.37 | 172.09 |
| 291 | ke | 0.13 | 67.80 | 194.81 | 0.15 | 67.84 | 225.54 |
| 292 | tul | 0.20 | 67.44 | 122.32 | 0.13 | 71.54 | 128.61 |
| 293 | da | 0.18 | 72.89 | 142.75 | 0.19 | 71.75 | 182.84 |
| 294 | ging | 0.18 | 65.67 | 104.69 | 0.23 | 64.63 | 112.12 |
| 295 | di | 0.07 | 71.38 | 141.46 | 0.13 | 69.69 | 131.98 |
| 296 | a | 0.20 | 76.45 | 159.43 | 0.10 | 79.67 | 177.77 |
| 297 | meng | 0.24 | 70.53 | 137.75 | 0.23 | 76.40 | 169.59 |
| 298 | gong | 0.25 | 70.93 | 142.63 | 0.25 | 72.59 | 138.23 |
| 299 | gong | 0.23 | 69.47 | 147.48 | 0.21 | 73.34 | 182.13 |
| 300 | da | 0.17 | 69.02 | 134.10 | 0.13 | 73.88 | 143.87 |
| 301 | ging | 0.13 | 66.98 | 210.91 | 0.16 | 70.13 | 132.91 |
| 302 | i | 0.23 | 57.54 | 300.10 | 0.22 | 58.43 | 141.53 |
| 303 | tu | 0.33 | 60.98 | 314.61 | 0.18 | 62.11 | 113.80 |
| 304 | di | 0.07 | 62.56 | 131.87 | 0.10 | 70.48 | 131.16 |
| 305 | mu | 0.17 | 71.15 | 135.92 | 0.18 | 74.38 | 146.14 |
| 306 | lut | 0.17 | 73.58 | 201.81 | 0.24 | 66.88 | 118.25 |
| 307 | un | 0.19 | 62.47 | 238.81 | 0.19 | 63.34 | 132.81 |
| 308 | tuk | 0.10 | 69.94 | 430.35 | 0.15 | 72.95 | 270.75 |
| 309 | me | 0.08 | 69.27 | 173.90 | 0.09 | 71.74 | 137.47 |
| 310 | ma | 0.26 | 67.06 | 128.58 | 0.21 | 64.74 | 134.56 |
| 311 | kan | 0.18 | 69.91 | 135.47 | 0.17 | 74.91 | 155.99 |
| 312 | nya | 0.16 | 67.21 | 138.59 | 0.14 | 71.33 | 139.06 |
| 313 | di | 0.21 | 61.16 | 130.45 | 0.14 | 61.92 | 128.92 |
| 314 | tem | 0.19 | 65.38 | 128.77 | 0.22 | 64.99 | 131.84 |
| 315 | pat | 0.10 | 74.35 | 306.98 | 0.12 | 71.02 | 98.20 |
| 316 | yang | 0.17 | 69.39 | 128.59 | 0.17 | 70.21 | 130.28 |
| 317 | se | 0.11 | 64.40 | 134.98 | 0.05 | 65.27 | 129.20 |
| 318 | la | 0.16 | 74.52 | 155.25 | 0.16 | 72.09 | 120.08 |
| 319 | mat | 0.18 | 61.51 | x | 0.29 | 63.73 | 98.30 |
| 320 | da | 0.12 | 74.80 | 135.97 | 0.09 | 75.08 | 141.45 |
| 321 | lam | 0.17 | 71.26 | 178.70 | 0.21 | 73.07 | 214.18 |
| 322 | per | 0.10 | 70.65 | 164.41 | 0.10 | 74.91 | 193.20 |
| 323 | ja | 0.10 | 73.10 | 149.66 | 0.14 | 75.32 | 159.02 |
| 324 | la | 0.17 | 77.19 | 137.59 | 0.18 | 75.71 | 141.18 |
| 325 | nan | 0.29 | 67.73 | 121.99 | 0.25 | 67.04 | 122.68 |
| 326 | di | 0.05 | 71.14 | 131.20 | 0.10 | 65.15 | 162.88 |
| 327 | a | 0.06 | 73.72 | 137.50 | 0.06 | 78.17 | 156.44 |
| 328 | la | 0.14 | 81.12 | 148.43 | 0.17 | 76.49 | 160.53 |
| 329 | lu | 0.14 | 75.84 | 156.06 | 0.15 | 72.09 | 147.28 |

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|---|---|---|---|---|---|---|---|
| 330 | di | 0.11 | 71.57 | 145.08 | 0.15 | 68.84 | 134.44 |
| 331 | te | 0.22 | 64.41 | 134.58 | 0.17 | 65.08 | 134.90 |
| 332 | pi | 0.04 | 70.28 | 300.93 | 0.11 | 71.87 | 145.12 |
| 333 | a | 0.22 | 72.93 | 131.42 | 0.15 | 69.59 | 221.63 |
| 334 | nak | 0.14 | 67.42 | 123.00 | 0.11 | 67.24 | 143.97 |
| 335 | su | 0.21 | 69.61 | 149.42 | 0.20 | 71.33 | 196.98 |
| 336 | ngai | 0.30 | 66.32 | 107.75 | 0.29 | 69.25 | 119.72 |
| 337 | se | 0.20 | 67.93 | 146.86 | 0.33 | 65.60 | 150.55 |
| 338 | ma | 0.16 | 74.05 | 145.73 | 0.13 | 70.80 | 168.25 |
| 339 | sa | 0.20 | 72.29 | 180.62 | 0.18 | 70.79 | 246.10 |
| 340 | ber | 0.13 | 75.50 | 169.03 | 0.17 | 76.09 | 210.00 |
| 341 | ja | 0.15 | 75.18 | 144.78 | 0.18 | 75.17 | 133.89 |
| 342 | lan | 0.25 | 69.21 | 128.51 | 0.26 | 67.14 | 112.72 |
| 343 | an | 0.17 | 70.23 | 134.27 | 0.19 | 70.58 | 135.82 |
| 344 | jing | 0.15 | 69.72 | 151.79 | 0.13 | 67.60 | 175.40 |
| 345 | i | 0.16 | 68.37 | 146.96 | 0.17 | 68.17 | 161.83 |
| 346 | tu | 0.12 | 71.12 | 153.37 | 0.08 | 75.42 | 181.39 |
| 347 | me | 0.13 | 73.79 | 144.47 | 0.16 | 74.39 | 170.93 |
| 348 | li | 0.16 | 73.09 | 140.36 | 0.11 | 74.41 | 158.63 |
| 349 | hat | 0.25 | 67.09 | 145.20 | 0.26 | 66.51 | 167.35 |
| 350 | ke | 0.12 | 65.65 | 144.23 | 0.10 | 72.34 | 136.81 |
| 351 | da | 0.16 | 74.04 | 134.82 | 0.11 | 76.38 | 123.52 |
| 352 | lam | 0.21 | 71.57 | 132.67 | 0.13 | 68.94 | 117.01 |
| 353 | a | 0.14 | 68.43 | 137.51 | 0.10 | 70.82 | 108.52 |
| 354 | ir | 0.31 | 62.79 | 111.34 | 0.29 | 65.06 | 103.94 |
| 355 | a | 0.16 | 70.77 | 120.99 | 0.15 | 71.15 | 145.82 |
| 356 | da | 0.13 | 76.08 | 153.26 | 0.06 | 76.46 | 185.74 |
| 357 | se | 0.13 | 70.27 | 246.93 | 0.20 | 74.75 | 190.47 |
| 358 | e | 0.18 | 69.58 | 214.55 | 0.13 | 70.82 | 145.30 |
| 359 | kor | 0.06 | 67.99 | 140.08 | 0.07 | 71.61 | 155.75 |
| 360 | an | 0.23 | 69.90 | 135.96 | 0.19 | 73.58 | 200.67 |
| 361 | jing | 0.17 | 70.44 | 140.14 | 0.14 | 71.36 | 150.13 |
| 362 | la | 0.11 | 76.04 | 140.85 | 0.12 | 76.61 | 166.35 |
| 363 | in | 0.31 | 69.95 | 136.05 | 0.28 | 69.85 | 128.74 |
| 364 | de | 0.12 | 68.17 | 130.49 | 0.11 | 68.05 | 121.47 |
| 365 | ngan | 0.17 | 72.84 | 137.47 | 0.17 | 72.83 | 144.45 |
| 366 | da | 0.19 | 74.56 | 136.16 | 0.18 | 76.36 | 154.61 |
| 367 | ging | 0.18 | 70.21 | 146.39 | 0.14 | 72.87 | 173.03 |
| 368 | di | 0.10 | 72.28 | 141.22 | 0.16 | 77.18 | 156.48 |
| 369 | mu | 0.15 | 72.41 | 142.60 | 0.13 | 71.46 | 163.03 |
| 370 | lut | 0.16 | 71.96 | 258.64 | 0.12 | 73.50 | 118.53 |
| 371 | nya | 0.28 | 66.98 | 133.12 | 0.28 | 68.24 | 130.97 |
| 372 | di | 0.12 | 70.02 | 129.75 | 0.10 | 67.66 | 144.02 |
| 373 | da | 0.13 | 76.83 | 137.57 | 0.19 | 76.34 | 171.46 |
| 374 | lam | 0.15 | 72.64 | 138.51 | 0.19 | 74.43 | 215.24 |
| 375 | a | 0.15 | 73.29 | 124.13 | 0.07 | 74.95 | 172.32 |
| 376 | ir | 0.19 | 71.88 | 144.74 | 0.15 | 74.00 | 118.62 |
| 377 | i | 0.15 | 68.86 | 154.50 | 0.25 | 65.38 | 108.01 |
| 378 | tu | 0.22 | 62.81 | 208.89 | 0.29 | 57.39 | 104.50 |
| 379 | di | 0.07 | 68.38 | 146.78 | 0.08 | 74.21 | 360.42 |
| 380 | a | 0.11 | 75.59 | 155.61 | 0.11 | 73.86 | 422.92 |
| 381 | ti | 0.11 | 74.72 | 156.61 | 0.11 | 74.32 | 162.66 |
| 382 | dak | 0.20 | 70.45 | 143.00 | 0.19 | 71.51 | 137.73 |
| 383 | ta | 0.18 | 73.41 | 132.61 | 0.16 | 72.87 | 116.01 |
| 384 | hu | 0.19 | 76.41 | 213.57 | 0.36 | 69.01 | 126.12 |
| 385 | i | 0.25 | 62.12 | 152.08 | 0.23 | 59.26 | 161.28 |
| 386 | tu | 0.16 | 71.04 | 262.83 | 0.10 | 74.50 | 341.38 |
| 387 | i | 0.09 | 70.35 | 165.28 | 0.10 | 74.51 | 192.91 |
| 388 | a | 0.09 | 70.35 | 165.28 | 0.10 | 74.51 | 192.91 |
| 389 | lah | 0.21 | 72.81 | 130.18 | 0.14 | 75.77 | 139.89 |
| 390 | ba | 0.08 | 74.45 | 124.02 | 0.19 | 74.90 | 128.57 |
| 391 | yang | 0.23 | 73.67 | 127.26 | 0.17 | 75.88 | 130.18 |
| 392 | ba | 0.08 | 75.10 | 126.23 | 0.06 | 76.05 | 130.41 |
| 393 | yang | 0.15 | 74.66 | 126.68 | 0.14 | 76.46 | 133.25 |
| 394 | nya | 0.09 | 73.09 | 128.06 | 0.08 | 71.15 | 137.11 |
| 395 | sen | 0.30 | 69.77 | 134.56 | 0.24 | 71.23 | 159.95 |
| 396 | di | 0.09 | 73.88 | 157.68 | 0.14 | 70.94 | 211.28 |
| 397 | ri | 0.38 | 65.08 | 119.96 | 0.33 | 67.38 | 155.82 |

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|---|---|---|---|---|---|---|---|
| 398 | di | 0.07 | 74.57 | 144.51 | 0.05 | 76.55 | 169.15 |
| 399 | a | 0.12 | 77.92 | 156.97 | 0.12 | 81.54 | 192.82 |
| 400 | ma | 0.25 | 68.28 | 155.90 | 0.18 | 77.37 | 212.32 |
| 401 | hu | 0.10 | 71.27 | 160.86 | 0.19 | 74.19 | 205.55 |
| 402 | men | 0.18 | 73.22 | 148.38 | 0.10 | 74.00 | 148.68 |
| 403 | da | 0.16 | 71.12 | 135.61 | 0.15 | 73.98 | 133.01 |
| 404 | pat | 0.17 | 67.20 | x | 0.15 | 67.41 | x |
| 405 | kan | 0.17 | 70.66 | 134.31 | 0.12 | 74.32 | 133.17 |
| 406 | da | 0.07 | 75.97 | 129.86 | 0.07 | 75.71 | 127.66 |
| 407 | ging | 0.24 | 69.88 | 124.74 | 0.16 | 71.99 | 122.23 |
| 408 | i | 0.18 | 58.53 | 123.23 | 0.22 | 64.95 | 108.92 |
| 409 | tu | 0.20 | 60.35 | 104.27 | 0.27 | 64.94 | 103.71 |
| 410 | di | 0.11 | 67.45 | 130.52 | 0.22 | 71.79 | 183.99 |
| 411 | a | 0.19 | 70.74 | 142.55 | 0.15 | 74.85 | 204.75 |
| 412 | pun | 0.13 | 72.35 | 164.87 | 0.17 | 78.26 | 208.02 |
| 413 | me | 0.16 | 74.60 | 157.08 | 0.11 | 78.19 | 156.06 |
| 414 | nya | 0.21 | 74.37 | 140.37 | 0.21 | 76.59 | 127.03 |
| 415 | lak | 0.25 | 68.61 | 147.63 | 0.24 | 66.24 | 186.97 |
| 416 | ke | 0.14 | 63.61 | 153.27 | 0.14 | 67.71 | 156.01 |
| 417 | pa | 0.12 | 73.61 | 136.87 | 0.14 | 73.96 | 161.26 |
| 418 | da | 0.17 | 66.68 | 261.69 | 0.06 | 75.46 | 184.94 |
| 419 | an | 0.17 | 73.73 | 148.19 | 0.18 | 74.28 | 145.44 |
| 420 | jing | 0.20 | 70.86 | 151.07 | 0.12 | 71.22 | 132.89 |
| 421 | di | 0.12 | 67.71 | 138.03 | 0.10 | 70.18 | 131.15 |
| 422 | da | 0.10 | 74.44 | 133.65 | 0.11 | 74.50 | 130.28 |
| 423 | lam | 0.24 | 72.12 | 129.30 | 0.15 | 74.82 | 124.82 |
| 424 | a | 0.15 | 70.55 | 140.70 | 0.10 | 70.92 | 112.40 |
| 425 | ir | 0.23 | 63.64 | 121.50 | 0.31 | 65.97 | 135.37 |
| 426 | se | 0.25 | 64.76 | 140.70 | 0.22 | 69.46 | 153.84 |
| 427 | ba | 0.09 | 78.40 | 148.48 | 0.07 | 77.87 | 182.37 |
| 428 | ik | 0.08 | 75.66 | 285.13 | 0.13 | 73.91 | 333.93 |
| 429 | sa | 0.31 | 70.62 | 233.16 | 0.29 | 70.97 | 210.29 |
| 430 | ja | 0.17 | 73.86 | 154.75 | 0.10 | 74.42 | 174.81 |
| 431 | di | 0.05 | 71.96 | 144.88 | 0.05 | 74.99 | 162.74 |
| 432 | a | 0.09 | 70.09 | 138.06 | 0.06 | 76.42 | 160.75 |
| 433 | mem | 0.08 | 71.37 | 134.67 | 0.13 | 74.54 | 157.98 |
| 434 | bu | 0.25 | 66.31 | 128.98 | 0.20 | 68.94 | 154.25 |
| 435 | ka | 0.12 | 70.09 | 139.52 | 0.14 | 75.08 | 154.01 |
| 436 | mu | 0.16 | 73.18 | 144.83 | 0.13 | 74.50 | 142.15 |
| 437 | lut | 0.26 | 65.97 | 123.48 | 0.25 | 68.06 | 128.65 |
| 438 | da | 0.21 | 71.99 | 132.60 | 0.22 | 72.59 | 149.34 |
| 439 | ging | 0.10 | 76.38 | 155.58 | 0.17 | 75.27 | 186.63 |
| 440 | di | 0.20 | 73.29 | 151.04 | 0.07 | 76.13 | 175.56 |
| 441 | mu | 0.14 | 73.66 | 146.41 | 0.11 | 71.34 | 167.53 |
| 442 | lut | 0.11 | 73.92 | 318.22 | 0.15 | 71.77 | 269.39 |
| 443 | nya | 0.18 | 69.67 | 181.38 | 0.31 | 67.40 | 192.12 |
| 444 | ter | 0.12 | 67.48 | 146.44 | 0.18 | 71.94 | 192.28 |
| 445 | ja | 0.26 | 68.25 | 141.33 | 0.25 | 69.53 | 205.70 |
| 446 | tuh | 0.12 | 67.94 | 153.08 | 0.17 | 69.76 | 200.24 |
| 447 | ke | 0.12 | 67.53 | 140.17 | 0.10 | 71.38 | 153.15 |
| 448 | da | 0.12 | 74.76 | 123.11 | 0.09 | 76.57 | 121.92 |
| 449 | lam | 0.10 | 75.29 | 121.09 | 0.14 | 69.95 | 112.67 |
| 450 | a | 0.27 | 65.59 | 140.80 | 0.09 | 69.51 | 105.10 |
| 451 | ir | 0.25 | 62.55 | 105.72 | 0.27 | 66.24 | 100.26 |
| 452 | se | 0.23 | 66.70 | x | 0.32 | 70.61 | 165.28 |
| 453 | e | 0.11 | 73.63 | 205.55 | 0.15 | 68.98 | 162.06 |
| 454 | kor | 0.24 | 69.58 | 173.30 | 0.20 | 71.30 | 238.51 |
| 455 | se | 0.17 | 71.90 | 173.15 | 0.22 | 68.87 | 167.86 |
| 456 | mut | 0.32 | 70.22 | 134.23 | 0.31 | 67.72 | 127.66 |
| 457 | yang | 0.21 | 68.74 | 139.41 | 0.23 | 69.74 | 198.73 |
| 458 | ke | 0.12 | 72.77 | 153.01 | 0.09 | 70.12 | 191.23 |
| 459 | hau | 0.15 | 76.79 | 153.06 | 0.23 | 72.64 | 165.07 |
| 460 | san | 0.39 | 68.74 | 136.51 | 0.41 | 68.90 | 163.47 |
| 461 | i | 0.09 | 67.19 | 134.49 | 0.14 | 74.49 | 170.31 |
| 462 | ngin | 0.15 | 74.35 | 154.72 | 0.13 | 74.12 | 183.10 |
| 463 | me | 0.10 | 75.33 | 151.88 | 0.11 | 73.36 | 182.98 |
| 464 | mi | 0.11 | 72.38 | 141.46 | 0.16 | 71.65 | 180.63 |
| 465 | num | 0.18 | 71.31 | 139.76 | 0.22 | 68.32 | 178.99 |

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|---|---|---|---|---|---|---|---|
| 466 | a | 0.18 | 68.63 | 129.86 | 0.26 | 72.36 | 165.04 |
| 467 | ir | 0.24 | 75.04 | 146.19 | 0.28 | 71.49 | 164.58 |
| 468 | da | 0.14 | 74.28 | 132.80 | 0.15 | 75.16 | 129.91 |
| 469 | ri | 0.11 | 70.92 | 134.67 | 0.11 | 70.58 | 134.30 |
| 470 | a | 0.12 | 72.31 | 131.75 | 0.16 | 68.81 | 134.50 |
| 471 | ir | 0.15 | 69.87 | 132.07 | 0.17 | 69.33 | 130.55 |
| 472 | ter | 0.10 | 69.17 | 136.65 | 0.20 | 69.33 | 128.82 |
| 473 | jun | 0.19 | 67.33 | 133.15 | 0.11 | 68.19 | 131.32 |
| 474 | yang | 0.09 | 71.48 | 130.03 | 0.20 | 73.15 | 125.62 |
| 475 | ber | 0.16 | 71.05 | 128.16 | 0.08 | 71.73 | 122.64 |
| 476 | ham | 0.22 | 67.03 | 129.73 | 0.24 | 65.61 | 129.33 |
| 477 | pi | 0.10 | 67.40 | 147.81 | 0.08 | 65.96 | 125.41 |
| 478 | ran | 0.23 | 67.92 | 195.21 | 0.25 | 66.42 | 112.53 |
| 479 | na | 0.19 | 76.47 | 149.23 | 0.25 | 76.34 | 181.26 |
| 480 | mun | 0.52 | 59.93 | 142.97 | 0.34 | 70.75 | 128.32 |
| 481 | na | 0.16 | 71.25 | 132.80 | 0.14 | 68.38 | 170.82 |
| 482 | sib | 0.26 | 72.25 | 270.09 | 0.23 | 69.09 | 189.93 |
| 483 | nya | 0.15 | 76.53 | 153.25 | 0.08 | 69.49 | 229.03 |
| 484 | ma | 0.15 | 75.10 | 132.91 | 0.22 | 75.99 | 168.68 |
| 485 | lang | 0.29 | 68.77 | 129.51 | 0.35 | 70.85 | 161.42 |
| 486 | a | 0.14 | 67.84 | 120.56 | 0.15 | 66.98 | 124.59 |
| 487 | pa | 0.13 | 73.10 | 141.65 | 0.13 | 73.05 | 147.58 |
| 488 | bi | 0.09 | 72.44 | 145.28 | 0.12 | 79.48 | 196.08 |
| 489 | la | 0.20 | 75.32 | 153.47 | 0.12 | 71.27 | 211.54 |
| 490 | ka | 0.19 | 66.86 | 136.48 | 0.22 | 65.11 | 167.92 |
| 491 | ki | 0.18 | 70.17 | 158.33 | 0.22 | 66.57 | 206.86 |
| 492 | nya | 0.19 | 69.43 | 153.15 | 0.13 | 71.57 | 195.48 |
| 493 | ter | 0.14 | 68.91 | 134.25 | 0.18 | 70.45 | 140.48 |
| 494 | ge | 0.18 | 70.27 | 131.62 | 0.08 | 69.88 | 129.01 |
| 495 | lin | 0.19 | 69.75 | 136.19 | 0.20 | 73.98 | 127.28 |
| 496 | cir | 0.22 | 72.87 | 140.00 | 0.32 | 66.14 | 135.00 |
| 497 | dan | 0.17 | 72.16 | 127.53 | 0.18 | 70.47 | 181.42 |
| 498 | ter | 0.15 | 71.08 | 131.14 | 0.19 | 70.65 | 189.20 |
| 499 | ja | 0.24 | 68.40 | 137.51 | 0.34 | 69.28 | 189.95 |
| 500 | tuh | 0.19 | 69.54 | 156.67 | 0.15 | 70.49 | 199.89 |
| 501 | di | 0.10 | 71.50 | 129.85 | 0.13 | 71.67 | 141.97 |
| 502 | da | 0.12 | 74.90 | 129.11 | 0.11 | 77.96 | 139.93 |
| 503 | lam | 0.18 | 72.94 | 130.00 | 0.31 | 69.72 | 131.61 |
| 504 | a | 0.14 | 67.47 | 129.08 | 0.09 | 74.83 | 128.11 |
| 505 | ir | 0.19 | 69.02 | 131.67 | 0.21 | 72.03 | 133.95 |
| 506 | ter | 0.22 | 72.73 | 131.35 | 0.18 | 71.33 | 131.40 |
| 507 | jun | 0.09 | 69.79 | 135.86 | 0.14 | 72.16 | 129.73 |
| 508 | yang | 0.21 | 73.13 | 128.52 | 0.16 | 74.69 | 123.22 |
| 509 | de | 0.10 | 75.84 | 144.39 | 0.11 | 74.45 | 121.55 |
| 510 | ras | 0.34 | 65.82 | 148.10 | 0.41 | 67.33 | 103.43 |
| 511 | a | 0.12 | 67.27 | 128.18 | 0.16 | 67.86 | 146.02 |
| 512 | pa | 0.12 | 71.18 | 143.31 | 0.12 | 77.97 | 194.57 |
| 513 | bi | 0.11 | 77.58 | 153.70 | 0.12 | 72.10 | 199.53 |
| 514 | la | 0.18 | 75.71 | 180.45 | 0.15 | 75.18 | 201.25 |
| 515 | di | 0.05 | 73.75 | 165.46 | 0.07 | 72.82 | 195.54 |
| 516 | a | 0.07 | 73.85 | 160.26 | 0.12 | 78.61 | 196.59 |
| 517 | ham | 0.24 | 68.14 | 147.70 | 0.26 | 72.89 | 195.10 |
| 518 | pir | 0.14 | 72.54 | 149.62 | 0.12 | 76.18 | 196.05 |
| 519 | ham | 0.18 | 68.67 | 145.07 | 0.24 | 70.71 | 187.75 |
| 520 | pir | 0.10 | 74.49 | 148.21 | 0.12 | 77.52 | 189.03 |
| 521 | le | 0.11 | 75.59 | 150.09 | 0.13 | 76.78 | 187.72 |
| 522 | mas | 0.41 | 64.72 | 125.83 | 0.36 | 67.89 | 182.56 |
| 523 | se | 0.18 | 65.47 | 425.48 | 0.23 | 66.71 | x |
| 524 | e | 0.18 | 68.39 | 253.33 | 0.13 | 69.21 | 163.18 |
| 525 | kor | 0.17 | 73.97 | 212.83 | 0.16 | 73.07 | 184.53 |
| 526 | mer | 0.14 | 69.48 | 154.71 | 0.19 | 70.70 | 186.41 |
| 527 | pa | 0.15 | 71.17 | 142.07 | 0.20 | 69.23 | 175.85 |
| 528 | ti | 0.08 | 66.03 | 144.08 | 0.07 | 65.99 | 177.16 |
| 529 | yang | 0.19 | 71.46 | 142.31 | 0.19 | 73.55 | 175.03 |
| 530 | ber | 0.15 | 69.89 | 147.67 | 0.18 | 64.89 | 176.96 |
| 531 | teng | 0.18 | 73.19 | 147.43 | 0.21 | 71.67 | 178.48 |
| 532 | gek | 0.21 | 69.79 | 283.52 | 0.19 | 69.48 | 332.63 |
| 533 | ti | 0.11 | 68.25 | 165.42 | 0.17 | 74.54 | 191.37 |

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|---|---|---|---|---|---|---|---|
| 534 | dak | 0.18 | 72.10 | 134.87 | 0.20 | 74.39 | 185.37 |
| 535 | ja | 0.13 | 72.77 | 141.90 | 0.14 | 73.50 | 172.20 |
| 536 | uh | 0.15 | 70.17 | 141.79 | 0.14 | 73.74 | 174.80 |
| 537 | da | 0.11 | 72.15 | 136.57 | 0.12 | 74.16 | 168.74 |
| 538 | ri | 0.14 | 65.12 | 138.44 | 0.16 | 71.54 | 168.86 |
| 539 | po | 0.08 | 64.43 | 137.08 | 0.15 | 66.25 | 168.38 |
| 540 | kok | 0.16 | 62.75 | 139.49 | 0.12 | 71.00 | 251.27 |
| 541 | i | 0.24 | 63.03 | 177.88 | 0.10 | 71.88 | 332.65 |
| 542 | tu | 0.23 | 64.05 | 128.80 | 0.39 | 65.55 | 171.20 |
| 543 | men | 0.20 | 70.92 | 137.24 | 0.20 | 68.32 | 179.50 |
| 544 | ja | 0.21 | 71.95 | 131.75 | 0.31 | 71.11 | 192.14 |
| 545 | tuh | 0.19 | 66.31 | 142.37 | 0.15 | 71.15 | 222.99 |
| 546 | kan | 0.15 | 70.96 | 140.32 | 0.20 | 70.99 | 139.31 |
| 547 | se | 0.18 | 64.97 | 139.04 | 0.08 | 72.46 | 128.40 |
| 548 | he | 0.11 | 72.23 | 133.02 | 0.06 | 74.08 | 122.98 |
| 549 | lai | 0.21 | 75.51 | 132.07 | 0.15 | 73.33 | 119.22 |
| 550 | da | 0.10 | 76.86 | 141.36 | 0.13 | 76.07 | 114.68 |
| 551 | un | 0.31 | 67.04 | 104.59 | 0.25 | 65.83 | 103.73 |
| 552 | se | 0.18 | 66.30 | 152.74 | 0.18 | 65.53 | 170.07 |
| 553 | mut | 0.15 | 74.17 | 152.46 | 0.15 | 74.99 | 182.26 |
| 554 | i | 0.20 | 63.69 | 145.63 | 0.10 | 71.91 | 182.49 |
| 555 | tu | 0.17 | 67.91 | 154.12 | 0.18 | 68.26 | 190.28 |
| 556 | pun | 0.16 | 73.07 | 154.27 | 0.14 | 76.35 | 196.93 |
| 557 | me | 0.10 | 72.39 | 143.79 | 0.12 | 79.28 | 192.07 |
| 558 | man | 0.21 | 71.51 | 144.51 | 0.28 | 76.48 | 191.63 |
| 559 | jat | 0.27 | 66.03 | 215.54 | 0.25 | 68.89 | 312.16 |
| 560 | ke | 0.10 | 65.21 | 137.28 | 0.08 | 69.95 | x |
| 561 | a | 0.20 | 69.31 | 97.40 | 0.11 | 64.29 | x |
| 562 | tas | 0.16 | 64.28 | 133.01 | 0.17 | 67.19 | 136.91 |
| 563 | da | 0.15 | 70.47 | 132.75 | 0.11 | 75.47 | 143.56 |
| 564 | un | 0.20 | 68.34 | 118.99 | 0.11 | 70.71 | 144.59 |
| 565 | ter | 0.07 | 68.46 | 131.99 | 0.12 | 69.59 | 160.26 |
| 566 | se | 0.20 | 68.86 | 130.73 | 0.17 | 74.04 | 236.76 |
| 567 | but | 0.29 | 64.68 | 105.13 | 0.29 | 67.31 | 330.78 |
| 568 | dan | 0.20 | 72.55 | 135.62 | 0.17 | 73.20 | 166.28 |
| 569 | ak | 0.23 | 69.24 | 134.46 | 0.25 | 70.26 | 180.70 |
| 570 | hir | 0.20 | 69.90 | 152.30 | 0.20 | 74.12 | 201.29 |
| 571 | nya | 0.20 | 65.79 | 145.70 | 0.28 | 72.38 | 198.83 |
| 572 | ti | 0.15 | 64.59 | 141.24 | 0.17 | 69.74 | 200.80 |
| 573 | ba | 0.12 | 73.73 | 146.09 | 0.10 | 78.25 | 215.67 |
| 574 | de | 0.10 | 72.40 | 137.89 | 0.08 | 77.09 | 260.36 |
| 575 | ngan | 0.08 | 71.48 | 132.09 | 0.13 | 74.55 | 143.35 |
| 576 | se | 0.16 | 66.56 | 128.74 | 0.13 | 66.73 | 137.20 |
| 577 | la | 0.11 | 71.28 | 135.29 | 0.13 | 74.47 | 136.49 |
| 578 | mat | 0.15 | 68.33 | 140.98 | 0.10 | 70.47 | 134.88 |
| 579 | di | 0.14 | 69.40 | 130.53 | 0.17 | 67.02 | 131.94 |
| 580 | te | 0.19 | 65.49 | 127.57 | 0.11 | 70.31 | 131.63 |
| 581 | bing | 0.19 | 74.12 | 127.20 | 0.17 | 74.75 | 127.67 |
| 582 | su | 0.12 | 64.92 | 129.58 | 0.15 | 68.51 | 129.44 |
| 583 | ngai | 0.36 | 67.48 | 103.62 | 0.31 | 66.68 | 106.80 |
| 584 | be | 0.08 | 72.75 | 136.89 | 0.14 | 73.56 | 135.67 |
| 585 | be | 0.15 | 73.88 | 138.47 | 0.07 | 79.51 | 146.38 |
| 586 | ra | 0.11 | 77.07 | 145.31 | 0.22 | 72.75 | 134.90 |
| 587 | pa | 0.15 | 67.49 | 162.06 | 0.11 | 75.43 | 240.83 |
| 588 | ha | 0.23 | 71.42 | 159.56 | 0.16 | 69.69 | 236.48 |
| 589 | ri | 0.16 | 72.49 | 153.15 | 0.17 | 66.96 | 227.82 |
| 590 | ke | 0.09 | 72.98 | 150.36 | 0.08 | 71.93 | 220.61 |
| 591 | mu | 0.15 | 71.80 | 142.19 | 0.13 | 76.63 | 209.19 |
| 592 | di | 0.07 | 64.32 | 130.26 | 0.07 | 71.81 | 196.91 |
| 593 | an | 0.30 | 66.90 | 120.69 | 0.32 | 69.74 | 188.41 |
| 594 | se | 0.23 | 66.89 | 138.88 | 0.15 | 66.34 | 130.73 |
| 595 | o | 0.17 | 77.12 | 133.40 | 0.16 | 77.75 | 147.34 |
| 596 | rang | 0.22 | 70.46 | 171.08 | 0.16 | 75.37 | 198.90 |
| 597 | pem | 0.19 | 70.13 | 149.79 | 0.18 | 73.11 | 168.32 |
| 598 | bu | 0.14 | 72.11 | 146.75 | 0.10 | 74.06 | 144.48 |
| 599 | ru | 0.27 | 65.83 | 144.50 | 0.31 | 65.85 | 137.80 |
| 600 | me | 0.12 | 69.13 | 136.49 | 0.11 | 75.26 | 158.46 |
| 601 | li | 0.15 | 72.49 | 145.23 | 0.15 | 77.45 | 155.63 |

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|---|---|---|---|---|---|---|---|
| 602 | hat | 0.38 | 63.19 | 152.85 | 0.19 | 72.68 | 117.20 |
| 603 | se | 0.16 | 65.04 | 433.18 | 0.16 | 67.87 | x |
| 604 | e | 0.12 | 74.90 | 237.27 | 0.19 | 69.40 | 428.98 |
| 605 | kor | 0.20 | 70.35 | 156.72 | 0.08 | 74.73 | 150.11 |
| 606 | mer | 0.18 | 67.97 | 148.19 | 0.19 | 69.00 | 142.95 |
| 607 | pa | 0.18 | 68.30 | 136.66 | 0.19 | 70.67 | 150.88 |
| 608 | ti | 0.13 | 73.36 | 155.16 | 0.27 | 62.51 | 145.65 |
| 609 | dan | 0.19 | 71.44 | 152.43 | 0.20 | 76.15 | 190.63 |
| 610 | i | 0.10 | 72.94 | 153.62 | 0.21 | 76.82 | 214.06 |
| 611 | ngin | 0.13 | 73.79 | 154.75 | 0.17 | 76.07 | 221.63 |
| 612 | me | 0.13 | 71.09 | 137.99 | 0.11 | 76.15 | 155.47 |
| 613 | nem | 0.18 | 69.86 | 134.23 | 0.22 | 74.10 | 140.26 |
| 614 | bak | 0.17 | 71.58 | x | 0.19 | 74.85 | 107.67 |
| 615 | nya | 0.30 | 65.55 | 117.56 | 0.29 | 66.10 | 113.99 |
| 616 | na | 0.20 | 73.46 | 148.23 | 0.28 | 73.40 | 180.00 |
| 617 | mun | 0.30 | 66.44 | 133.94 | 0.33 | 69.89 | 135.23 |
| 618 | se | 0.27 | 68.69 | 155.00 | 0.17 | 65.69 | 175.77 |
| 619 | mut | 0.18 | 70.15 | 342.61 | 0.25 | 71.79 | 216.62 |
| 620 | ter | 0.14 | 73.43 | 157.62 | 0.13 | 74.79 | 160.93 |
| 621 | li | 0.13 | 75.14 | 157.27 | 0.12 | 72.67 | 136.67 |
| 622 | hat | 0.27 | 67.02 | 170.93 | 0.18 | 71.28 | 143.61 |
| 623 | a | 0.20 | 66.68 | 139.50 | 0.15 | 66.16 | 147.40 |
| 624 | kan | 0.19 | 66.19 | 140.71 | 0.20 | 66.71 | 148.32 |
| 625 | per | 0.14 | 71.04 | 141.20 | 0.07 | 69.21 | 147.35 |
| 626 | la | 0.25 | 64.61 | 138.91 | 0.21 | 73.24 | 143.03 |
| 627 | ku | 0.04 | 69.71 | 147.38 | 0.11 | 62.62 | 148.57 |
| 628 | an | 0.28 | 66.74 | 136.99 | 0.15 | 68.33 | 149.41 |
| 629 | pem | 0.14 | 66.49 | 134.82 | 0.14 | 71.43 | 147.36 |
| 630 | bu | 0.11 | 71.20 | 135.94 | 0.11 | 73.39 | 154.47 |
| 631 | ru | 0.10 | 71.50 | 132.46 | 0.11 | 71.47 | 220.66 |
| 632 | i | 0.16 | 65.59 | 234.06 | 0.17 | 63.17 | 353.43 |
| 633 | tu | 0.33 | 60.41 | 104.29 | 0.25 | 67.32 | 200.73 |
| 634 | se | 0.17 | 68.66 | 162.44 | 0.26 | 67.83 | 212.65 |
| 635 | mut | 0.28 | 71.56 | 253.08 | 0.18 | 74.05 | 220.58 |
| 636 | pun | 0.21 | 68.66 | 156.74 | 0.17 | 77.91 | 214.31 |
| 637 | lan | 0.24 | 70.70 | 152.68 | 0.28 | 73.98 | 205.43 |
| 638 | tas | 0.19 | 68.90 | 146.06 | 0.20 | 72.30 | 212.90 |
| 639 | meng | 0.17 | 70.26 | 135.28 | 0.20 | 71.71 | 142.88 |
| 640 | gi | 0.20 | 69.04 | 134.07 | 0.13 | 69.85 | 131.17 |
| 641 | git | 0.22 | 66.05 | 301.14 | 0.14 | 71.77 | 264.53 |
| 642 | ka | 0.22 | 61.74 | 133.89 | 0.22 | 66.75 | 136.76 |
| 643 | ki | 0.20 | 59.86 | 162.67 | 0.17 | 67.69 | 165.27 |
| 644 | pem | 0.15 | 68.19 | 135.37 | 0.13 | 70.17 | 133.70 |
| 645 | bu | 0.10 | 71.60 | 129.41 | 0.09 | 73.20 | 130.14 |
| 646 | ru | 0.14 | 71.00 | 239.73 | 0.04 | 73.14 | 130.08 |
| 647 | i | 0.18 | 57.90 | 164.53 | 0.29 | 64.52 | 129.03 |
| 648 | tu | 0.21 | 68.98 | 195.18 | 0.24 | 64.12 | 104.93 |
| 649 | dan | 0.21 | 67.27 | 139.47 | 0.21 | 70.99 | 150.81 |
| 650 | tem | 0.16 | 73.10 | 150.70 | 0.16 | 73.88 | 170.27 |
| 651 | ba | 0.16 | 70.19 | 148.75 | 0.16 | 73.33 | 172.29 |
| 652 | kan | 0.11 | 74.17 | 153.28 | 0.11 | 73.69 | 210.10 |
| 653 | nya | 0.12 | 71.88 | 150.20 | 0.16 | 74.65 | 211.89 |
| 654 | ter | 0.14 | 66.51 | 143.84 | 0.08 | 72.47 | 159.25 |
| 655 | sa | 0.20 | 68.28 | 136.54 | 0.18 | 71.67 | 116.63 |
| 656 | sar | 0.31 | 64.38 | 110.42 | 0.37 | 66.96 | 111.42 |
| 657 | mer | 0.18 | 70.35 | 139.51 | 0.22 | 68.80 | 139.76 |
| 658 | pa | 0.17 | 72.13 | 138.76 | 0.22 | 68.83 | 143.40 |
| 659 | ti | 0.10 | 71.12 | 166.34 | 0.10 | 72.12 | 154.73 |
| 660 | yang | 0.24 | 73.14 | 162.05 | 0.18 | 70.33 | 152.07 |
| 661 | ter | 0.16 | 68.53 | 152.11 | 0.12 | 74.96 | 155.37 |
| 662 | de | 0.14 | 75.26 | 152.13 | 0.20 | 74.21 | 150.51 |
| 663 | ngar | 0.17 | 72.69 | 164.77 | 0.19 | 72.43 | 146.85 |
| 664 | je | 0.10 | 72.59 | 149.88 | 0.10 | 69.53 | 145.43 |
| 665 | ri | 0.18 | 69.34 | 145.52 | 0.18 | 69.81 | 149.89 |
| 666 | tan | 0.14 | 70.45 | 145.02 | 0.17 | 67.56 | 148.10 |
| 667 | pem | 0.17 | 72.76 | 142.59 | 0.12 | 75.72 | 150.14 |
| 668 | bu | 0.05 | 73.14 | 141.73 | 0.13 | 71.61 | 144.93 |
| 669 | ru | 0.10 | 74.76 | 141.35 | 0.12 | 72.47 | 228.55 |

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|---|---|---|---|---|---|---|---|
| 670 | i | 0.14 | 69.67 | 135.52 | 0.22 | 64.44 | 199.11 |
| 671 | tu | 0.15 | 66.89 | 166.35 | 0.32 | 64.99 | 145.19 |
| 672 | se | 0.26 | 69.88 | 163.11 | 0.25 | 71.69 | 200.53 |
| 673 | ge | 0.10 | 72.69 | 160.92 | 0.10 | 81.03 | 211.46 |
| 674 | ra | 0.16 | 73.76 | 160.34 | 0.14 | 77.32 | 227.55 |
| 675 | ter | 0.25 | 72.15 | 155.48 | 0.28 | 72.61 | 206.49 |
| 676 | bang | 0.32 | 69.68 | 138.52 | 0.34 | 67.16 | 123.70 |
| 677 | ber | 0.07 | 69.48 | 138.01 | 0.09 | 72.43 | 137.88 |
| 678 | e | 0.15 | 74.83 | 137.20 | 0.23 | 76.41 | 164.45 |
| 679 | dar | 0.10 | 77.50 | 134.31 | 0.17 | 78.31 | 199.15 |
| 680 | da | 0.11 | 77.85 | 131.67 | 0.13 | 79.18 | 124.13 |
| 681 | ri | 0.08 | 73.55 | 129.59 | 0.10 | 71.67 | 121.73 |
| 682 | si | 0.23 | 62.42 | 121.43 | 0.27 | 64.78 | 120.90 |
| 683 | tu | 0.18 | 62.54 | 100.21 | 0.28 | 66.07 | 98.72 |

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data Male Storyteller 2 (Mst2)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.15 | 55.50 | x | 0.13 | 54.75 | x |
| 2 | a | 0.24 | 65.18 | 175.01 | 0.19 | 70.72 | 206.60 |
| 3 | tu | 0.13 | 74.55 | 216.43 | 0.15 | 68.51 | 258.69 |
| 4 | ma | 0.16 | 73.33 | 192.82 | 0.15 | 75.18 | 234.20 |
| 5 | sa | 0.22 | 68.65 | 177.69 | 0.22 | 71.49 | 207.93 |
| 6 | da | 0.19 | 72.00 | 150.13 | 0.12 | 73.55 | 176.03 |
| 7 | hu | 0.10 | 65.18 | 134.50 | 0.21 | 69.51 | 143.08 |
| 8 | lu | 0.24 | 64.26 | 146.46 | 0.47 | 63.08 | 167.00 |
| 9 | ting | 0.14 | 61.70 | 180.63 | 0.20 | 70.27 | 195.30 |
| 10 | gal | 0.21 | 68.06 | 183.25 | 0.23 | 72.73 | 210.42 |
| 11 | se | 0.16 | 65.55 | 229.68 | 0.16 | 65.75 | 220.86 |
| 12 | o | 0.13 | 70.33 | 154.16 | 0.13 | 70.73 | 246.13 |
| 13 | rang | 0.23 | 67.19 | 161.93 | 0.22 | 68.50 | 170.90 |
| 14 | pe | 0.13 | 60.90 | 93.83 | 0.13 | 63.36 | 178.12 |
| 15 | ta | 0.14 | 71.63 | 144.72 | 0.18 | 68.02 | 181.22 |
| 16 | ni | 0.24 | 70.00 | 157.73 | 0.32 | 68.87 | 188.88 |
| 17 | yang | 0.26 | 68.20 | 138.10 | 0.25 | 68.40 | 160.69 |
| 18 | me | 0.14 | 63.92 | 127.03 | 0.13 | 68.36 | 156.36 |
| 19 | me | 0.06 | 63.15 | 122.17 | 0.06 | 67.72 | 148.66 |
| 20 | li | 0.09 | 66.10 | 134.85 | 0.10 | 68.44 | 149.53 |
| 21 | ha | 0.17 | 70.48 | 157.34 | 0.20 | 69.87 | 185.02 |
| 22 | ra | 0.16 | 71.34 | 167.39 | 0.18 | 70.19 | 201.29 |
| 23 | se | 0.18 | 62.79 | 222.93 | 0.16 | 62.06 | 480.10 |
| 24 | e | 0.12 | 59.82 | 173.54 | 0.19 | 63.02 | 260.40 |
| 25 | kor | 0.25 | 61.60 | 126.11 | 0.24 | 65.59 | 176.38 |
| 26 | ang | 0.18 | 64.36 | 150.29 | 0.17 | 67.48 | 157.32 |
| 27 | sa | 0.33 | 63.88 | 181.15 | 0.30 | 64.46 | 217.94 |
| 28 | pa | 0.17 | 70.46 | 144.97 | 0.17 | 69.75 | 170.06 |
| 29 | da | 0.20 | 71.90 | 108.98 | 0.12 | 76.17 | 243.67 |
| 30 | su | 0.10 | 62.68 | 106.03 | 0.13 | 65.56 | 247.75 |
| 31 | a | 0.21 | 69.45 | 177.04 | 0.16 | 73.41 | 197.88 |
| 32 | tu | 0.12 | 68.91 | 167.01 | 0.12 | 70.00 | 184.18 |
| 33 | ha | 0.18 | 73.85 | 156.27 | 0.18 | 73.91 | 147.17 |
| 34 | ri | 0.30 | 69.31 | 194.48 | 0.42 | 65.25 | 149.10 |
| 35 | ke | 0.15 | 66.99 | 187.64 | 0.19 | 65.75 | 194.15 |
| 36 | ti | 0.18 | 59.34 | 169.32 | 0.19 | 66.46 | 214.94 |
| 37 | ka | 0.15 | 69.79 | 183.15 | 0.16 | 75.16 | 229.66 |
| 38 | i | 0.23 | 63.91 | 190.45 | 0.19 | 67.04 | 211.57 |
| 39 | tu | 0.21 | 72.69 | 196.57 | 0.25 | 68.06 | 265.68 |
| 40 | di | 0.11 | 66.31 | 177.55 | 0.16 | 70.24 | 187.83 |
| 41 | a | 0.34 | 69.69 | 160.29 | 0.13 | 77.01 | 221.25 |
| 42 | i | 0.13 | 68.72 | 167.19 | 0.16 | 72.15 | 213.89 |
| 43 | ngin | 0.30 | 68.37 | 176.19 | 0.37 | 71.62 | 220.00 |

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|---|---|---|---|---|---|---|---|
| 44 | me | 0.17 | 69.52 | 159.45 | 0.15 | 70.93 | 174.20 |
| 45 | ngam | 0.17 | 69.51 | 161.57 | 0.21 | 74.83 | 194.60 |
| 46 | bil | 0.28 | 68.84 | 169.32 | 0.28 | 68.92 | 200.16 |
| 47 | te | 0.14 | 66.52 | 164.23 | 0.13 | 73.70 | 214.08 |
| 48 | lur | 0.28 | 68.29 | 136.62 | 0.23 | 76.64 | 222.47 |
| 49 | ang | 0.18 | 66.20 | 141.78 | 0.20 | 67.35 | 181.53 |
| 50 | sa | 0.20 | 68.89 | 173.29 | 0.31 | 69.45 | 172.26 |
| 51 | nya | 0.29 | 65.93 | 121.29 | 0.31 | 61.85 | 125.58 |
| 52 | si | 0.41 | 62.86 | 206.57 | 0.33 | 60.02 | 188.02 |
| 53 | pe | 0.10 | 69.71 | 188.03 | 0.14 | 71.79 | 183.60 |
| 54 | ta | 0.15 | 73.36 | 165.27 | 0.15 | 72.86 | 177.80 |
| 55 | ni | 0.23 | 72.33 | 185.85 | 0.20 | 75.36 | 203.52 |
| 56 | men | 0.11 | 71.90 | 161.17 | 0.15 | 69.46 | 155.83 |
| 57 | da | 0.16 | 68.68 | 157.04 | 0.14 | 69.99 | 166.89 |
| 58 | pa | 0.18 | 65.06 | 84.65 | 0.08 | 72.12 | 169.16 |
| 59 | ti | 0.17 | 68.72 | 191.25 | 0.23 | 61.48 | 170.36 |
| 60 | te | 0.18 | 60.48 | 184.73 | 0.12 | 69.48 | 200.35 |
| 61 | lur | 0.19 | 70.29 | 184.65 | 0.17 | 73.41 | 210.79 |
| 62 | i | 0.20 | 62.77 | 172.40 | 0.15 | 68.78 | 171.27 |
| 63 | tu | 0.23 | 72.08 | 193.61 | 0.31 | 63.48 | 220.82 |
| 64 | ke | 0.12 | 70.82 | 175.43 | 0.06 | 73.50 | 197.66 |
| 65 | li | 0.11 | 73.29 | 156.33 | 0.09 | 74.34 | 188.37 |
| 66 | ha | 0.17 | 64.68 | 165.29 | 0.24 | 68.53 | 187.81 |
| 67 | tan | 0.19 | 72.51 | 84.94 | 0.31 | 70.67 | 195.76 |
| 68 | a | 0.16 | 70.14 | 166.54 | 0.14 | 79.03 | 212.01 |
| 69 | neh | 0.17 | 67.10 | 132.58 | 0.21 | 66.82 | 186.65 |
| 70 | war | 0.16 | 72.09 | 159.84 | 0.18 | 71.73 | 157.49 |
| 71 | na | 0.22 | 72.58 | 184.04 | 0.22 | 71.80 | 173.33 |
| 72 | nya | 0.40 | 71.78 | 204.45 | 0.29 | 73.05 | 190.78 |
| 73 | ku | 0.09 | 71.82 | 190.94 | 0.12 | 69.72 | 225.98 |
| 74 | ning | 0.36 | 73.55 | 201.18 | 0.31 | 73.54 | 231.45 |
| 75 | ke | 0.10 | 66.91 | 222.36 | 0.08 | 71.00 | 191.90 |
| 76 | e | 0.11 | 69.79 | 154.48 | 0.10 | 74.25 | 162.87 |
| 77 | ma | 0.09 | 73.24 | 93.71 | 0.14 | 72.54 | 156.80 |
| 78 | san | 0.27 | 68.22 | 152.88 | 0.35 | 67.95 | 161.96 |
| 79 | dan | 0.22 | 69.66 | 166.37 | 0.38 | 74.45 | 186.86 |
| 80 | be | 0.16 | 71.93 | 165.89 | 0.09 | 73.99 | 136.96 |
| 81 | rat | 0.22 | 71.08 | 142.20 | 0.28 | 68.47 | 236.65 |
| 82 | di | 0.10 | 66.37 | 152.75 | 0.13 | 69.94 | 153.93 |
| 83 | a | 0.32 | 73.76 | 193.13 | 0.23 | 77.97 | 203.48 |
| 84 | me | 0.11 | 65.43 | 186.65 | 0.19 | 75.17 | 221.12 |
| 85 | nyang | 0.27 | 66.11 | 178.84 | 0.32 | 70.00 | 178.55 |
| 86 | ka | 0.18 | 73.63 | 198.62 | 0.23 | 70.79 | 203.08 |
| 87 | ji | 0.13 | 71.84 | 177.50 | 0.15 | 70.10 | 171.66 |
| 88 | ran | 0.17 | 74.85 | 186.46 | 0.18 | 75.74 | 177.25 |
| 89 | nya | 0.28 | 71.67 | 196.44 | 0.34 | 72.66 | 196.12 |
| 90 | cu | 0.11 | 67.53 | 178.63 | 0.18 | 72.01 | 226.25 |
| 91 | ba | 0.20 | 69.83 | 178.13 | 0.19 | 77.51 | 216.53 |
| 92 | ber | 0.15 | 69.93 | 165.20 | 0.20 | 71.45 | 182.22 |
| 93 | gu | 0.11 | 71.51 | 165.61 | 0.09 | 72.63 | 170.29 |
| 94 | rau | 0.30 | 72.99 | 146.43 | 0.39 | 71.38 | 202.55 |
| 95 | la | 0.11 | 74.21 | 156.45 | 0.19 | 71.38 | 145.47 |
| 96 | lu | 0.21 | 68.58 | 172.74 | 0.22 | 73.99 | 182.98 |
| 97 | ber | 0.11 | 70.09 | 166.46 | 0.13 | 68.85 | 166.66 |
| 98 | ca | 0.21 | 69.50 | 110.94 | 0.17 | 70.63 | 139.12 |
| 99 | dang | 0.25 | 69.73 | 174.43 | 0.32 | 67.40 | 158.75 |
| 100 | un | 0.22 | 59.66 | 183.08 | 0.22 | 64.52 | 150.33 |
| 101 | tuk | 0.21 | 65.64 | 191.91 | 0.26 | 67.09 | 192.71 |
| 102 | mem | 0.23 | 68.32 | 154.95 | 0.19 | 71.74 | 175.53 |
| 103 | bu | 0.06 | 66.85 | 166.84 | 0.10 | 72.67 | 190.63 |
| 104 | ang | 0.30 | 68.53 | 160.20 | 0.35 | 75.02 | 198.97 |
| 105 | te | 0.12 | 67.93 | 163.06 | 0.10 | 66.87 | 173.40 |
| 106 | lur | 0.22 | 67.72 | 165.92 | 0.18 | 73.90 | 154.60 |
| 107 | i | 0.16 | 62.41 | 169.22 | 0.25 | 59.83 | 145.13 |
| 108 | tu | 0.20 | 61.76 | 125.26 | 0.22 | 58.80 | 133.55 |
| 109 | na | 0.13 | 71.05 | 164.13 | 0.18 | 73.68 | 150.58 |
| 110 | mun | 0.24 | 72.69 | 222.39 | 0.29 | 71.20 | 190.57 |
| 111 | se | 0.09 | 60.78 | 240.87 | 0.13 | 61.80 | 408.31 |

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|---|---|---|---|---|---|---|---|
| 112 | le | 0.21 | 69.46 | 190.78 | 0.21 | 65.17 | 165.11 |
| 113 | pas | 0.14 | 75.77 | 193.06 | 0.16 | 72.95 | 192.68 |
| 114 | ber | 0.20 | 66.09 | 177.53 | 0.10 | 70.75 | 177.06 |
| 115 | fi | 0.19 | 62.20 | 182.38 | 0.24 | 65.44 | 179.96 |
| 116 | kir | 0.31 | 72.28 | 196.74 | 0.32 | 72.70 | 190.34 |
| 117 | di | 0.10 | 65.09 | 175.86 | 0.17 | 67.97 | 176.35 |
| 118 | a | 0.26 | 76.06 | 190.95 | 0.14 | 79.13 | 192.15 |
| 119 | mem | 0.13 | 71.83 | 167.13 | 0.19 | 75.53 | 174.17 |
| 120 | ba | 0.13 | 79.55 | 168.13 | 0.13 | 77.34 | 142.79 |
| 121 | wa | 0.26 | 74.63 | 193.04 | 0.17 | 74.13 | 144.78 |
| 122 | te | 0.07 | 70.47 | 180.10 | 0.18 | 64.57 | 176.53 |
| 123 | lur | 0.25 | 72.74 | 186.57 | 0.37 | 64.99 | 198.88 |
| 124 | i | 0.18 | 65.66 | 172.22 | 0.05 | 63.12 | 216.43 |
| 125 | tu | 0.22 | 65.48 | 186.73 | 0.17 | 70.23 | 227.17 |
| 126 | pu | 0.08 | 64.38 | 183.91 | 0.12 | 73.85 | 218.95 |
| 127 | lang | 0.30 | 66.38 | 180.65 | 0.36 | 74.81 | 204.28 |
| 128 | ke | 0.13 | 69.11 | 163.20 | 0.11 | 72.01 | 174.43 |
| 129 | ru | 0.14 | 69.17 | 173.38 | 0.11 | 72.32 | 154.82 |
| 130 | mah | 0.19 | 69.12 | 177.85 | 0.25 | 65.24 | 138.10 |
| 131 | un | 0.16 | 64.50 | 171.02 | 0.18 | 65.62 | 160.43 |
| 132 | tuk | 0.14 | 66.19 | 227.81 | 0.14 | 69.77 | 181.80 |
| 133 | di | 0.06 | 68.61 | 155.20 | 0.07 | 65.67 | 160.65 |
| 134 | pe | 0.12 | 63.21 | 155.80 | 0.17 | 61.23 | 140.93 |
| 135 | rik | 0.14 | 70.83 | 273.23 | 0.09 | 69.84 | 350.70 |
| 136 | sa | 0.34 | 66.87 | 219.41 | 0.36 | 65.48 | 114.60 |
| 137 | si | 0.30 | 63.76 | 199.51 | 0.35 | 64.38 | 196.42 |
| 138 | pe | 0.10 | 70.70 | 194.67 | 0.13 | 72.33 | 216.03 |
| 139 | ta | 0.11 | 75.21 | 185.20 | 0.11 | 77.76 | 201.94 |
| 140 | ni | 0.23 | 75.89 | 203.80 | 0.27 | 72.16 | 230.12 |
| 141 | be | 0.06 | 69.97 | 191.62 | 0.09 | 72.52 | 201.80 |
| 142 | ra | 0.13 | 73.62 | 171.71 | 0.11 | 76.55 | 214.38 |
| 143 | sa | 0.18 | 67.79 | 173.80 | 0.24 | 69.82 | 222.11 |
| 144 | ter | 0.10 | 66.31 | 174.66 | 0.15 | 68.12 | 219.04 |
| 145 | ke | 0.15 | 67.31 | 188.12 | 0.09 | 77.38 | 223.63 |
| 146 | jut | 0.30 | 69.79 | 197.70 | 0.28 | 72.59 | 204.73 |
| 147 | a | 0.11 | 69.73 | x | 0.12 | 62.44 | 143.08 |
| 148 | pa | 0.12 | 70.36 | 174.05 | 0.13 | 67.04 | 148.64 |
| 149 | bi | 0.20 | 66.16 | 177.08 | 0.14 | 66.59 | 139.64 |
| 150 | la | 0.18 | 75.67 | 186.83 | 0.34 | 69.41 | 168.85 |
| 151 | men | 0.15 | 71.54 | 163.22 | 0.17 | 66.28 | 142.32 |
| 152 | da | 0.14 | 72.87 | 163.09 | 0.17 | 66.04 | 140.60 |
| 153 | pa | 0.14 | 72.13 | 180.78 | 0.20 | 61.35 | x |
| 154 | ti | 0.39 | 67.11 | 195.50 | 0.25 | 67.81 | 190.08 |
| 155 | i | 0.18 | 66.22 | 192.34 | 0.23 | 65.85 | 204.97 |
| 156 | tu | 0.15 | 72.89 | 208.05 | 0.17 | 73.60 | 276.41 |
| 157 | a | 0.13 | 73.78 | 90.25 | 0.13 | 69.24 | 222.31 |
| 158 | da | 0.09 | 76.23 | 173.35 | 0.13 | 70.39 | 159.57 |
| 159 | lah | 0.24 | 69.58 | 175.27 | 0.19 | 67.36 | 159.60 |
| 160 | te | 0.07 | 69.63 | 177.99 | 0.13 | 72.12 | 296.87 |
| 161 | lur | 0.26 | 68.48 | 120.32 | 0.29 | 78.51 | 247.84 |
| 162 | e | 0.08 | 63.93 | 210.28 | 0.19 | 68.68 | 190.94 |
| 163 | mas | 0.29 | 66.30 | 162.23 | 0.41 | 64.38 | 146.40 |
| 164 | si | 0.29 | 64.31 | 195.70 | 0.34 | 62.94 | 157.04 |
| 165 | pe | 0.13 | 73.81 | 195.80 | 0.13 | 67.90 | 163.63 |
| 166 | ta | 0.10 | 78.28 | 137.85 | 0.12 | 75.86 | 166.78 |
| 167 | ni | 0.17 | 75.30 | 193.93 | 0.19 | 73.02 | 184.84 |
| 168 | sung | 0.38 | 68.99 | 192.93 | 0.30 | 71.54 | 177.98 |
| 169 | guh | 0.20 | 71.60 | 189.76 | 0.31 | 79.00 | 221.18 |
| 170 | gem | 0.18 | 69.91 | 168.32 | 0.15 | 74.71 | 155.83 |
| 171 | bi | 0.11 | 73.13 | 162.75 | 0.12 | 75.41 | 135.97 |
| 172 | ra | 0.26 | 70.75 | 200.69 | 0.25 | 70.69 | 112.41 |
| 173 | ha | 0.13 | 72.36 | 168.85 | 0.20 | 69.96 | 164.30 |
| 174 | ri | 0.16 | 74.79 | 195.26 | 0.22 | 75.77 | 193.23 |
| 175 | de | 0.13 | 71.40 | 185.90 | 0.12 | 75.38 | 173.53 |
| 176 | mi | 0.15 | 69.90 | 176.42 | 0.15 | 72.89 | 161.73 |
| 177 | ha | 0.18 | 74.49 | 183.00 | 0.29 | 72.44 | 167.33 |
| 178 | ri | 0.13 | 74.16 | 202.84 | 0.30 | 70.14 | 189.76 |
| 179 | se | 0.18 | 69.25 | 179.08 | 0.12 | 65.52 | 185.40 |

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|---|---|---|---|---|---|---|---|
| 180 | le | 0.16 | 66.19 | 164.52 | 0.20 | 68.11 | 162.51 |
| 181 | pas | 0.17 | 72.76 | 109.48 | 0.23 | 67.24 | x |
| 182 | i | 0.18 | 64.14 | 184.98 | 0.15 | 65.57 | 175.52 |
| 183 | tu | 0.20 | 71.82 | 207.46 | 0.35 | 65.01 | 243.68 |
| 184 | si | 0.25 | 67.41 | 173.48 | 0.26 | 66.10 | 200.88 |
| 185 | ang | 0.19 | 72.87 | 112.62 | 0.19 | 75.60 | 199.55 |
| 186 | sa | 0.45 | 67.12 | 154.40 | 0.43 | 67.27 | 210.31 |
| 187 | te | 0.08 | 72.12 | 201.55 | 0.10 | 72.32 | 230.39 |
| 188 | rus | 0.24 | 71.20 | 193.17 | 0.22 | 68.98 | 232.88 |
| 189 | ber | 0.19 | 65.22 | 169.14 | 0.23 | 66.81 | 181.57 |
| 190 | te | 0.11 | 69.37 | 186.98 | 0.08 | 73.63 | 183.17 |
| 191 | lur | 0.23 | 66.72 | 137.12 | 0.26 | 74.46 | 165.65 |
| 192 | e | 0.11 | 67.89 | 167.09 | 0.16 | 70.03 | 153.49 |
| 193 | mas | 0.25 | 66.19 | 113.75 | 0.34 | 63.91 | 141.90 |
| 194 | si | 0.31 | 65.76 | 194.90 | 0.29 | 60.75 | 140.47 |
| 195 | pe | 0.05 | 72.44 | 192.92 | 0.11 | 69.71 | 149.39 |
| 196 | ta | 0.16 | 73.20 | 183.41 | 0.16 | 73.23 | 166.05 |
| 197 | ni | 0.22 | 76.12 | 196.83 | 0.31 | 71.17 | 189.78 |
| 198 | mu | 0.22 | 69.29 | 182.50 | 0.21 | 75.68 | 187.63 |
| 199 | la | 0.27 | 78.11 | 148.68 | 0.16 | 79.25 | 210.69 |
| 200 | men | 0.19 | 69.64 | 155.26 | 0.16 | 74.36 | 164.85 |
| 201 | ja | 0.13 | 74.09 | 158.22 | 0.12 | 73.64 | 141.94 |
| 202 | di | 0.16 | 70.38 | 167.58 | 0.17 | 64.11 | 139.00 |
| 203 | ta | 0.13 | 74.96 | 176.13 | 0.11 | 76.48 | 130.95 |
| 204 | mak | 0.22 | 70.04 | 156.50 | 0.29 | 69.17 | 121.83 |
| 205 | si | 0.41 | 64.45 | 174.66 | 0.33 | 60.31 | 137.05 |
| 206 | pe | 0.13 | 73.02 | 185.28 | 0.11 | 66.53 | 150.39 |
| 207 | ta | 0.16 | 74.78 | 173.21 | 0.15 | 73.36 | 160.37 |
| 208 | ni | 0.24 | 76.28 | 202.81 | 0.21 | 68.92 | 162.43 |
| 209 | me | 0.12 | 72.21 | 181.36 | 0.13 | 70.14 | 149.25 |
| 210 | ngam | 0.19 | 73.94 | 169.98 | 0.19 | 71.74 | 143.50 |
| 211 | bil | 0.19 | 71.96 | 152.29 | 0.19 | 64.78 | 140.37 |
| 212 | pi | 0.10 | 71.63 | 114.28 | 0.16 | 68.23 | 163.03 |
| 213 | sau | 0.35 | 75.27 | 197.94 | 0.35 | 71.04 | 204.99 |
| 214 | dan | 0.13 | 72.13 | 153.19 | 0.21 | 74.01 | 197.98 |
| 215 | me | 0.07 | 70.93 | 161.23 | 0.14 | 76.44 | 201.09 |
| 216 | nyem | 0.24 | 70.91 | 164.88 | 0.32 | 79.95 | 208.05 |
| 217 | be | 0.07 | 73.98 | 187.34 | 0.09 | 82.66 | 271.05 |
| 218 | lih | 0.31 | 72.71 | 191.63 | 0.35 | 70.27 | 212.11 |
| 219 | ang | 0.18 | 67.76 | 163.28 | 0.14 | 68.25 | 173.47 |
| 220 | sa | 0.18 | 65.67 | 187.78 | 0.34 | 71.93 | 208.87 |
| 221 | ber | 0.08 | 70.67 | 178.71 | 0.18 | 68.51 | 147.24 |
| 222 | tu | 0.14 | 64.12 | 162.91 | 0.06 | 66.84 | x |
| 223 | ah | 0.23 | 71.99 | 176.41 | 0.15 | 72.16 | 144.75 |
| 224 | nya | 0.31 | 67.14 | 147.26 | 0.30 | 65.87 | 136.76 |
| 225 | a | 0.11 | 66.24 | 149.52 | 0.09 | 54.17 | x |
| 226 | pa | 0.11 | 72.07 | 177.52 | 0.12 | 73.63 | 163.80 |
| 227 | bi | 0.13 | 75.97 | 170.96 | 0.12 | 77.60 | 157.23 |
| 228 | la | 0.14 | 77.18 | 207.94 | 0.28 | 78.74 | 187.68 |
| 229 | men | 0.14 | 78.70 | 209.82 | 0.17 | 71.86 | 157.25 |
| 230 | da | 0.20 | 71.30 | 181.04 | 0.12 | 73.31 | 131.86 |
| 231 | pa | 0.19 | 72.41 | 187.53 | 0.22 | 66.94 | 137.83 |
| 232 | ti | 0.23 | 67.74 | 201.07 | 0.44 | 61.50 | 172.76 |
| 233 | ti | 0.06 | 65.93 | 195.30 | 0.09 | 64.80 | 207.06 |
| 234 | a | 0.13 | 77.42 | 187.69 | 0.14 | 77.15 | 202.03 |
| 235 | da | 0.12 | 71.59 | 194.44 | 0.34 | 77.24 | 212.20 |
| 236 | se | 0.19 | 68.13 | 198.75 | 0.18 | 66.97 | 163.23 |
| 237 | bi | 0.19 | 65.09 | 180.73 | 0.13 | 75.03 | 156.55 |
| 238 | ji | 0.24 | 69.46 | 188.75 | 0.18 | 71.59 | 155.79 |
| 239 | pun | 0.29 | 70.53 | 219.12 | 0.39 | 70.30 | 157.03 |
| 240 | te | 0.10 | 68.50 | 216.54 | 0.08 | 69.95 | 183.16 |
| 241 | lur | 0.23 | 76.54 | 194.34 | 0.38 | 76.91 | 191.90 |
| 242 | e | 0.16 | 69.84 | 144.80 | 0.08 | 70.70 | 166.75 |
| 243 | mas | 0.24 | 71.23 | 187.29 | 0.42 | 67.77 | 232.43 |
| 244 | di | 0.17 | 67.42 | 161.81 | 0.10 | 70.77 | 151.56 |
| 245 | da | 0.10 | 75.60 | 173.37 | 0.11 | 80.14 | 151.13 |
| 246 | lam | 0.27 | 74.64 | 191.36 | 0.22 | 69.93 | 142.12 |
| 247 | pe | 0.07 | 75.53 | 194.29 | 0.06 | 72.63 | 194.02 |

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|---|---|---|---|---|---|---|---|
| 248 | rut | 0.21 | 67.24 | 142.59 | 0.22 | 70.41 | 193.37 |
| 249 | ang | 0.13 | 68.37 | 174.65 | 0.15 | 72.95 | 151.19 |
| 250 | sa | 0.27 | 66.29 | 175.67 | 0.30 | 66.85 | 256.78 |
| 251 | i | 0.18 | 65.34 | 189.98 | 0.18 | 63.28 | x |
| 252 | tu | 0.35 | 64.75 | 193.07 | 0.29 | 67.88 | 160.10 |
| 253 | si | 0.29 | 62.28 | 190.50 | 0.30 | 66.34 | 216.83 |
| 254 | pe | 0.11 | 67.60 | 189.84 | 0.12 | 68.87 | 198.89 |
| 255 | ta | 0.11 | 73.81 | 186.57 | 0.14 | 76.12 | 190.54 |
| 256 | ni | 0.22 | 72.59 | 187.64 | 0.30 | 64.83 | 184.08 |
| 257 | mu | 0.17 | 72.39 | 169.26 | 0.22 | 72.28 | 189.49 |
| 258 | la | 0.13 | 74.75 | 171.00 | 0.22 | 77.09 | 183.44 |
| 259 | me | 0.10 | 71.05 | 161.15 | 0.13 | 74.74 | 154.98 |
| 260 | nye | 0.09 | 72.19 | 164.17 | 0.12 | 72.65 | 146.53 |
| 261 | da | 0.15 | 77.47 | 185.51 | 0.14 | 78.03 | 143.85 |
| 262 | ri | 0.17 | 72.72 | 193.80 | 0.34 | 67.66 | 137.52 |
| 263 | ke | 0.07 | 68.05 | 186.18 | 0.05 | 67.55 | 161.58 |
| 264 | si | 0.13 | 65.80 | 134.19 | 0.12 | 67.13 | 165.18 |
| 265 | la | 0.19 | 70.60 | 83.27 | 0.23 | 74.57 | 154.68 |
| 266 | pan | 0.17 | 76.26 | 157.69 | 0.13 | 76.22 | 162.34 |
| 267 | nya | 0.20 | 75.55 | 190.73 | 0.41 | 69.02 | 156.57 |
| 268 | dan | 0.26 | 71.95 | 166.20 | 0.24 | 74.36 | 158.52 |
| 269 | be | 0.07 | 72.57 | 166.73 | 0.06 | 74.52 | 159.90 |
| 270 | ra | 0.12 | 74.20 | 181.66 | 0.15 | 75.69 | 163.38 |
| 271 | sa | 0.19 | 72.27 | 189.93 | 0.21 | 69.60 | 161.89 |
| 272 | sa | 0.23 | 70.66 | 170.10 | 0.33 | 68.54 | 173.19 |
| 273 | ngat | 0.23 | 67.31 | 157.09 | 0.21 | 68.89 | 175.73 |
| 274 | me | 0.07 | 67.30 | 170.60 | 0.11 | 67.20 | 147.77 |
| 275 | nye | 0.12 | 72.33 | 167.50 | 0.11 | 71.20 | 131.68 |
| 276 | sal | 0.31 | 71.92 | 114.05 | 0.40 | 67.49 | 137.83 |
| 277 | su | 0.12 | 60.22 | 481.10 | 0.10 | 54.05 | x |
| 278 | a | 0.22 | 66.72 | 170.89 | 0.24 | 65.41 | 168.41 |
| 279 | tu | 0.07 | 74.34 | 201.06 | 0.15 | 71.69 | 218.23 |
| 280 | ha | 0.23 | 72.71 | 184.19 | 0.13 | 72.01 | 180.74 |
| 281 | ri | 0.20 | 71.83 | 189.75 | 0.24 | 71.25 | 194.57 |
| 282 | se | 0.10 | 65.07 | 204.30 | 0.19 | 64.62 | 234.71 |
| 283 | e | 0.23 | 63.59 | 176.05 | 0.19 | 64.44 | 166.14 |
| 284 | kor | 0.16 | 73.05 | 170.16 | 0.09 | 73.75 | 168.69 |
| 285 | an | 0.21 | 67.33 | 166.06 | 0.24 | 68.64 | 170.43 |
| 286 | jing | 0.26 | 70.05 | 189.66 | 0.26 | 74.64 | 193.44 |
| 287 | ter | 0.17 | 68.51 | 155.22 | 0.13 | 69.60 | 154.15 |
| 288 | jum | 0.24 | 63.99 | 169.15 | 0.27 | 64.56 | 181.52 |
| 289 | pa | 0.10 | 73.34 | 89.19 | 0.19 | 70.49 | 208.01 |
| 290 | se | 0.22 | 63.53 | 215.57 | 0.22 | 59.90 | 201.69 |
| 291 | ke | 0.16 | 61.31 | 159.68 | 0.18 | 63.69 | 224.38 |
| 292 | tul | 0.11 | 72.44 | 164.36 | 0.10 | 77.02 | 205.71 |
| 293 | da | 0.20 | 73.21 | 158.98 | 0.16 | 77.49 | 162.74 |
| 294 | ging | 0.21 | 65.09 | 135.25 | 0.31 | 66.51 | 143.59 |
| 295 | di | 0.13 | 66.03 | 172.51 | 0.13 | 72.43 | 152.81 |
| 296 | a | 0.22 | 75.17 | 197.60 | 0.28 | 76.25 | 205.13 |
| 297 | meng | 0.22 | 70.50 | 174.10 | 0.19 | 73.17 | 172.70 |
| 298 | gong | 0.17 | 71.45 | 176.14 | 0.20 | 71.88 | 179.08 |
| 299 | gong | 0.19 | 70.87 | 187.49 | 0.37 | 71.58 | 203.95 |
| 300 | da | 0.20 | 72.08 | 165.19 | 0.21 | 72.35 | 174.05 |
| 301 | ging | 0.19 | 66.39 | 170.92 | 0.25 | 74.73 | 197.88 |
| 302 | i | 0.18 | 58.10 | 171.03 | 0.22 | 66.38 | 172.60 |
| 303 | tu | 0.21 | 66.98 | 184.85 | 0.67 | 56.69 | 178.05 |
| 304 | di | 0.16 | 73.19 | 156.58 | 0.23 | 73.61 | 165.41 |
| 305 | mu | 0.17 | 67.15 | 164.70 | 0.15 | 74.14 | 183.79 |
| 306 | lut | 0.20 | 65.28 | 299.13 | 0.30 | 69.71 | 192.37 |
| 307 | un | 0.21 | 56.08 | 152.85 | 0.23 | 67.63 | 190.91 |
| 308 | tuk | 0.17 | 69.59 | 182.50 | 0.17 | 72.32 | 206.46 |
| 309 | me | 0.12 | 65.27 | 153.55 | 0.17 | 69.61 | 162.87 |
| 310 | ma | 0.18 | 65.94 | 155.33 | 0.23 | 68.50 | 151.76 |
| 311 | kan | 0.15 | 67.97 | 179.81 | 0.22 | 77.74 | 193.17 |
| 312 | nya | 0.16 | 69.08 | 179.20 | 0.38 | 72.30 | 198.63 |
| 313 | di | 0.19 | 65.35 | 161.02 | 0.18 | 69.50 | 195.99 |
| 314 | tem | 0.20 | 63.47 | 152.21 | 0.26 | 63.66 | 213.11 |
| 315 | pat | 0.21 | 68.37 | 172.89 | 0.32 | 64.10 | 138.78 |

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|---|---|---|---|---|---|---|---|
| 316 | yang | 0.20 | 67.00 | 148.38 | 0.30 | 69.14 | 157.67 |
| 317 | se | 0.10 | 57.39 | 181.30 | 0.11 | 57.77 | 155.53 |
| 318 | la | 0.16 | 71.56 | 169.46 | 0.14 | 69.83 | 139.73 |
| 319 | mat | 0.17 | 64.30 | 232.85 | 0.15 | 62.28 | 185.80 |
| 320 | da | 0.12 | 75.41 | 145.31 | 0.12 | 73.04 | 165.87 |
| 321 | lam | 0.25 | 68.95 | 198.86 | 0.22 | 76.22 | 196.67 |
| 322 | per | 0.13 | 68.99 | 212.73 | 0.13 | 73.26 | 185.22 |
| 323 | ja | 0.10 | 74.06 | 176.23 | 0.14 | 75.16 | 145.88 |
| 324 | la | 0.16 | 70.65 | 140.37 | 0.16 | 71.15 | 121.13 |
| 325 | nan | 0.38 | 69.05 | 191.89 | 0.33 | 67.04 | 163.19 |
| 326 | di | 0.11 | 68.49 | 160.70 | 0.09 | 66.84 | 158.03 |
| 327 | a | 0.16 | 75.93 | 176.18 | 0.13 | 75.72 | 161.28 |
| 328 | la | 0.23 | 72.34 | 167.73 | 0.17 | 72.84 | 181.14 |
| 329 | lu | 0.16 | 71.39 | 183.28 | 0.21 | 75.48 | 195.42 |
| 330 | di | 0.16 | 69.59 | 164.31 | 0.18 | 71.40 | 167.33 |
| 331 | te | 0.18 | 60.70 | 159.30 | 0.21 | 59.93 | 93.27 |
| 332 | pi | 0.12 | 65.31 | 184.53 | 0.20 | 74.58 | 206.84 |
| 333 | a | 0.17 | 70.02 | 152.57 | 0.19 | 69.21 | 163.82 |
| 334 | nak | 0.13 | 70.31 | 262.94 | 0.12 | 67.01 | 141.65 |
| 335 | su | 0.20 | 62.81 | 202.54 | 0.18 | 60.17 | 142.43 |
| 336 | ngai | 0.29 | 67.37 | 120.54 | 0.33 | 61.77 | 116.30 |
| 337 | se | 0.18 | 57.65 | 172.43 | 0.11 | 57.90 | 205.80 |
| 338 | ma | 0.18 | 68.42 | 183.50 | 0.14 | 76.21 | 200.88 |
| 339 | sa | 0.13 | 74.83 | 219.31 | 0.18 | 71.34 | 222.69 |
| 340 | ber | 0.15 | 72.77 | 191.45 | 0.18 | 76.29 | 199.41 |
| 341 | ja | 0.15 | 74.22 | 177.30 | 0.14 | 75.96 | 143.48 |
| 342 | lan | 0.32 | 71.69 | 188.66 | 0.31 | 69.15 | 170.56 |
| 343 | an | 0.20 | 67.48 | 163.46 | 0.24 | 72.82 | 185.89 |
| 344 | jing | 0.24 | 66.66 | 182.39 | 0.16 | 74.33 | 206.62 |
| 345 | i | 0.22 | 61.37 | 173.16 | 0.21 | 66.28 | 190.95 |
| 346 | tu | 0.27 | 73.56 | 194.22 | 0.22 | 69.31 | 217.35 |
| 347 | me | 0.14 | 69.21 | 173.31 | 0.15 | 72.09 | 189.98 |
| 348 | li | 0.16 | 70.99 | 163.49 | 0.08 | 80.48 | 196.06 |
| 349 | hat | 0.24 | 67.46 | 181.82 | 0.32 | 68.57 | 199.48 |
| 350 | ke | 0.10 | 71.16 | 152.81 | 0.09 | 67.45 | 161.13 |
| 351 | da | 0.15 | 77.67 | 157.75 | 0.08 | 76.75 | 148.43 |
| 352 | lam | 0.23 | 70.54 | 166.41 | 0.15 | 69.21 | 135.16 |
| 353 | a | 0.11 | 71.11 | 123.20 | 0.10 | 67.56 | 122.50 |
| 354 | ir | 0.26 | 67.47 | 265.12 | 0.26 | 64.09 | 260.29 |
| 355 | a | 0.15 | 67.89 | 166.58 | 0.19 | 68.36 | 172.84 |
| 356 | da | 0.14 | 73.75 | 210.33 | 0.13 | 75.30 | 207.60 |
| 357 | se | 0.15 | 67.48 | 194.82 | 0.18 | 69.33 | 211.34 |
| 358 | e | 0.19 | 61.48 | 90.37 | 0.24 | 63.53 | 148.20 |
| 359 | kor | 0.19 | 72.52 | 190.89 | 0.18 | 68.36 | 165.35 |
| 360 | an | 0.20 | 69.27 | 186.59 | 0.25 | 73.11 | 193.98 |
| 361 | jing | 0.21 | 73.13 | 191.60 | 0.14 | 76.35 | 204.56 |
| 362 | la | 0.13 | 77.53 | 194.63 | 0.21 | 76.74 | 209.15 |
| 363 | in | 0.29 | 72.05 | 212.55 | 0.32 | 68.66 | 162.98 |
| 364 | de | 0.13 | 68.88 | 168.79 | 0.13 | 66.15 | 145.72 |
| 365 | ngan | 0.23 | 72.34 | 145.77 | 0.16 | 65.93 | 136.13 |
| 366 | da | 0.17 | 75.01 | 103.93 | 0.15 | 74.74 | 151.54 |
| 367 | ging | 0.28 | 73.49 | 188.59 | 0.40 | 75.94 | 185.53 |
| 368 | di | 0.18 | 72.28 | 163.38 | 0.15 | 69.21 | 169.20 |
| 369 | mu | 0.14 | 71.85 | 168.98 | 0.14 | 79.37 | 200.30 |
| 370 | lut | 0.16 | 72.57 | 186.54 | 0.27 | 73.00 | 230.89 |
| 371 | nya | 0.24 | 73.44 | 190.28 | 0.35 | 67.18 | 160.91 |
| 372 | di | 0.18 | 72.63 | 173.14 | 0.12 | 68.04 | 154.30 |
| 373 | da | 0.16 | 75.34 | 163.79 | 0.13 | 77.57 | 146.78 |
| 374 | lam | 0.24 | 68.41 | 100.98 | 0.26 | 66.60 | 147.02 |
| 375 | a | 0.14 | 67.75 | 155.83 | 0.12 | 69.06 | 140.05 |
| 376 | ir | 0.25 | 69.56 | 165.77 | 0.22 | 63.51 | 141.34 |
| 377 | i | 0.10 | 65.00 | 170.98 | 0.14 | 62.85 | 154.72 |
| 378 | tu | 0.30 | 61.47 | 277.39 | 0.24 | 62.65 | 118.54 |
| 379 | di | 0.12 | 69.90 | 171.67 | 0.13 | 71.16 | 161.05 |
| 380 | a | 0.21 | 75.41 | 206.87 | 0.29 | 77.68 | 209.30 |
| 381 | ti | 0.10 | 70.75 | 193.02 | 0.08 | 73.54 | 193.12 |
| 382 | dak | 0.19 | 72.57 | 157.94 | 0.16 | 72.22 | 219.68 |
| 383 | ta | 0.13 | 74.17 | 147.48 | 0.13 | 72.67 | 154.96 |

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|---|---|---|---|---|---|---|---|
| 384 | hu | 0.22 | 73.64 | 200.42 | 0.32 | 67.08 | 154.72 |
| 385 | i | 0.19 | 61.77 | 179.39 | 0.16 | 65.62 | 157.90 |
| 386 | tu | 0.21 | 73.37 | 199.17 | 0.34 | 71.80 | 191.61 |
| 387 | i | 0.10 | 71.55 | 182.47 | 0.08 | 73.63 | 153.87 |
| 388 | a | 0.10 | 71.55 | 182.47 | 0.08 | 73.63 | 153.87 |
| 389 | lah | 0.25 | 68.02 | 178.98 | 0.23 | 65.22 | 157.82 |
| 390 | ba | 0.11 | 78.43 | 170.67 | 0.17 | 74.23 | 168.68 |
| 391 | yang | 0.28 | 68.51 | 183.42 | 0.33 | 74.86 | 180.76 |
| 392 | ba | 0.12 | 78.62 | 170.35 | 0.13 | 74.34 | 141.39 |
| 393 | yang | 0.19 | 67.67 | 179.63 | 0.16 | 71.77 | 144.85 |
| 394 | nya | 0.20 | 66.57 | 179.33 | 0.18 | 65.56 | 139.75 |
| 395 | sen | 0.27 | 67.85 | 164.28 | 0.24 | 66.09 | 131.68 |
| 396 | di | 0.10 | 74.05 | 163.16 | 0.10 | 69.49 | 128.29 |
| 397 | ri | 0.23 | 64.99 | 134.19 | 0.30 | 60.22 | 119.86 |
| 398 | di | 0.11 | 72.46 | 166.47 | 0.14 | 68.72 | 152.92 |
| 399 | a | 0.17 | 78.17 | 199.94 | 0.21 | 77.23 | 178.06 |
| 400 | ma | 0.19 | 73.75 | 170.58 | 0.22 | 72.66 | 179.14 |
| 401 | hu | 0.18 | 74.87 | 192.96 | 0.18 | 79.55 | 204.23 |
| 402 | men | 0.19 | 71.50 | 171.79 | 0.17 | 72.70 | 150.43 |
| 403 | da | 0.16 | 71.91 | 164.83 | 0.16 | 71.95 | 144.98 |
| 404 | pat | 0.22 | 68.04 | 187.80 | 0.17 | 65.02 | 103.87 |
| 405 | kan | 0.15 | 73.22 | 185.94 | 0.18 | 72.10 | 147.76 |
| 406 | da | 0.22 | 72.18 | 171.08 | 0.17 | 73.27 | 138.88 |
| 407 | ging | 0.22 | 68.06 | 171.03 | 0.16 | 69.00 | 137.27 |
| 408 | i | 0.11 | 66.36 | 171.42 | 0.21 | 57.39 | 133.67 |
| 409 | tu | 0.24 | 62.14 | 126.24 | 0.25 | 59.87 | 111.13 |
| 410 | di | 0.11 | 70.75 | 165.72 | 0.14 | 70.20 | 161.54 |
| 411 | a | 0.30 | 69.27 | 201.57 | 0.23 | 70.50 | 189.33 |
| 412 | pun | 0.25 | 74.37 | 207.76 | 0.19 | 75.70 | 193.22 |
| 413 | me | 0.10 | 71.12 | 174.98 | 0.15 | 71.67 | 173.23 |
| 414 | nya | 0.17 | 73.26 | 172.70 | 0.17 | 73.21 | 181.68 |
| 415 | lak | 0.29 | 67.42 | 189.18 | 0.24 | 66.58 | 303.28 |
| 416 | ke | 0.06 | 58.22 | 171.56 | 0.04 | 68.71 | 157.45 |
| 417 | pa | 0.15 | 72.74 | 160.66 | 0.08 | 76.13 | 151.70 |
| 418 | da | 0.05 | 75.18 | 167.00 | 0.15 | 72.35 | 152.63 |
| 419 | an | 0.28 | 68.54 | 177.84 | 0.21 | 71.50 | 167.41 |
| 420 | jing | 0.24 | 72.54 | 188.49 | 0.21 | 71.15 | 162.93 |
| 421 | di | 0.13 | 69.16 | 157.37 | 0.10 | 68.54 | 141.59 |
| 422 | da | 0.14 | 73.92 | 81.28 | 0.13 | 76.17 | 132.55 |
| 423 | lam | 0.14 | 75.05 | 158.79 | 0.16 | 68.98 | 130.00 |
| 424 | a | 0.18 | 68.01 | 124.56 | 0.14 | 59.51 | 121.03 |
| 425 | ir | 0.29 | 67.42 | 194.30 | 0.19 | 61.20 | 112.18 |
| 426 | se | 0.18 | 63.77 | 168.79 | 0.17 | 61.24 | 192.52 |
| 427 | ba | 0.11 | 79.00 | 190.18 | 0.06 | 78.22 | 209.47 |
| 428 | ik | 0.16 | 74.23 | 216.82 | 0.15 | 76.20 | 210.64 |
| 429 | sa | 0.30 | 67.40 | 187.78 | 0.27 | 72.34 | 191.94 |
| 430 | ja | 0.24 | 73.12 | 209.40 | 0.16 | 75.69 | 200.89 |
| 431 | di | 0.09 | 64.87 | 190.21 | 0.08 | 68.53 | 187.63 |
| 432 | a | 0.23 | 78.18 | 198.08 | 0.18 | 77.77 | 183.77 |
| 433 | mem | 0.19 | 71.78 | 175.73 | 0.17 | 72.97 | 164.53 |
| 434 | bu | 0.21 | 62.60 | 168.83 | 0.15 | 63.45 | 163.43 |
| 435 | ka | 0.15 | 76.57 | 174.82 | 0.07 | 73.43 | 169.40 |
| 436 | mu | 0.14 | 70.30 | 174.68 | 0.15 | 75.14 | 162.50 |
| 437 | lut | 0.33 | 68.34 | 200.17 | 0.28 | 68.07 | 178.61 |
| 438 | da | 0.18 | 74.03 | 167.33 | 0.25 | 72.94 | 166.59 |
| 439 | ging | 0.26 | 73.87 | 194.32 | 0.19 | 72.74 | 177.12 |
| 440 | di | 0.14 | 71.85 | 166.79 | 0.15 | 74.73 | 160.03 |
| 441 | mu | 0.16 | 71.72 | 167.02 | 0.11 | 71.97 | 165.34 |
| 442 | lut | 0.15 | 75.46 | 195.23 | 0.21 | 70.70 | 180.81 |
| 443 | nya | 0.41 | 67.03 | 196.06 | 0.22 | 69.52 | 176.18 |
| 444 | ter | 0.21 | 69.44 | 165.37 | 0.17 | 70.51 | 159.41 |
| 445 | ja | 0.23 | 69.87 | 180.09 | 0.20 | 72.01 | 174.24 |
| 446 | tuh | 0.24 | 69.49 | 192.25 | 0.21 | 66.42 | 179.44 |
| 447 | ke | 0.10 | 71.67 | 205.72 | 0.07 | 69.76 | 158.61 |
| 448 | da | 0.14 | 74.93 | 161.03 | 0.12 | 77.64 | 146.28 |
| 449 | lam | 0.19 | 74.23 | 171.03 | 0.24 | 68.33 | 140.55 |
| 450 | a | 0.17 | 69.07 | 151.75 | 0.10 | 65.62 | 127.47 |
| 451 | ir | 0.27 | 67.02 | 168.43 | 0.24 | 61.84 | 215.66 |

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|---|---|---|---|---|---|---|---|
| 452 | se | 0.19 | 63.99 | 264.90 | 0.21 | 66.75 | 99.75 |
| 453 | e | 0.14 | 71.10 | 149.43 | 0.24 | 61.41 | 171.26 |
| 454 | kor | 0.26 | 69.59 | 199.69 | 0.16 | 76.00 | 198.16 |
| 455 | se | 0.18 | 67.04 | 202.89 | 0.22 | 66.56 | 179.97 |
| 456 | mut | 0.22 | 73.37 | 193.06 | 0.31 | 65.92 | 173.30 |
| 457 | yang | 0.28 | 70.08 | 163.11 | 0.36 | 68.84 | 165.70 |
| 458 | ke | 0.12 | 63.64 | 153.19 | 0.11 | 66.31 | 161.46 |
| 459 | hau | 0.19 | 69.02 | 156.78 | 0.21 | 69.36 | 145.41 |
| 460 | san | 0.38 | 65.27 | 142.80 | 0.45 | 64.03 | 149.66 |
| 461 | i | 0.11 | 62.50 | 171.81 | 0.17 | 68.02 | 171.31 |
| 462 | ngin | 0.24 | 68.50 | 175.76 | 0.28 | 66.90 | 178.45 |
| 463 | me | 0.20 | 71.83 | 152.45 | 0.12 | 67.38 | 151.45 |
| 464 | mi | 0.18 | 70.10 | 159.29 | 0.20 | 68.97 | 145.06 |
| 465 | num | 0.22 | 63.13 | 179.40 | 0.22 | 60.22 | 140.53 |
| 466 | a | 0.17 | 67.73 | 161.80 | 0.14 | 66.05 | 154.79 |
| 467 | ir | 0.23 | 68.49 | 175.43 | 0.31 | 63.63 | 160.21 |
| 468 | da | 0.26 | 68.71 | 156.82 | 0.17 | 68.92 | 164.73 |
| 469 | ri | 0.18 | 66.78 | 172.65 | 0.19 | 66.09 | 175.80 |
| 470 | a | 0.16 | 70.38 | 154.88 | 0.11 | 66.54 | 245.72 |
| 471 | ir | 0.23 | 64.38 | 162.19 | 0.20 | 60.41 | 157.93 |
| 472 | ter | 0.17 | 66.06 | 160.31 | 0.10 | 63.84 | 184.94 |
| 473 | jun | 0.26 | 67.34 | 172.65 | 0.36 | 65.55 | 168.01 |
| 474 | yang | 0.35 | 67.59 | 157.13 | 0.28 | 67.83 | 142.02 |
| 475 | ber | 0.07 | 73.60 | 152.05 | 0.08 | 66.29 | 150.78 |
| 476 | ham | 0.23 | 63.32 | 157.14 | 0.28 | 58.89 | 154.98 |
| 477 | pi | 0.09 | 69.77 | 157.13 | 0.10 | 65.59 | 133.00 |
| 478 | ran | 0.23 | 64.54 | 130.23 | 0.18 | 64.03 | 123.56 |
| 479 | na | 0.13 | 73.48 | 149.66 | 0.21 | 70.79 | 142.87 |
| 480 | mun | 0.26 | 73.12 | 191.53 | 1.05 | 53.32 | 164.33 |
| 481 | na | 0.13 | 71.87 | 183.08 | 0.12 | 69.80 | 166.85 |
| 482 | sib | 0.21 | 69.05 | 193.06 | 0.25 | 68.62 | 183.40 |
| 483 | nya | 0.26 | 73.41 | 191.70 | 0.21 | 71.85 | 177.32 |
| 484 | ma | 0.12 | 72.88 | 181.64 | 0.17 | 73.00 | 154.29 |
| 485 | lang | 0.23 | 76.04 | 193.51 | 0.36 | 67.83 | 133.36 |
| 486 | a | 0.12 | 67.87 | 161.03 | 0.08 | 52.57 | x |
| 487 | pa | 0.13 | 62.87 | 167.14 | 0.10 | 66.26 | 143.47 |
| 488 | bi | 0.08 | 70.33 | 170.14 | 0.07 | 71.35 | 136.50 |
| 489 | la | 0.15 | 72.31 | 183.19 | 0.17 | 67.78 | 135.58 |
| 490 | ka | 0.20 | 67.25 | 174.98 | 0.18 | 64.16 | 154.54 |
| 491 | ki | 0.11 | 72.59 | 195.87 | 0.13 | 67.10 | 183.40 |
| 492 | nya | 0.24 | 71.91 | 198.53 | 0.32 | 72.33 | 172.23 |
| 493 | ter | 0.13 | 70.01 | 171.32 | 0.22 | 71.66 | 164.55 |
| 494 | ge | 0.12 | 74.63 | 168.32 | 0.11 | 75.52 | 156.70 |
| 495 | lin | 0.22 | 67.95 | 181.66 | 0.23 | 71.23 | 165.03 |
| 496 | cir | 0.38 | 71.66 | 186.49 | 0.40 | 72.06 | 235.34 |
| 497 | dan | 0.29 | 68.97 | 181.99 | 0.42 | 68.34 | 158.66 |
| 498 | ter | 0.17 | 68.38 | 146.56 | 0.24 | 71.45 | 185.51 |
| 499 | ja | 0.19 | 68.81 | 86.78 | 0.22 | 69.80 | 178.02 |
| 500 | tuh | 0.16 | 70.34 | 192.01 | 0.23 | 68.50 | 193.98 |
| 501 | di | 0.16 | 67.93 | 170.88 | 0.13 | 66.02 | 146.24 |
| 502 | da | 0.12 | 74.99 | 166.58 | 0.17 | 76.64 | 142.53 |
| 503 | lam | 0.24 | 67.28 | 177.32 | 0.26 | 67.32 | 123.77 |
| 504 | a | 0.13 | 62.99 | 82.10 | 0.13 | 69.49 | 172.78 |
| 505 | ir | 0.20 | 67.51 | 168.42 | 0.27 | 70.71 | 183.54 |
| 506 | ter | 0.21 | 63.43 | 179.74 | 0.24 | 69.45 | 155.62 |
| 507 | jun | 0.25 | 67.41 | 185.99 | 0.37 | 68.90 | 155.30 |
| 508 | yang | 0.25 | 67.92 | 148.70 | 0.38 | 66.78 | 139.91 |
| 509 | de | 0.18 | 69.50 | 119.67 | 0.16 | 63.27 | 142.01 |
| 510 | ras | 0.34 | 64.47 | 117.16 | 0.38 | 64.42 | 134.05 |
| 511 | a | 0.12 | 60.46 | x | 0.07 | 64.70 | 143.08 |
| 512 | pa | 0.10 | 72.36 | 172.65 | 0.09 | 69.77 | 143.66 |
| 513 | bi | 0.12 | 69.14 | 183.51 | 0.09 | 71.41 | 141.12 |
| 514 | la | 0.19 | 77.45 | 215.68 | 0.19 | 72.20 | 136.62 |
| 515 | di | 0.10 | 73.06 | 197.50 | 0.06 | 71.63 | 138.23 |
| 516 | a | 0.16 | 79.79 | 196.55 | 0.07 | 74.58 | 132.30 |
| 517 | ham | 0.33 | 69.30 | 197.14 | 0.39 | 69.14 | 181.74 |
| 518 | pir | 0.14 | 78.64 | 195.74 | 0.19 | 77.14 | 211.85 |
| 519 | ham | 0.26 | 66.56 | 184.20 | 0.36 | 71.14 | 194.46 |

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|---|---|---|---|---|---|---|---|
| 520 | pir | 0.17 | 74.06 | 184.78 | 0.16 | 75.23 | 200.24 |
| 521 | le | 0.15 | 72.49 | 177.09 | 0.19 | 75.69 | 189.53 |
| 522 | mas | 0.40 | 68.07 | 192.08 | 0.46 | 64.79 | 175.15 |
| 523 | se | 0.15 | 61.87 | 81.30 | 0.19 | 63.70 | 101.15 |
| 524 | e | 0.17 | 67.89 | 157.66 | 0.10 | 66.01 | 182.60 |
| 525 | kor | 0.26 | 74.80 | 198.97 | 0.38 | 66.44 | 161.94 |
| 526 | mer | 0.15 | 66.50 | 181.50 | 0.26 | 62.57 | 150.49 |
| 527 | pa | 0.23 | 66.40 | 173.07 | 0.26 | 60.38 | 133.38 |
| 528 | ti | 0.18 | 71.62 | 99.98 | 0.41 | 65.75 | 165.64 |
| 529 | yang | 0.37 | 71.06 | 170.09 | 0.33 | 71.08 | 168.63 |
| 530 | ber | 0.16 | 64.65 | 173.11 | 0.20 | 64.09 | 159.09 |
| 531 | teng | 0.18 | 71.07 | 185.56 | 0.16 | 78.31 | 199.31 |
| 532 | gek | 0.30 | 68.26 | 190.22 | 0.28 | 70.23 | 209.49 |
| 533 | ti | 0.10 | 67.71 | 168.38 | 0.10 | 70.76 | 152.20 |
| 534 | dak | 0.16 | 73.41 | 237.47 | 0.19 | 70.13 | 209.27 |
| 535 | ja | 0.15 | 75.89 | 187.11 | 0.10 | 76.87 | 164.83 |
| 536 | uh | 0.22 | 69.86 | 201.27 | 0.27 | 70.72 | 182.77 |
| 537 | da | 0.14 | 75.07 | 96.90 | 0.17 | 68.47 | 122.34 |
| 538 | ri | 0.13 | 68.29 | 180.60 | 0.10 | 62.09 | 137.85 |
| 539 | po | 0.19 | 69.32 | 188.63 | 0.17 | 63.02 | 149.96 |
| 540 | kok | 0.10 | 71.89 | 166.59 | 0.09 | 67.71 | 385.24 |
| 541 | i | 0.21 | 62.37 | 164.48 | 0.23 | 58.58 | 329.65 |
| 542 | tu | 0.16 | 76.60 | 197.77 | 0.28 | 67.71 | 207.19 |
| 543 | men | 0.21 | 70.98 | 170.30 | 0.13 | 71.80 | 157.85 |
| 544 | ja | 0.18 | 70.79 | 167.24 | 0.19 | 70.85 | 183.48 |
| 545 | tuh | 0.21 | 63.10 | 186.56 | 0.26 | 67.57 | 200.25 |
| 546 | kan | 0.12 | 76.99 | 190.07 | 0.30 | 68.10 | 157.22 |
| 547 | se | 0.29 | 67.16 | 190.99 | 0.15 | 63.69 | 166.47 |
| 548 | he | 0.18 | 73.86 | 173.78 | 0.20 | 70.67 | 142.13 |
| 549 | lai | 0.22 | 75.99 | 158.63 | 0.19 | 73.46 | 127.60 |
| 550 | da | 0.09 | 77.76 | 142.13 | 0.08 | 72.06 | 122.55 |
| 551 | un | 0.30 | 67.83 | 243.60 | 0.25 | 61.56 | 104.50 |
| 552 | se | 0.16 | 67.54 | 192.96 | 0.22 | 60.90 | 191.40 |
| 553 | mut | 0.25 | 73.23 | 214.80 | 0.27 | 75.33 | 191.67 |
| 554 | i | 0.15 | 67.76 | 182.76 | 0.13 | 68.49 | 172.93 |
| 555 | tu | 0.17 | 70.18 | 195.20 | 0.16 | 67.06 | 184.32 |
| 556 | pun | 0.23 | 74.85 | 206.63 | 0.40 | 68.19 | 173.60 |
| 557 | me | 0.12 | 70.29 | 178.06 | 0.16 | 70.94 | 159.71 |
| 558 | man | 0.21 | 70.90 | 178.67 | 0.27 | 76.72 | 184.12 |
| 559 | jat | 0.26 | 70.12 | 167.63 | 0.32 | 67.77 | 191.59 |
| 560 | ke | 0.06 | 76.24 | 83.45 | 0.08 | 71.13 | 84.71 |
| 561 | a | 0.11 | 72.55 | 94.61 | 0.09 | 65.56 | 85.83 |
| 562 | tas | 0.12 | 67.99 | 174.19 | 0.15 | 63.52 | 157.36 |
| 563 | da | 0.12 | 72.88 | 127.35 | 0.14 | 70.77 | 147.98 |
| 564 | un | 0.16 | 75.85 | 190.71 | 0.14 | 65.07 | 138.66 |
| 565 | ter | 0.14 | 68.76 | 146.93 | 0.10 | 59.75 | 135.83 |
| 566 | se | 0.13 | 68.75 | 187.96 | 0.20 | 63.34 | 132.84 |
| 567 | but | 0.24 | 70.55 | 161.81 | 0.17 | 61.89 | 334.01 |
| 568 | dan | 0.18 | 74.70 | 162.29 | 0.24 | 67.37 | 130.07 |
| 569 | ak | 0.15 | 67.44 | 164.73 | 0.22 | 61.47 | 141.10 |
| 570 | hir | 0.12 | 72.35 | 190.91 | 0.13 | 74.54 | 172.80 |
| 571 | nya | 0.20 | 75.35 | 193.89 | 0.33 | 67.39 | 140.30 |
| 572 | ti | 0.18 | 70.56 | 175.09 | 0.20 | 74.01 | 154.85 |
| 573 | ba | 0.23 | 75.81 | 184.72 | 0.21 | 78.33 | 156.50 |
| 574 | de | 0.07 | 72.41 | 172.87 | 0.10 | 72.40 | 142.13 |
| 575 | ngan | 0.20 | 71.39 | 171.56 | 0.18 | 71.07 | 130.83 |
| 576 | se | 0.16 | 64.63 | 178.30 | 0.13 | 63.05 | 128.02 |
| 577 | la | 0.17 | 70.22 | 101.21 | 0.11 | 73.45 | 156.98 |
| 578 | mat | 0.20 | 66.26 | 187.05 | 0.28 | 66.93 | 144.38 |
| 579 | di | 0.15 | 67.71 | 158.64 | 0.19 | 63.19 | 137.78 |
| 580 | te | 0.12 | 68.02 | 164.64 | 0.15 | 66.47 | 142.06 |
| 581 | bing | 0.19 | 71.32 | 170.08 | 0.21 | 70.04 | 131.64 |
| 582 | su | 0.18 | 65.59 | 176.23 | 0.17 | 59.46 | 128.92 |
| 583 | ngai | 0.27 | 68.21 | 160.03 | 0.20 | 61.43 | 111.39 |
| 584 | be | 0.15 | 75.15 | 171.03 | 0.19 | 67.62 | 184.57 |
| 585 | be | 0.05 | 78.51 | 187.27 | 0.16 | 73.44 | 185.47 |
| 586 | ra | 0.23 | 74.51 | 187.50 | 0.22 | 69.54 | 177.96 |
| 587 | pa | 0.07 | 75.80 | 226.10 | 0.10 | 76.44 | 173.56 |

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|---|---|---|---|---|---|---|---|
| 588 | ha | 0.16 | 77.68 | 200.92 | 0.19 | 72.55 | 141.00 |
| 589 | ri | 0.19 | 73.38 | 198.13 | 0.28 | 64.16 | 134.37 |
| 590 | ke | 0.09 | 71.01 | 192.38 | 0.07 | 65.87 | 124.46 |
| 591 | mu | 0.06 | 72.62 | 178.86 | 0.11 | 64.41 | 115.37 |
| 592 | di | 0.06 | 70.27 | 176.56 | 0.08 | 69.23 | 101.63 |
| 593 | an | 0.26 | 79.77 | 197.85 | 0.36 | 64.77 | 145.01 |
| 594 | se | 0.12 | 69.24 | 201.87 | 0.16 | 58.04 | 182.65 |
| 595 | o | 0.14 | 75.93 | 91.15 | 0.14 | 74.38 | 179.38 |
| 596 | rang | 0.14 | 77.88 | 187.21 | 0.30 | 77.97 | 190.78 |
| 597 | pem | 0.23 | 74.15 | 182.09 | 0.23 | 74.00 | 172.67 |
| 598 | bu | 0.12 | 74.58 | 170.32 | 0.13 | 71.25 | 138.10 |
| 599 | ru | 0.25 | 75.44 | 194.38 | 0.40 | 68.73 | 166.39 |
| 600 | me | 0.13 | 68.20 | 172.88 | 0.12 | 70.66 | 167.84 |
| 601 | li | 0.13 | 72.14 | 144.47 | 0.14 | 77.64 | 180.64 |
| 602 | hat | 0.19 | 76.54 | 154.62 | 0.31 | 69.82 | 192.25 |
| 603 | se | 0.18 | 68.86 | 134.16 | 0.18 | 62.25 | 247.85 |
| 604 | e | 0.14 | 64.58 | 154.45 | 0.22 | 71.88 | 214.41 |
| 605 | kor | 0.15 | 69.44 | 187.73 | 0.25 | 74.96 | 208.09 |
| 606 | mer | 0.20 | 69.04 | 170.51 | 0.19 | 65.81 | 158.93 |
| 607 | pa | 0.23 | 68.91 | 184.32 | 0.23 | 61.41 | 135.03 |
| 608 | ti | 0.25 | 69.97 | 193.18 | 0.28 | 63.98 | 142.10 |
| 609 | dan | 0.25 | 75.89 | 176.83 | 0.31 | 68.20 | 140.68 |
| 610 | i | 0.13 | 65.69 | 176.39 | 0.11 | 77.28 | 199.67 |
| 611 | ngin | 0.24 | 65.91 | 181.04 | 0.19 | 75.99 | 195.36 |
| 612 | me | 0.13 | 68.47 | 164.43 | 0.23 | 72.73 | 155.48 |
| 613 | nem | 0.18 | 72.47 | 166.32 | 0.21 | 77.50 | 151.96 |
| 614 | bak | 0.18 | 74.88 | 172.43 | 0.20 | 80.49 | 179.85 |
| 615 | nya | 0.38 | 66.56 | 152.24 | 0.39 | 64.83 | 117.92 |
| 616 | na | 0.21 | 72.97 | 165.58 | 0.25 | 71.42 | 129.50 |
| 617 | mun | 0.30 | 69.56 | 247.21 | 0.41 | 67.24 | 171.31 |
| 618 | se | 0.24 | 63.81 | 198.50 | 0.19 | 60.41 | 186.27 |
| 619 | mut | 0.28 | 71.41 | 203.45 | 0.28 | 70.06 | 197.80 |
| 620 | ter | 0.09 | 73.71 | 183.39 | 0.12 | 71.60 | 157.90 |
| 621 | li | 0.09 | 75.04 | 188.41 | 0.13 | 75.92 | 164.23 |
| 622 | hat | 0.31 | 75.94 | 152.17 | 0.32 | 68.56 | 169.58 |
| 623 | a | 0.22 | 67.60 | 167.90 | 0.24 | 62.78 | 150.81 |
| 624 | kan | 0.21 | 74.60 | 158.50 | 0.29 | 68.71 | 169.59 |
| 625 | per | 0.09 | 71.20 | 179.12 | 0.18 | 66.49 | 148.08 |
| 626 | la | 0.19 | 71.56 | 169.79 | 0.27 | 64.27 | 146.91 |
| 627 | ku | 0.05 | 77.72 | 192.45 | 0.08 | 65.70 | 175.96 |
| 628 | an | 0.16 | 72.18 | 186.83 | 0.29 | 69.71 | 164.64 |
| 629 | pem | 0.13 | 70.42 | 186.39 | 0.17 | 69.46 | 144.83 |
| 630 | bu | 0.19 | 70.14 | 177.91 | 0.12 | 68.63 | 142.25 |
| 631 | ru | 0.10 | 68.01 | 173.42 | 0.10 | 70.87 | 134.56 |
| 632 | i | 0.15 | 64.96 | 170.58 | 0.25 | 59.80 | 126.08 |
| 633 | tu | 0.28 | 65.95 | 136.61 | 0.16 | 58.57 | 103.28 |
| 634 | se | 0.20 | 59.79 | 182.13 | 0.14 | 56.49 | x |
| 635 | mut | 0.28 | 68.78 | 202.34 | 0.25 | 61.33 | 141.77 |
| 636 | pun | 0.18 | 77.75 | 198.46 | 0.12 | 69.66 | 142.74 |
| 637 | lan | 0.26 | 71.30 | 180.55 | 0.26 | 67.94 | 146.86 |
| 638 | tas | 0.17 | 77.87 | 199.82 | 0.24 | 65.78 | 166.23 |
| 639 | meng | 0.22 | 68.95 | 166.16 | 0.25 | 66.77 | 138.11 |
| 640 | gi | 0.15 | 68.12 | 175.37 | 0.19 | 70.49 | 165.09 |
| 641 | git | 0.25 | 69.69 | 187.67 | 0.25 | 72.44 | 206.35 |
| 642 | ka | 0.22 | 69.34 | 172.18 | 0.23 | 67.11 | 192.72 |
| 643 | ki | 0.14 | 72.95 | 196.37 | 0.15 | 70.94 | 185.50 |
| 644 | pem | 0.11 | 70.69 | 189.53 | 0.17 | 72.46 | 178.06 |
| 645 | bu | 0.17 | 72.21 | 182.87 | 0.16 | 76.44 | 183.68 |
| 646 | ru | 0.18 | 72.87 | 184.85 | 0.11 | 68.57 | 178.82 |
| 647 | i | 0.15 | 65.45 | 185.64 | 0.17 | 65.87 | 173.72 |
| 648 | tu | 0.36 | 70.26 | 209.11 | 0.26 | 65.87 | 220.24 |
| 649 | dan | 0.23 | 73.17 | 179.83 | 0.43 | 68.68 | 169.91 |
| 650 | tem | 0.08 | 74.15 | 182.11 | 0.14 | 79.66 | 199.43 |
| 651 | ba | 0.22 | 72.52 | 193.35 | 0.23 | 77.19 | 193.67 |
| 652 | kan | 0.18 | 72.99 | 179.70 | 0.17 | 74.98 | 184.31 |
| 653 | nya | 0.32 | 70.46 | 189.63 | 0.32 | 66.21 | 168.13 |
| 654 | ter | 0.06 | 71.66 | 82.17 | 0.24 | 75.79 | 163.42 |
| 655 | sa | 0.17 | 69.82 | 149.53 | 0.23 | 63.57 | 118.60 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 656 | sar | 0.38 | 68.27 | 168.60 | 0.37 | 64.46 | 114.75 |
| 657 | mer | 0.17 | 67.64 | 178.74 | 0.20 | 64.91 | 151.64 |
| 658 | pa | 0.24 | 68.34 | 183.18 | 0.21 | 65.34 | 157.58 |
| 659 | ti | 0.27 | 74.77 | 195.34 | 0.19 | 71.09 | 175.23 |
| 660 | yang | 0.38 | 69.56 | 185.23 | 0.38 | 70.12 | 151.98 |
| 661 | ter | 0.15 | 72.36 | 183.13 | 0.17 | 71.82 | 165.90 |
| 662 | de | 0.12 | 73.46 | 178.87 | 0.13 | 74.70 | 173.43 |
| 663 | ngar | 0.32 | 74.75 | 190.52 | 0.39 | 72.86 | 169.01 |
| 664 | je | 0.08 | 74.15 | 174.96 | 0.20 | 70.66 | 153.45 |
| 665 | ri | 0.17 | 69.55 | 165.68 | 0.26 | 64.49 | 149.86 |
| 666 | tan | 0.24 | 72.78 | 181.33 | 0.33 | 67.77 | 148.21 |
| 667 | pem | 0.15 | 72.07 | 176.58 | 0.15 | 70.63 | 152.48 |
| 668 | bu | 0.10 | 70.98 | 178.43 | 0.11 | 73.03 | 151.22 |
| 669 | ru | 0.18 | 72.69 | 186.66 | 0.19 | 70.57 | 146.78 |
| 670 | i | 0.15 | 65.85 | 186.96 | 0.22 | 63.26 | 190.19 |
| 671 | tu | 0.21 | 74.26 | 212.55 | 0.20 | 69.92 | 187.15 |
| 672 | se | 0.21 | 66.71 | 192.15 | 0.16 | 61.20 | 187.90 |
| 673 | ge | 0.07 | 73.48 | 186.19 | 0.19 | 74.47 | 166.68 |
| 674 | ra | 0.21 | 70.78 | 182.49 | 0.22 | 73.09 | 162.96 |
| 675 | ter | 0.22 | 71.16 | 186.84 | 0.20 | 70.24 | 187.09 |
| 676 | bang | 0.42 | 71.65 | 188.50 | 0.38 | 70.35 | 183.02 |
| 677 | ber | 0.09 | 72.98 | 177.99 | 0.13 | 72.83 | 145.22 |
| 678 | e | 0.21 | 75.09 | 210.15 | 0.26 | 69.42 | 206.53 |
| 679 | dar | 0.18 | 78.59 | 183.46 | 0.19 | 75.50 | 142.18 |
| 680 | da | 0.18 | 80.58 | 168.98 | 0.22 | 69.54 | 136.62 |
| 681 | ri | 0.11 | 73.76 | 168.55 | 0.09 | 67.14 | 131.73 |
| 682 | si | 0.20 | 68.94 | 171.10 | 0.28 | 58.61 | 132.03 |
| 683 | tu | 0.30 | 65.02 | 141.29 | 0.21 | 59.21 | 171.15 |

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data
## Male Storyteller 3 (Mst3)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.20 | 66.98 | 0.00 | 0.17 | 65.48 | x |
| 2 | a | 0.25 | 77.60 | 122.77 | 0.25 | 78.04 | 125.45 |
| 3 | tu | 0.15 | 79.12 | 170.17 | 0.10 | 79.32 | 223.89 |
| 4 | ma | 0.15 | 80.52 | 142.24 | 0.19 | 80.97 | 229.72 |
| 5 | sa | 0.28 | 75.79 | 127.78 | 0.22 | 80.73 | 175.23 |
| 6 | da | 0.19 | 75.88 | 109.33 | 0.13 | 83.57 | 131.61 |
| 7 | hu | 0.18 | 73.52 | 102.04 | 0.16 | 83.31 | 122.17 |
| 8 | lu | 0.32 | 65.75 | 153.12 | 0.43 | 75.55 | 150.83 |
| 9 | ting | 0.17 | 76.43 | 116.41 | 0.12 | 75.67 | 105.62 |
| 10 | gal | 0.25 | 84.00 | 138.23 | 0.25 | 80.72 | 143.53 |
| 11 | se | 0.14 | 72.19 | 127.48 | 0.10 | 72.01 | 0.00 |
| 12 | o | 0.08 | 79.03 | 113.17 | 0.10 | 79.57 | 155.43 |
| 13 | rang | 0.26 | 73.88 | 114.33 | 0.18 | 79.74 | 134.21 |
| 14 | pe | 0.17 | 69.63 | 388.80 | 0.16 | 73.49 | 130.56 |
| 15 | ta | 0.17 | 80.94 | 110.16 | 0.22 | 78.98 | 120.83 |
| 16 | ni | 0.38 | 77.21 | 126.73 | 0.34 | 74.47 | 110.18 |
| 17 | yang | 0.26 | 77.38 | 116.32 | 0.23 | 74.31 | 119.79 |
| 18 | me | 0.12 | 73.69 | 112.03 | 0.08 | 72.46 | 108.59 |
| 19 | me | 0.13 | 78.20 | 108.64 | 0.13 | 75.93 | 107.23 |
| 20 | li | 0.10 | 78.01 | 111.73 | 0.09 | 74.38 | 109.01 |
| 21 | ha | 0.30 | 73.89 | 115.02 | 0.23 | 80.83 | 124.08 |
| 22 | ra | 0.29 | 78.68 | 121.62 | 0.39 | 81.95 | 138.27 |
| 23 | se | 0.16 | 67.56 | 120.40 | 0.19 | 72.41 | 141.03 |
| 24 | e | 0.22 | 69.99 | 313.86 | 0.13 | 72.51 | 117.92 |
| 25 | kor | 0.15 | 74.57 | 194.24 | 0.11 | 79.96 | 129.54 |
| 26 | ang | 0.39 | 72.95 | 144.70 | 0.26 | 77.98 | 162.88 |
| 27 | sa | 0.30 | 65.55 | 352.69 | 0.35 | 77.87 | 232.17 |
| 28 | pa | 0.15 | 80.09 | 118.93 | 0.15 | 62.71 | 277.43 |
| 29 | da | 0.14 | 82.53 | 155.56 | 0.11 | 74.87 | 110.85 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 30 | su | 0.17 | 73.54 | 166.96 | 0.07 | 71.03 | 112.63 |
| 31 | a | 0.27 | 77.04 | 125.61 | 0.22 | 77.55 | 138.97 |
| 32 | tu | 0.13 | 77.37 | 123.20 | 0.06 | 81.46 | 149.75 |
| 33 | ha | 0.24 | 75.51 | 118.03 | 0.21 | 81.91 | 139.55 |
| 34 | ri | 0.33 | 74.68 | 110.46 | 0.28 | 78.38 | 208.27 |
| 35 | ke | 0.16 | 74.18 | 119.20 | 0.09 | 76.52 | 117.92 |
| 36 | ti | 0.17 | 71.79 | 128.81 | 0.07 | 69.74 | 157.72 |
| 37 | ka | 0.11 | 77.49 | 154.70 | 0.11 | 78.45 | 130.72 |
| 38 | i | 0.23 | 77.33 | 139.85 | 0.21 | 73.50 | 126.82 |
| 39 | tu | 0.48 | 74.53 | 186.63 | 0.23 | 86.87 | 301.16 |
| 40 | di | 0.14 | 78.90 | 122.46 | 0.07 | 78.53 | 324.77 |
| 41 | a | 0.19 | 80.77 | 141.32 | 0.15 | 82.48 | 134.86 |
| 42 | i | 0.09 | 79.01 | 128.41 | 0.11 | 80.14 | 139.56 |
| 43 | ngin | 0.44 | 82.11 | 163.49 | 0.37 | 83.79 | 141.85 |
| 44 | me | 0.15 | 74.65 | 118.64 | 0.13 | 78.97 | 127.53 |
| 45 | ngam | 0.30 | 80.06 | 124.39 | 0.16 | 80.40 | 120.12 |
| 46 | bil | 0.32 | 79.61 | 126.56 | 0.25 | 81.01 | 132.27 |
| 47 | te | 0.14 | 73.13 | 120.80 | 0.08 | 73.38 | 121.60 |
| 48 | lur | 0.16 | 78.56 | 113.65 | 0.21 | 80.40 | 124.62 |
| 49 | ang | 0.33 | 72.28 | 184.88 | 0.26 | 76.77 | 133.28 |
| 50 | sa | 0.34 | 73.81 | 128.36 | 0.30 | 78.85 | 179.60 |
| 51 | nya | 0.26 | 75.16 | 109.56 | 0.28 | 78.34 | 140.15 |
| 52 | si | 0.31 | 74.02 | 128.24 | 0.20 | 67.88 | 106.33 |
| 53 | pe | 0.17 | 72.98 | 130.40 | 0.12 | 68.06 | 101.86 |
| 54 | ta | 0.21 | 85.23 | 133.85 | 0.15 | 81.51 | 119.88 |
| 55 | ni | 0.37 | 77.63 | 143.48 | 0.44 | 81.99 | 195.40 |
| 56 | men | 0.23 | 80.72 | 126.90 | 0.12 | 74.13 | 110.69 |
| 57 | da | 0.19 | 77.01 | 131.46 | 0.21 | 77.51 | 113.18 |
| 58 | pa | 0.17 | 79.44 | 140.67 | 0.23 | 74.93 | 134.41 |
| 59 | ti | 0.37 | 73.91 | 141.39 | 0.22 | 73.19 | 174.74 |
| 60 | te | 0.11 | 79.20 | 125.18 | 0.09 | 76.49 | 152.41 |
| 61 | lur | 0.27 | 81.38 | 149.76 | 0.15 | 85.53 | 138.45 |
| 62 | i | 0.24 | 72.10 | 147.50 | 0.21 | 77.11 | 133.40 |
| 63 | tu | 0.36 | 76.71 | 142.38 | 0.17 | 75.61 | 186.55 |
| 64 | ke | 0.10 | 75.03 | 114.27 | 0.09 | 68.32 | 191.51 |
| 65 | li | 0.09 | 74.54 | 107.51 | 0.12 | 78.51 | 169.66 |
| 66 | ha | 0.29 | 74.65 | 123.95 | 0.11 | 78.66 | 176.82 |
| 67 | tan | 0.24 | 76.07 | 126.66 | 0.20 | 76.71 | 184.73 |
| 68 | a | 0.18 | 74.78 | 140.17 | 0.13 | 78.48 | 233.70 |
| 69 | neh | 0.26 | 75.15 | 198.18 | 0.25 | 77.55 | 174.24 |
| 70 | war | 0.22 | 79.13 | 118.98 | 0.11 | 73.30 | 112.20 |
| 71 | na | 0.20 | 84.39 | 136.21 | 0.12 | 83.02 | 133.40 |
| 72 | nya | 0.50 | 79.65 | 164.76 | 0.26 | 78.48 | 217.20 |
| 73 | ku | 0.17 | 80.99 | 155.13 | 0.12 | 78.72 | 177.70 |
| 74 | ning | 0.26 | 80.78 | 181.24 | 0.20 | 81.48 | 188.49 |
| 75 | ke | 0.15 | 72.14 | 122.23 | 0.07 | 74.78 | 183.17 |
| 76 | e | 0.09 | 73.29 | 111.74 | 0.09 | 77.83 | 186.66 |
| 77 | ma | 0.15 | 78.62 | 124.96 | 0.19 | 77.78 | 207.56 |
| 78 | san | 0.45 | 75.47 | 143.96 | 0.47 | 72.10 | 152.39 |
| 79 | dan | 0.26 | 80.54 | 122.50 | 0.25 | 80.98 | 137.51 |
| 80 | be | 0.15 | 77.37 | 110.38 | 0.63 | 86.70 | 231.11 |
| 81 | rat | 0.32 | 75.74 | 116.18 | 0.47 | 77.61 | 219.69 |
| 82 | di | 0.34 | 81.56 | 121.18 | 0.07 | 71.25 | 100.09 |
| 83 | a | 0.34 | 67.50 | 165.86 | 0.16 | 73.08 | 108.44 |
| 84 | me | 0.12 | 81.60 | 159.18 | 0.07 | 79.39 | 123.73 |
| 85 | nyang | 0.40 | 79.84 | 168.68 | 0.17 | 81.26 | 136.93 |
| 86 | ka | 0.41 | 74.81 | 153.78 | 0.40 | 78.33 | 143.28 |
| 87 | ji | 0.12 | 78.27 | 120.47 | 0.14 | 76.17 | 111.87 |
| 88 | ran | 0.30 | 83.24 | 132.94 | 0.25 | 83.21 | 129.43 |
| 89 | nya | 0.39 | 80.69 | 151.70 | 0.15 | 83.72 | 126.32 |
| 90 | cu | 0.30 | 74.34 | 137.64 | 0.16 | 77.67 | 133.62 |
| 91 | ba | 0.23 | 80.50 | 127.47 | 0.26 | 79.24 | 161.70 |
| 92 | ber | 0.22 | 76.23 | 111.82 | 0.15 | 81.62 | 153.78 |
| 93 | gu | 0.13 | 78.38 | 136.83 | 0.11 | 83.89 | 168.30 |
| 94 | rau | 0.43 | 80.51 | 125.13 | 0.30 | 81.33 | 168.26 |
| 95 | la | 0.21 | 80.00 | 121.48 | 0.17 | 73.65 | 105.89 |
| 96 | lu | 0.17 | 80.34 | 126.78 | 0.28 | 82.02 | 121.85 |
| 97 | ber | 0.21 | 74.91 | 111.10 | 0.12 | 79.39 | 121.60 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 98 | ca | 0.27 | 76.34 | 132.64 | 0.24 | 78.30 | 128.88 |
| 99 | dang | 0.41 | 79.31 | 149.19 | 0.22 | 82.02 | 207.33 |
| 100 | un | 0.23 | 75.64 | 129.64 | 0.08 | 79.64 | 157.25 |
| 101 | tuk | 0.18 | 76.91 | 129.11 | 0.19 | 77.37 | 156.44 |
| 102 | mem | 0.28 | 78.85 | 120.79 | 0.16 | 83.03 | 138.76 |
| 103 | bu | 0.12 | 80.98 | 133.72 | 0.15 | 81.94 | 145.87 |
| 104 | ang | 0.47 | 80.45 | 138.71 | 0.31 | 82.42 | 196.54 |
| 105 | te | 0.10 | 72.15 | 197.50 | 0.14 | 72.60 | 163.58 |
| 106 | lur | 0.23 | 77.83 | 118.91 | 0.12 | 79.70 | 112.29 |
| 107 | i | 0.24 | 74.76 | 143.37 | 0.20 | 69.32 | 104.37 |
| 108 | tu | 0.24 | 71.30 | 174.64 | 0.14 | 64.17 | 90.98 |
| 109 | na | 0.22 | 79.81 | 148.13 | 0.21 | 74.13 | 104.20 |
| 110 | mun | 0.41 | 78.24 | 164.73 | 0.21 | 85.39 | 189.38 |
| 111 | se | 0.14 | 66.99 | 127.35 | 0.19 | 76.38 | 203.23 |
| 112 | le | 0.23 | 72.75 | 122.07 | 0.10 | 73.04 | 173.81 |
| 113 | pas | 0.19 | 78.93 | 165.75 | 0.16 | 78.27 | 164.93 |
| 114 | ber | 0.15 | 76.88 | 139.39 | 0.08 | 78.75 | 141.30 |
| 115 | fi | 0.31 | 70.87 | 149.51 | 0.27 | 77.30 | 128.03 |
| 116 | kir | 0.43 | 74.73 | 123.41 | 0.34 | 78.97 | 151.20 |
| 117 | di | 0.09 | 79.18 | 127.06 | 0.06 | 66.88 | 97.66 |
| 118 | a | 0.15 | 85.00 | 153.17 | 0.09 | 75.40 | 111.58 |
| 119 | mem | 0.25 | 84.79 | 139.73 | 0.26 | 77.48 | 112.33 |
| 120 | ba | 0.21 | 87.08 | 138.38 | 0.21 | 83.98 | 133.44 |
| 121 | wa | 0.56 | 80.24 | 170.50 | 0.39 | 82.41 | 195.08 |
| 122 | te | 0.07 | 77.49 | 136.84 | 0.10 | 75.15 | 161.33 |
| 123 | lur | 0.29 | 80.71 | 128.57 | 0.19 | 83.80 | 139.18 |
| 124 | i | 0.26 | 72.73 | 138.68 | 0.25 | 77.09 | 139.27 |
| 125 | tu | 0.36 | 75.75 | 161.04 | 0.29 | 81.55 | 263.93 |
| 126 | pu | 0.12 | 81.31 | 160.98 | 0.08 | 83.03 | 155.50 |
| 127 | lang | 0.43 | 79.81 | 122.47 | 0.24 | 84.04 | 204.67 |
| 128 | ke | 0.14 | 73.27 | 112.59 | 0.16 | 79.84 | 244.52 |
| 129 | ru | 0.12 | 83.80 | 130.87 | 0.10 | 83.98 | 134.25 |
| 130 | mah | 0.35 | 78.73 | 138.14 | 0.39 | 77.53 | 138.86 |
| 131 | un | 0.21 | 76.87 | 126.23 | 0.22 | 75.11 | 125.85 |
| 132 | tuk | 0.22 | 73.64 | 177.29 | 0.11 | 77.14 | 128.57 |
| 133 | di | 0.24 | 71.68 | 114.24 | 0.08 | 73.78 | 114.23 |
| 134 | pe | 0.12 | 74.34 | 107.44 | 0.14 | 66.68 | 113.54 |
| 135 | rik | 0.15 | 77.69 | 139.76 | 0.13 | 74.34 | 116.13 |
| 136 | sa | 0.39 | 69.89 | 89.27 | 0.33 | 69.15 | 98.93 |
| 137 | si | 0.30 | 74.86 | 132.60 | 0.22 | 69.67 | 107.33 |
| 138 | pe | 0.17 | 73.16 | 129.59 | 0.12 | 68.37 | 0.00 |
| 139 | ta | 0.18 | 84.65 | 147.55 | 0.13 | 79.72 | 116.61 |
| 140 | ni | 0.48 | 75.10 | 180.07 | 0.25 | 82.25 | 128.34 |
| 141 | be | 0.13 | 76.58 | 122.23 | 0.05 | 79.29 | 162.42 |
| 142 | ra | 0.19 | 83.71 | 142.39 | 0.09 | 79.14 | 159.58 |
| 143 | sa | 0.31 | 73.86 | 143.54 | 0.19 | 75.03 | 178.31 |
| 144 | ter | 0.13 | 72.70 | 129.52 | 0.16 | 71.76 | 190.59 |
| 145 | ke | 0.15 | 77.43 | 172.72 | 0.15 | 74.52 | 244.66 |
| 146 | jut | 0.30 | 76.13 | 126.85 | 0.20 | 78.34 | 152.00 |
| 147 | a | 0.19 | 69.57 | 155.39 | 0.15 | 64.47 | 114.70 |
| 148 | pa | 0.15 | 78.85 | 125.43 | 0.09 | 79.62 | 119.57 |
| 149 | bi | 0.16 | 81.02 | 151.22 | 0.17 | 76.49 | 115.74 |
| 150 | la | 0.41 | 82.33 | 167.36 | 0.10 | 81.25 | 140.60 |
| 151 | men | 0.15 | 75.10 | 121.17 | 0.09 | 82.05 | 187.49 |
| 152 | da | 0.26 | 76.96 | 123.75 | 0.13 | 82.68 | 162.23 |
| 153 | pa | 0.30 | 74.11 | 151.06 | 0.15 | 77.99 | 144.83 |
| 154 | ti | 0.44 | 78.88 | 165.88 | 0.53 | 72.53 | 153.91 |
| 155 | i | 0.23 | 74.03 | 143.02 | 0.17 | 69.74 | 120.14 |
| 156 | tu | 0.24 | 77.22 | 185.10 | 0.14 | 77.07 | 214.79 |
| 157 | a | 0.15 | 78.63 | 129.13 | 0.17 | 78.29 | 198.64 |
| 158 | da | 0.16 | 79.95 | 127.07 | 0.11 | 82.54 | 148.06 |
| 159 | lah | 0.23 | 78.27 | 128.91 | 0.21 | 75.80 | 141.89 |
| 160 | te | 0.12 | 74.63 | 122.37 | 0.07 | 76.94 | 169.10 |
| 161 | lur | 0.34 | 72.17 | 253.96 | 0.17 | 80.84 | 179.19 |
| 162 | e | 0.13 | 78.34 | 153.91 | 0.17 | 81.87 | 242.45 |
| 163 | mas | 0.52 | 70.96 | 118.20 | 0.35 | 73.88 | 245.25 |
| 164 | si | 0.32 | 70.56 | 171.06 | 0.21 | 66.58 | 101.83 |
| 165 | pe | 0.18 | 72.19 | 128.85 | 0.15 | 69.48 | 108.60 |

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|---|---|---|---|---|---|---|---|
| 166 | ta | 0.20 | 83.30 | 151.17 | 0.12 | 79.41 | 145.59 |
| 167 | ni | 0.37 | 76.96 | 167.43 | 0.18 | 81.74 | 239.30 |
| 168 | sung | 0.29 | 73.62 | 152.22 | 0.21 | 77.85 | 256.53 |
| 169 | guh | 0.33 | 77.29 | 131.02 | 0.10 | 83.17 | 254.85 |
| 170 | gem | 0.22 | 78.43 | 120.51 | 0.13 | 79.19 | 261.19 |
| 171 | bi | 0.19 | 82.84 | 146.68 | 0.17 | 87.58 | 269.82 |
| 172 | ra | 0.39 | 73.23 | 113.85 | 0.27 | 80.53 | 199.76 |
| 173 | ha | 0.15 | 82.95 | 149.10 | 0.20 | 65.94 | 441.80 |
| 174 | ri | 0.34 | 77.25 | 192.12 | 0.14 | 81.84 | 129.29 |
| 175 | de | 0.16 | 81.79 | 160.77 | 0.08 | 83.70 | 143.09 |
| 176 | mi | 0.22 | 78.94 | 159.79 | 0.18 | 88.20 | 154.26 |
| 177 | ha | 0.31 | 80.62 | 159.61 | 0.13 | 84.86 | 158.02 |
| 178 | ri | 0.38 | 76.12 | 133.05 | 0.27 | 82.05 | 169.88 |
| 179 | se | 0.12 | 68.59 | 140.65 | 0.16 | 69.53 | 191.53 |
| 180 | le | 0.19 | 71.15 | 138.30 | 0.18 | 76.96 | 156.02 |
| 181 | pas | 0.23 | 76.06 | 126.31 | 0.16 | 74.69 | 162.07 |
| 182 | i | 0.18 | 71.96 | 157.68 | 0.18 | 65.97 | 159.93 |
| 183 | tu | 0.37 | 75.03 | 170.83 | 0.34 | 71.45 | 150.46 |
| 184 | si | 0.16 | 73.17 | 131.92 | 0.09 | 72.48 | 151.40 |
| 185 | ang | 0.29 | 80.46 | 144.14 | 0.18 | 79.74 | 145.19 |
| 186 | sa | 0.57 | 80.62 | 161.00 | 0.38 | 79.21 | 180.37 |
| 187 | te | 0.08 | 78.86 | 170.83 | 0.61 | 87.67 | 249.30 |
| 188 | rus | 0.40 | 78.07 | 202.63 | 0.30 | 79.93 | 270.38 |
| 189 | ber | 0.26 | 71.97 | 158.35 | 0.15 | 77.94 | 136.58 |
| 190 | te | 0.12 | 73.14 | 214.75 | 0.09 | 73.73 | 139.96 |
| 191 | lur | 0.26 | 79.06 | 125.68 | 0.20 | 78.71 | 119.45 |
| 192 | e | 0.11 | 75.88 | 149.89 | 0.09 | 75.17 | 112.69 |
| 193 | mas | 0.47 | 71.92 | 141.80 | 0.29 | 69.04 | 97.81 |
| 194 | si | 0.30 | 72.79 | 127.06 | 0.13 | 66.46 | 121.20 |
| 195 | pe | 0.17 | 72.99 | 132.37 | 0.12 | 68.53 | 0.00 |
| 196 | ta | 0.22 | 82.00 | 153.23 | 0.13 | 78.13 | 115.71 |
| 197 | ni | 0.36 | 75.25 | 176.57 | 0.31 | 80.55 | 210.56 |
| 198 | mu | 0.19 | 79.76 | 147.08 | 0.11 | 81.19 | 135.82 |
| 199 | la | 0.26 | 82.18 | 146.09 | 0.17 | 85.35 | 131.32 |
| 200 | men | 0.13 | 77.56 | 103.93 | 0.08 | 81.99 | 116.99 |
| 201 | ja | 0.23 | 79.25 | 117.07 | 0.11 | 79.19 | 106.95 |
| 202 | di | 0.30 | 74.87 | 130.71 | 0.11 | 74.68 | 96.36 |
| 203 | ta | 0.21 | 76.38 | 171.59 | 0.16 | 69.39 | 90.38 |
| 204 | mak | 0.24 | 75.80 | 150.55 | 0.25 | 63.67 | 83.50 |
| 205 | si | 0.34 | 73.93 | 128.18 | 0.21 | 70.86 | 106.14 |
| 206 | pe | 0.16 | 72.16 | 125.67 | 0.12 | 71.28 | 102.30 |
| 207 | ta | 0.19 | 82.39 | 151.58 | 0.14 | 78.46 | 111.03 |
| 208 | ni | 0.38 | 77.14 | 178.10 | 0.34 | 78.72 | 208.68 |
| 209 | me | 0.12 | 78.76 | 147.49 | 0.12 | 73.26 | 102.55 |
| 210 | ngam | 0.40 | 82.88 | 153.36 | 0.15 | 75.52 | 113.42 |
| 211 | bil | 0.27 | 81.47 | 190.05 | 0.18 | 76.27 | 116.60 |
| 212 | pi | 0.14 | 73.14 | 224.14 | 0.10 | 73.15 | 117.93 |
| 213 | sau | 0.62 | 78.47 | 162.28 | 0.42 | 78.64 | 141.59 |
| 214 | dan | 0.29 | 81.79 | 134.33 | 0.18 | 84.79 | 122.57 |
| 215 | me | 0.13 | 80.87 | 123.43 | 0.08 | 87.17 | 134.33 |
| 216 | nyem | 0.27 | 76.67 | 119.52 | 0.26 | 86.30 | 130.74 |
| 217 | be | 0.20 | 79.72 | 128.93 | 0.10 | 86.00 | 196.86 |
| 218 | lih | 0.29 | 79.99 | 257.53 | 0.34 | 83.46 | 236.84 |
| 219 | ang | 0.17 | 77.94 | 129.09 | 0.16 | 79.55 | 124.11 |
| 220 | sa | 0.32 | 75.95 | 127.81 | 0.16 | 76.74 | 123.85 |
| 221 | ber | 0.26 | 69.87 | 156.75 | 0.18 | 73.41 | 101.53 |
| 222 | tu | 0.12 | 76.05 | 129.82 | 0.07 | 73.11 | 103.95 |
| 223 | ah | 0.23 | 77.58 | 144.42 | 0.17 | 72.07 | 95.23 |
| 224 | nya | 0.32 | 73.85 | 130.00 | 0.24 | 62.75 | 162.37 |
| 225 | a | 0.21 | 66.60 | 112.43 | 0.17 | 63.70 | 93.81 |
| 226 | pa | 0.16 | 80.59 | 133.46 | 0.06 | 76.07 | 113.10 |
| 227 | bi | 0.15 | 80.62 | 170.78 | 0.18 | 79.57 | 114.02 |
| 228 | la | 0.28 | 80.58 | 200.77 | 0.25 | 85.22 | 186.18 |
| 229 | men | 0.21 | 81.09 | 179.48 | 0.15 | 82.05 | 194.50 |
| 230 | da | 0.28 | 81.04 | 155.94 | 0.16 | 81.60 | 160.68 |
| 231 | pa | 0.24 | 74.76 | 163.14 | 0.26 | 76.66 | 158.12 |
| 232 | ti | 0.30 | 70.83 | 177.76 | 0.32 | 77.80 | 121.25 |
| 233 | ti | 0.07 | 80.13 | 143.80 | 0.03 | 79.43 | 130.50 |

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|---|---|---|---|---|---|---|---|
| 234 | a | 0.24 | 81.55 | 165.44 | 0.17 | 82.27 | 125.78 |
| 235 | da | 0.14 | 82.65 | 186.28 | 0.10 | 83.35 | 140.61 |
| 236 | se | 0.30 | 78.67 | 169.78 | 0.14 | 77.55 | 138.86 |
| 237 | bi | 0.18 | 81.20 | 141.42 | 0.25 | 83.69 | 119.66 |
| 238 | ji | 0.39 | 72.63 | 170.39 | 0.33 | 79.58 | 262.28 |
| 239 | pun | 0.36 | 77.61 | 176.23 | 0.24 | 79.17 | 277.62 |
| 240 | te | 0.10 | 79.53 | 139.96 | 0.08 | 79.33 | 151.57 |
| 241 | lur | 0.27 | 81.98 | 150.26 | 0.21 | 83.20 | 139.90 |
| 242 | e | 0.14 | 78.38 | 148.36 | 0.11 | 80.41 | 150.06 |
| 243 | mas | 0.38 | 76.95 | 155.13 | 0.42 | 76.23 | 124.51 |
| 244 | di | 0.19 | 75.54 | 126.50 | 0.12 | 76.61 | 121.94 |
| 245 | da | 0.17 | 82.98 | 139.44 | 0.12 | 83.85 | 123.14 |
| 246 | lam | 0.19 | 81.65 | 145.04 | 0.22 | 80.27 | 151.71 |
| 247 | pe | 0.14 | 69.01 | 147.32 | 0.04 | 73.50 | 162.70 |
| 248 | rut | 0.18 | 77.88 | 153.01 | 0.14 | 79.22 | 153.05 |
| 249 | ang | 0.26 | 75.92 | 204.34 | 0.14 | 79.55 | 130.78 |
| 250 | sa | 0.36 | 76.55 | 159.60 | 0.24 | 78.26 | 120.98 |
| 251 | i | 0.17 | 79.11 | 148.45 | 0.25 | 69.66 | 108.04 |
| 252 | tu | 0.44 | 74.01 | 149.82 | 0.27 | 75.87 | 198.81 |
| 253 | si | 0.24 | 72.51 | 126.17 | 0.18 | 69.49 | 118.67 |
| 254 | pe | 0.18 | 70.64 | 129.51 | 0.11 | 69.42 | 0.00 |
| 255 | ta | 0.17 | 82.14 | 148.22 | 0.11 | 78.69 | 114.82 |
| 256 | ni | 0.39 | 77.04 | 168.98 | 0.26 | 79.74 | 183.79 |
| 257 | mu | 0.16 | 79.21 | 162.13 | 0.13 | 84.17 | 138.58 |
| 258 | la | 0.35 | 84.18 | 129.13 | 0.25 | 84.90 | 214.38 |
| 259 | me | 0.15 | 76.85 | 109.60 | 0.10 | 86.55 | 161.64 |
| 260 | nye | 0.19 | 75.28 | 108.21 | 0.19 | 84.92 | 136.14 |
| 261 | da | 0.26 | 81.33 | 146.42 | 0.19 | 85.56 | 125.34 |
| 262 | ri | 0.29 | 73.70 | 168.36 | 0.33 | 79.20 | 129.21 |
| 263 | ke | 0.10 | 72.55 | 246.32 | 0.07 | 70.13 | 121.43 |
| 264 | si | 0.12 | 73.12 | 130.43 | 0.12 | 71.72 | 120.20 |
| 265 | la | 0.28 | 74.64 | 116.48 | 0.20 | 74.19 | 105.80 |
| 266 | pan | 0.16 | 81.93 | 154.92 | 0.18 | 76.18 | 105.71 |
| 267 | nya | 0.40 | 76.79 | 154.87 | 0.32 | 78.70 | 226.59 |
| 268 | dan | 0.31 | 82.26 | 163.82 | 0.18 | 83.22 | 126.78 |
| 269 | be | 0.12 | 77.74 | 115.08 | 0.08 | 82.96 | 125.40 |
| 270 | ra | 0.19 | 83.08 | 138.90 | 0.12 | 83.49 | 129.21 |
| 271 | sa | 0.54 | 76.19 | 149.97 | 0.41 | 75.05 | 165.45 |
| 272 | sa | 0.20 | 73.70 | 129.44 | 0.74 | 81.16 | 247.61 |
| 273 | ngat | 0.23 | 78.63 | 132.84 | 0.41 | 85.37 | 280.39 |
| 274 | me | 0.13 | 71.97 | 119.69 | 0.09 | 77.95 | 198.90 |
| 275 | nye | 0.13 | 82.64 | 126.47 | 0.16 | 82.18 | 122.21 |
| 276 | sal | 0.40 | 73.78 | 131.30 | 0.43 | 68.46 | 97.10 |
| 277 | su | 0.20 | 67.37 | 155.40 | 0.15 | 66.95 | x |
| 278 | a | 0.30 | 79.41 | 158.60 | 0.26 | 64.79 | 94.26 |
| 279 | tu | 0.21 | 77.06 | 200.33 | 0.22 | 79.80 | 250.09 |
| 280 | ha | 0.27 | 78.83 | 177.23 | 0.18 | 81.00 | 144.07 |
| 281 | ri | 0.39 | 77.14 | 144.43 | 0.48 | 75.51 | 168.89 |
| 282 | se | 0.28 | 71.51 | 134.40 | 0.20 | 64.94 | 102.90 |
| 283 | e | 0.25 | 72.31 | 142.55 | 0.25 | 68.61 | 98.57 |
| 284 | kor | 0.28 | 76.87 | 200.80 | 0.21 | 78.36 | 173.94 |
| 285 | an | 0.30 | 81.01 | 157.94 | 0.28 | 81.90 | 130.40 |
| 286 | jing | 0.55 | 75.57 | 150.19 | 0.46 | 76.66 | 160.95 |
| 287 | ter | 0.17 | 74.53 | 124.27 | 0.19 | 72.74 | 106.15 |
| 288 | jum | 0.46 | 74.26 | 137.34 | 0.35 | 77.21 | 137.94 |
| 289 | pa | 0.48 | 75.12 | 184.72 | 0.22 | 84.10 | 157.79 |
| 290 | se | 0.28 | 68.61 | 136.10 | 0.24 | 74.94 | 138.73 |
| 291 | ke | 0.21 | 73.66 | 151.22 | 0.21 | 68.27 | 113.91 |
| 292 | tul | 0.30 | 79.69 | 139.05 | 0.21 | 74.90 | 108.86 |
| 293 | da | 0.20 | 83.95 | 164.58 | 0.15 | 82.97 | 155.36 |
| 294 | ging | 0.42 | 72.10 | 121.34 | 0.43 | 75.26 | 149.24 |
| 295 | di | 0.22 | 71.31 | 125.69 | 0.13 | 68.99 | 127.14 |
| 296 | a | 0.62 | 79.74 | 185.49 | 0.26 | 81.63 | 144.26 |
| 297 | meng | 0.27 | 81.64 | 129.85 | 0.18 | 82.35 | 155.68 |
| 298 | gong | 0.33 | 81.12 | 129.10 | 0.25 | 86.49 | 136.89 |
| 299 | gong | 0.33 | 83.48 | 147.23 | 0.48 | 78.76 | 170.84 |
| 300 | da | 0.17 | 80.26 | 119.59 | 0.21 | 75.94 | 137.06 |
| 301 | ging | 0.22 | 77.21 | 118.56 | 0.18 | 71.97 | 117.23 |

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| 302 | i | 0.30 | 72.99 | 158.61 | 0.20 | 54.63 | 107.68 |
| 303 | tu | 0.50 | 71.14 | 181.03 | 0.37 | 68.22 | 111.60 |
| 304 | di | 0.20 | 76.37 | 124.23 | 0.19 | 72.52 | 110.30 |
| 305 | mu | 0.29 | 83.13 | 159.63 | 0.15 | 83.31 | 124.08 |
| 306 | lut | 0.41 | 74.99 | 189.14 | 0.42 | 74.98 | 134.51 |
| 307 | un | 0.31 | 72.39 | 165.73 | 0.24 | 66.50 | 115.13 |
| 308 | tuk | 0.19 | 77.54 | 218.43 | 0.15 | 77.85 | 172.08 |
| 309 | me | 0.20 | 78.63 | 130.54 | 0.13 | 79.97 | 139.84 |
| 310 | ma | 0.24 | 76.14 | 136.58 | 0.29 | 78.06 | 127.93 |
| 311 | kan | 0.22 | 79.60 | 160.02 | 0.24 | 79.98 | 124.73 |
| 312 | nya | 0.55 | 78.89 | 156.97 | 0.40 | 73.50 | 112.72 |
| 313 | di | 0.20 | 66.76 | 117.26 | 0.18 | 68.01 | 112.57 |
| 314 | tem | 0.29 | 73.57 | 142.41 | 0.26 | 66.56 | 122.73 |
| 315 | pat | 0.27 | 76.45 | 145.18 | 0.23 | 74.75 | 126.69 |
| 316 | yang | 0.32 | 77.41 | 127.09 | 0.19 | 74.24 | 112.83 |
| 317 | se | 0.17 | 73.70 | 127.34 | 0.09 | 69.27 | 103.48 |
| 318 | la | 0.19 | 82.16 | 150.30 | 0.18 | 70.76 | 93.59 |
| 319 | mat | 0.42 | 68.56 | 111.52 | 0.18 | 64.81 | 86.00 |
| 320 | da | 0.23 | 76.71 | 147.28 | 0.15 | 67.97 | 164.87 |
| 321 | lam | 0.19 | 80.13 | 217.50 | 0.20 | 81.92 | 165.57 |
| 322 | per | 0.21 | 75.74 | 174.42 | 0.13 | 78.36 | 203.77 |
| 323 | ja | 0.18 | 85.02 | 149.20 | 0.11 | 83.89 | 169.28 |
| 324 | la | 0.17 | 85.35 | 165.72 | 0.21 | 86.35 | 143.15 |
| 325 | nan | 0.55 | 75.69 | 143.39 | 0.40 | 75.56 | 135.14 |
| 326 | di | 0.18 | 71.07 | 126.60 | 0.06 | 73.07 | 117.87 |
| 327 | a | 0.23 | 83.03 | 146.85 | 0.09 | 80.17 | 113.64 |
| 328 | la | 0.26 | 82.10 | 159.23 | 0.30 | 80.65 | 150.08 |
| 329 | lu | 0.48 | 69.52 | 178.09 | 0.19 | 79.37 | 240.08 |
| 330 | di | 0.19 | 71.61 | 126.15 | 0.19 | 74.69 | 198.13 |
| 331 | te | 0.24 | 72.48 | 153.92 | 0.23 | 72.75 | 182.69 |
| 332 | pi | 0.44 | 72.88 | 154.53 | 0.37 | 78.40 | 256.11 |
| 333 | a | 0.18 | 75.89 | 130.53 | 0.16 | 69.92 | 143.41 |
| 334 | nak | 0.15 | 77.97 | 143.45 | 0.21 | 72.12 | 111.08 |
| 335 | su | 0.30 | 71.63 | 165.01 | 0.24 | 75.56 | 122.09 |
| 336 | ngai | 0.45 | 73.13 | 117.10 | 0.29 | 67.20 | 101.98 |
| 337 | se | 0.20 | 69.61 | 131.05 | 0.15 | 67.53 | 103.13 |
| 338 | ma | 0.19 | 84.87 | 139.09 | 0.13 | 74.91 | 113.18 |
| 339 | sa | 0.28 | 78.72 | 198.33 | 0.22 | 80.55 | 212.77 |
| 340 | ber | 0.24 | 76.35 | 181.53 | 0.14 | 85.71 | 197.09 |
| 341 | ja | 0.20 | 85.64 | 166.05 | 0.25 | 84.47 | 154.63 |
| 342 | lan | 0.54 | 75.16 | 145.64 | 0.49 | 74.85 | 108.08 |
| 343 | an | 0.20 | 79.21 | 138.78 | 0.21 | 72.89 | 114.53 |
| 344 | jing | 0.22 | 79.13 | 153.86 | 0.17 | 82.12 | 131.14 |
| 345 | i | 0.24 | 72.53 | 157.97 | 0.16 | 75.28 | 125.91 |
| 346 | tu | 0.47 | 74.68 | 173.05 | 0.12 | 79.11 | 141.71 |
| 347 | me | 0.14 | 81.45 | 128.82 | 0.11 | 83.69 | 134.73 |
| 348 | li | 0.30 | 84.40 | 145.03 | 0.18 | 81.50 | 123.35 |
| 349 | hat | 0.45 | 73.84 | 157.06 | 0.26 | 75.78 | 130.47 |
| 350 | ke | 0.15 | 70.88 | 121.51 | 0.16 | 69.83 | 113.79 |
| 351 | da | 0.11 | 82.46 | 126.74 | 0.10 | 80.36 | 116.39 |
| 352 | lam | 0.21 | 82.69 | 129.33 | 0.22 | 76.74 | 125.78 |
| 353 | a | 0.32 | 77.82 | 149.78 | 0.14 | 75.20 | 184.51 |
| 354 | ir | 0.35 | 70.68 | 103.00 | 0.45 | 70.07 | 186.79 |
| 355 | a | 0.24 | 77.25 | 147.31 | 0.24 | 64.79 | 96.92 |
| 356 | da | 0.22 | 83.45 | 205.33 | 0.12 | 85.49 | 168.65 |
| 357 | se | 0.18 | 75.27 | 193.70 | 0.13 | 80.40 | 224.47 |
| 358 | e | 0.25 | 75.45 | 149.40 | 0.22 | 79.40 | 190.68 |
| 359 | kor | 0.21 | 76.04 | 147.87 | 0.11 | 80.91 | 192.18 |
| 360 | an | 0.27 | 79.51 | 144.49 | 0.16 | 82.62 | 145.34 |
| 361 | jing | 0.59 | 74.78 | 115.90 | 0.12 | 86.26 | 154.00 |
| 362 | la | 0.25 | 77.94 | 140.26 | 0.20 | 86.64 | 147.43 |
| 363 | in | 0.55 | 75.21 | 158.88 | 0.66 | 78.69 | 181.23 |
| 364 | de | 0.17 | 78.71 | 128.89 | 0.20 | 75.83 | 114.41 |
| 365 | ngan | 0.24 | 83.79 | 133.79 | 0.20 | 85.39 | 141.73 |
| 366 | da | 0.26 | 82.20 | 143.83 | 0.18 | 83.05 | 133.44 |
| 367 | ging | 0.50 | 77.64 | 191.75 | 0.34 | 82.16 | 127.71 |
| 368 | di | 0.20 | 70.96 | 152.06 | 0.16 | 80.15 | 116.04 |
| 369 | mu | 0.26 | 84.00 | 128.11 | 0.14 | 83.25 | 125.73 |

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|---|---|---|---|---|---|---|---|
| 370 | lut | 0.18 | 80.75 | 275.85 | 0.19 | 80.72 | 174.78 |
| 371 | nya | 0.52 | 79.00 | 146.95 | 0.44 | 77.51 | 186.58 |
| 372 | di | 0.16 | 69.13 | 115.60 | 0.13 | 68.68 | 152.69 |
| 373 | da | 0.18 | 82.30 | 128.54 | 0.14 | 78.49 | 106.39 |
| 374 | lam | 0.37 | 79.56 | 138.09 | 0.10 | 76.61 | 103.89 |
| 375 | a | 0.19 | 76.42 | 117.58 | 0.09 | 73.64 | 97.82 |
| 376 | ir | 0.20 | 79.23 | 126.56 | 0.12 | 71.65 | 98.04 |
| 377 | i | 0.22 | 70.68 | 173.96 | 0.20 | 60.66 | 100.23 |
| 378 | tu | 0.30 | 66.92 | 128.05 | 0.19 | 52.43 | 89.85 |
| 379 | di | 0.15 | 75.52 | 129.75 | 0.17 | 63.47 | x |
| 380 | a | 0.35 | 83.03 | 190.81 | 0.15 | 77.51 | 134.76 |
| 381 | ti | 0.12 | 75.65 | 171.38 | 0.12 | 77.13 | 121.54 |
| 382 | dak | 0.29 | 74.88 | 221.69 | 0.18 | 73.72 | 113.11 |
| 383 | ta | 0.18 | 80.27 | 156.98 | 0.17 | 80.55 | 174.47 |
| 384 | hu | 0.45 | 74.98 | 146.99 | 0.47 | 76.15 | 150.99 |
| 385 | i | 0.25 | 71.92 | 154.58 | 0.13 | 66.46 | 97.96 |
| 386 | tu | 0.27 | 77.40 | 102.31 | 0.19 | 73.67 | 171.25 |
| 387 | i | 0.15 | 80.80 | 141.39 | 0.08 | 80.70 | 184.35 |
| 388 | a | 0.15 | 80.80 | 141.39 | 0.08 | 80.70 | 184.35 |
| 389 | lah | 0.36 | 75.44 | 138.09 | 0.20 | 81.18 | 152.48 |
| 390 | ba | 0.21 | 75.86 | 113.80 | 0.10 | 80.34 | 117.47 |
| 391 | yang | 0.29 | 83.27 | 140.50 | 0.17 | 83.26 | 122.58 |
| 392 | ba | 0.17 | 78.33 | 123.98 | 0.13 | 83.75 | 122.73 |
| 393 | yang | 0.26 | 84.00 | 132.21 | 0.16 | 83.63 | 126.59 |
| 394 | nya | 0.21 | 84.07 | 127.51 | 0.19 | 85.90 | 134.67 |
| 395 | sen | 0.32 | 76.60 | 131.30 | 0.14 | 78.31 | 148.08 |
| 396 | di | 0.21 | 81.40 | 233.66 | 0.14 | 81.53 | 225.20 |
| 397 | ri | 0.33 | 71.10 | 121.43 | 0.39 | 73.93 | 181.53 |
| 398 | di | 0.09 | 76.66 | 130.64 | 0.07 | 62.16 | 102.70 |
| 399 | a | 0.24 | 85.25 | 164.08 | 0.13 | 83.11 | 145.11 |
| 400 | ma | 0.25 | 84.23 | 151.51 | 0.30 | 82.05 | 238.69 |
| 401 | hu | 0.50 | 79.65 | 141.96 | 0.11 | 84.92 | 223.48 |
| 402 | men | 0.23 | 77.12 | 121.65 | 0.09 | 87.60 | 249.22 |
| 403 | da | 0.21 | 77.64 | 142.14 | 0.15 | 81.79 | 134.10 |
| 404 | pat | 0.24 | 72.22 | 150.18 | 0.15 | 73.42 | 134.00 |
| 405 | kan | 0.51 | 74.88 | 110.03 | 0.10 | 75.59 | 112.55 |
| 406 | da | 0.22 | 79.91 | 124.46 | 0.20 | 77.38 | 101.99 |
| 407 | ging | 0.25 | 79.74 | 125.64 | 0.19 | 72.21 | 93.55 |
| 408 | i | 0.21 | 71.13 | 154.23 | 0.16 | 62.20 | 90.00 |
| 409 | tu | 0.28 | 66.09 | 106.19 | 0.19 | 61.59 | 89.50 |
| 410 | di | 0.12 | 77.41 | 127.10 | 0.06 | 66.72 | 92.40 |
| 411 | a | 0.34 | 81.24 | 163.09 | 0.20 | 68.15 | 94.42 |
| 412 | pun | 0.38 | 78.08 | 171.01 | 0.16 | 77.72 | 133.72 |
| 413 | me | 0.15 | 79.92 | 155.60 | 0.11 | 81.15 | 117.95 |
| 414 | nya | 0.24 | 85.50 | 148.16 | 0.23 | 81.11 | 167.40 |
| 415 | lak | 0.32 | 75.97 | 134.20 | 0.30 | 73.30 | 248.97 |
| 416 | ke | 0.33 | 61.68 | 136.70 | 0.11 | 56.61 | x |
| 417 | pa | 0.25 | 80.36 | 133.02 | 0.13 | 76.39 | 109.83 |
| 418 | da | 0.50 | 74.40 | 142.65 | 0.08 | 74.84 | 95.15 |
| 419 | an | 0.29 | 79.09 | 145.27 | 0.19 | 74.80 | 107.03 |
| 420 | jing | 0.37 | 79.12 | 136.98 | 0.23 | 79.87 | 123.99 |
| 421 | di | 0.16 | 75.43 | 112.81 | 0.06 | 75.72 | 110.46 |
| 422 | da | 0.16 | 81.84 | 128.32 | 0.12 | 76.11 | 98.74 |
| 423 | lam | 0.23 | 78.99 | 127.43 | 0.07 | 72.30 | 90.67 |
| 424 | a | 0.22 | 74.55 | 136.85 | 0.10 | 69.38 | 95.02 |
| 425 | ir | 0.36 | 72.12 | 101.40 | 0.26 | 58.97 | 97.20 |
| 426 | se | 0.32 | 70.76 | 118.53 | 0.24 | 61.69 | 98.20 |
| 427 | ba | 0.13 | 84.93 | 137.74 | 0.24 | 73.87 | 95.61 |
| 428 | ik | 0.21 | 81.99 | 192.71 | 0.22 | 85.53 | 253.92 |
| 429 | sa | 0.38 | 76.70 | 160.86 | 0.23 | 80.61 | 173.83 |
| 430 | ja | 0.52 | 76.73 | 168.89 | 0.11 | 85.10 | 300.70 |
| 431 | di | 0.22 | 72.35 | 166.52 | 0.04 | 83.23 | 343.66 |
| 432 | a | 0.25 | 87.51 | 168.38 | 0.13 | 85.88 | 335.97 |
| 433 | mem | 0.27 | 81.56 | 121.59 | 0.17 | 80.01 | 172.21 |
| 434 | bu | 0.21 | 71.99 | 114.79 | 0.09 | 76.36 | 168.97 |
| 435 | ka | 0.22 | 75.78 | 114.72 | 0.13 | 77.04 | 178.42 |
| 436 | mu | 0.15 | 79.57 | 144.69 | 0.14 | 80.67 | 181.18 |
| 437 | lut | 0.42 | 77.13 | 196.05 | 0.39 | 74.08 | 141.98 |

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|---|---|---|---|---|---|---|---|
| 438 | da | 0.32 | 76.73 | 149.15 | 0.27 | 73.48 | 123.61 |
| 439 | ging | 0.32 | 82.73 | 159.38 | 0.14 | 83.95 | 195.01 |
| 440 | di | 0.19 | 77.02 | 116.27 | 0.14 | 87.34 | 194.23 |
| 441 | mu | 0.10 | 82.27 | 124.68 | 0.14 | 88.10 | 196.37 |
| 442 | lut | 0.19 | 81.45 | 264.30 | 0.11 | 85.40 | 214.09 |
| 443 | nya | 0.62 | 79.64 | 153.50 | 0.38 | 75.60 | 270.64 |
| 444 | ter | 0.25 | 70.39 | 106.68 | 0.23 | 79.68 | 154.55 |
| 445 | ja | 0.29 | 80.38 | 118.73 | 0.40 | 81.14 | 213.92 |
| 446 | tuh | 0.29 | 77.15 | 141.65 | 0.39 | 81.30 | 224.08 |
| 447 | ke | 0.15 | 69.68 | 114.54 | 0.07 | 79.22 | x |
| 448 | da | 0.15 | 78.70 | 110.70 | 0.08 | 81.08 | 120.80 |
| 449 | lam | 0.19 | 76.53 | 114.40 | 0.16 | 79.15 | 112.03 |
| 450 | a | 0.28 | 73.54 | 170.37 | 0.17 | 70.63 | 98.20 |
| 451 | ir | 0.35 | 70.06 | 97.43 | 0.25 | 63.47 | 85.60 |
| 452 | se | 0.37 | 77.70 | 159.55 | 0.20 | 68.44 | 121.73 |
| 453 | e | 0.14 | 84.90 | 163.50 | 0.25 | 73.71 | 128.41 |
| 454 | kor | 0.30 | 79.99 | 199.82 | 0.20 | 80.92 | 208.45 |
| 455 | se | 0.23 | 79.25 | 206.57 | 0.16 | 77.81 | 197.13 |
| 456 | mut | 0.49 | 78.95 | 192.60 | 0.53 | 76.52 | 121.11 |
| 457 | yang | 0.49 | 76.38 | 156.57 | 0.35 | 74.79 | 140.11 |
| 458 | ke | 0.15 | 74.55 | 158.77 | 0.13 | 70.06 | 125.57 |
| 459 | hau | 0.30 | 77.30 | 177.50 | 0.19 | 76.28 | 116.86 |
| 460 | san | 0.52 | 75.72 | 167.70 | 0.59 | 69.96 | 149.89 |
| 461 | i | 0.24 | 81.04 | 164.13 | 0.12 | 68.22 | 117.47 |
| 462 | ngin | 0.51 | 75.40 | 188.93 | 0.25 | 79.99 | 118.55 |
| 463 | me | 0.21 | 80.47 | 127.96 | 0.16 | 81.12 | 151.79 |
| 464 | mi | 0.12 | 84.06 | 144.39 | 0.18 | 87.27 | 139.10 |
| 465 | num | 0.35 | 79.53 | 112.01 | 0.22 | 78.19 | 177.26 |
| 466 | a | 0.25 | 84.48 | 148.98 | 0.18 | 71.06 | 119.58 |
| 467 | ir | 0.41 | 79.03 | 157.91 | 0.41 | 73.72 | 149.02 |
| 468 | da | 0.35 | 79.06 | 137.86 | 0.18 | 70.39 | 138.52 |
| 469 | ri | 0.48 | 78.33 | 154.06 | 0.16 | 75.44 | 114.56 |
| 470 | a | 0.14 | 74.09 | 117.30 | 0.13 | 69.15 | 104.40 |
| 471 | ir | 0.20 | 75.71 | 120.69 | 0.21 | 70.50 | 104.98 |
| 472 | ter | 0.27 | 72.99 | 148.22 | 0.23 | 69.21 | 104.49 |
| 473 | jun | 0.58 | 79.83 | 153.79 | 0.47 | 69.86 | 101.41 |
| 474 | yang | 0.43 | 79.48 | 172.59 | 0.25 | 70.46 | 98.14 |
| 475 | ber | 0.17 | 72.56 | 139.89 | 0.08 | 66.86 | 88.90 |
| 476 | ham | 0.28 | 76.24 | 119.79 | 0.27 | 59.00 | 266.35 |
| 477 | pi | 0.17 | 78.19 | 167.38 | 0.12 | 62.04 | 320.81 |
| 478 | ran | 0.39 | 75.58 | 116.85 | 0.35 | 66.91 | 130.54 |
| 479 | na | 0.25 | 81.52 | 142.60 | 0.22 | 62.76 | 286.15 |
| 480 | mun | 0.54 | 76.50 | 173.04 | 0.51 | 74.41 | 188.61 |
| 481 | na | 0.24 | 76.36 | 128.74 | 0.18 | 68.62 | 109.93 |
| 482 | sib | 0.23 | 76.08 | 167.17 | 0.20 | 72.45 | 124.94 |
| 483 | nya | 0.29 | 83.97 | 158.35 | 0.26 | 80.56 | 143.13 |
| 484 | ma | 0.22 | 83.93 | 164.65 | 0.23 | 82.70 | 151.43 |
| 485 | lang | 0.51 | 78.30 | 165.45 | 0.45 | 73.47 | 118.34 |
| 486 | a | 0.22 | 71.59 | 124.44 | 0.14 | 62.41 | 107.70 |
| 487 | pa | 0.15 | 78.43 | 132.30 | 0.10 | 72.38 | 108.50 |
| 488 | bi | 0.18 | 85.27 | 150.81 | 0.15 | 74.75 | 108.77 |
| 489 | la | 0.45 | 83.49 | 168.48 | 0.18 | 77.28 | 141.85 |
| 490 | ka | 0.23 | 73.05 | 127.46 | 0.23 | 71.45 | 127.75 |
| 491 | ki | 0.16 | 74.21 | 183.89 | 0.11 | 75.13 | 123.62 |
| 492 | nya | 0.32 | 75.70 | 177.65 | 0.38 | 76.24 | 123.73 |
| 493 | ter | 0.21 | 75.62 | 190.27 | 0.22 | 69.11 | 101.92 |
| 494 | ge | 0.12 | 81.42 | 141.44 | 0.16 | 72.12 | 106.07 |
| 495 | lin | 0.19 | 75.47 | 163.58 | 0.23 | 78.11 | 145.93 |
| 496 | cir | 0.53 | 75.97 | 206.72 | 0.50 | 73.53 | 135.60 |
| 497 | dan | 0.32 | 76.39 | 154.09 | 0.21 | 77.54 | 122.54 |
| 498 | ter | 0.25 | 74.29 | 114.85 | 0.22 | 70.81 | 107.08 |
| 499 | ja | 0.34 | 76.96 | 145.67 | 0.31 | 71.76 | 128.39 |
| 500 | tuh | 0.44 | 74.94 | 136.14 | 0.36 | 71.34 | 114.76 |
| 501 | di | 0.20 | 72.83 | 115.49 | 0.12 | 71.73 | 102.58 |
| 502 | da | 0.24 | 84.93 | 141.89 | 0.10 | 78.33 | 111.55 |
| 503 | lam | 0.52 | 75.27 | 160.77 | 0.23 | 74.52 | 114.24 |
| 504 | a | 0.14 | 78.05 | 140.42 | 0.13 | 71.00 | 105.67 |
| 505 | ir | 0.22 | 80.32 | 147.27 | 0.14 | 71.06 | 105.32 |

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|---|---|---|---|---|---|---|---|
| 506 | ter | 0.23 | 75.94 | 142.65 | 0.19 | 68.92 | 103.63 |
| 507 | jun | 0.49 | 78.66 | 163.20 | 0.19 | 73.51 | 103.43 |
| 508 | yang | 0.32 | 79.93 | 124.40 | 0.19 | 74.24 | 100.40 |
| 509 | de | 0.12 | 81.35 | 173.49 | 0.12 | 78.16 | 141.38 |
| 510 | ras | 0.47 | 71.99 | 149.43 | 0.39 | 67.22 | 124.00 |
| 511 | a | 0.20 | 74.14 | 125.56 | 0.18 | 63.96 | 93.50 |
| 512 | pa | 0.18 | 79.45 | 137.31 | 0.15 | 76.08 | 102.53 |
| 513 | bi | 0.13 | 79.81 | 183.55 | 0.12 | 82.61 | 214.58 |
| 514 | la | 0.63 | 75.91 | 222.14 | 0.25 | 82.25 | 260.59 |
| 515 | di | 0.25 | 72.96 | 150.97 | 0.09 | 76.58 | 246.09 |
| 516 | a | 0.26 | 82.92 | 207.63 | 0.16 | 82.36 | 206.20 |
| 517 | ham | 0.26 | 75.38 | 177.79 | 0.12 | 75.26 | 173.23 |
| 518 | pir | 0.13 | 80.61 | 170.02 | 0.09 | 74.85 | 179.03 |
| 519 | ham | 0.24 | 78.80 | 155.59 | 0.16 | 83.11 | 156.96 |
| 520 | pir | 0.21 | 77.65 | 126.98 | 0.15 | 79.22 | 137.43 |
| 521 | le | 0.13 | 80.54 | 150.88 | 0.12 | 78.42 | 107.88 |
| 522 | mas | 0.55 | 75.74 | 135.00 | 0.42 | 70.31 | 126.79 |
| 523 | se | 0.24 | 70.11 | 125.34 | 0.18 | 69.65 | x |
| 524 | e | 0.27 | 74.93 | 208.13 | 0.18 | 67.67 | 96.67 |
| 525 | kor | 0.22 | 77.74 | 217.57 | 0.19 | 76.14 | 185.91 |
| 526 | mer | 0.32 | 77.27 | 193.33 | 0.16 | 75.97 | 190.08 |
| 527 | pa | 0.30 | 72.51 | 173.30 | 0.27 | 74.09 | 149.33 |
| 528 | ti | 0.41 | 74.93 | 141.37 | 0.45 | 70.57 | 123.21 |
| 529 | yang | 0.29 | 78.75 | 153.82 | 0.26 | 72.10 | 146.46 |
| 530 | ber | 0.31 | 74.57 | 156.68 | 0.19 | 69.51 | 213.58 |
| 531 | teng | 0.29 | 80.79 | 174.52 | 0.19 | 79.60 | 172.85 |
| 532 | gek | 0.33 | 72.36 | 242.79 | 0.37 | 74.19 | 146.20 |
| 533 | ti | 0.13 | 72.95 | 132.13 | 0.16 | 68.12 | 118.94 |
| 534 | dak | 0.18 | 80.72 | 127.52 | 0.22 | 76.18 | 109.64 |
| 535 | ja | 0.35 | 80.44 | 133.95 | 0.23 | 79.88 | 133.51 |
| 536 | uh | 0.32 | 81.85 | 259.32 | 0.22 | 79.87 | 156.63 |
| 537 | da | 0.27 | 75.28 | 110.49 | 0.13 | 78.58 | 112.70 |
| 538 | ri | 0.21 | 78.86 | 196.93 | 0.17 | 70.69 | 126.98 |
| 539 | po | 0.17 | 80.07 | 156.26 | 0.19 | 71.96 | 178.31 |
| 540 | kok | 0.22 | 75.25 | 272.06 | 0.12 | 69.36 | 363.64 |
| 541 | i | 0.28 | 73.46 | 215.98 | 0.25 | 64.86 | 174.02 |
| 542 | tu | 0.41 | 73.18 | 208.76 | 0.34 | 69.87 | 132.93 |
| 543 | men | 0.26 | 75.95 | 116.70 | 0.17 | 71.51 | 108.24 |
| 544 | ja | 0.28 | 77.52 | 145.71 | 0.25 | 70.92 | 107.96 |
| 545 | tuh | 0.26 | 75.71 | 209.12 | 0.18 | 72.50 | 131.62 |
| 546 | kan | 0.50 | 75.82 | 142.00 | 0.17 | 75.70 | 134.29 |
| 547 | se | 0.20 | 66.70 | 125.07 | 0.17 | 71.75 | 121.31 |
| 548 | he | 0.13 | 81.62 | 131.28 | 0.15 | 73.54 | 100.20 |
| 549 | lai | 0.36 | 82.99 | 130.90 | 0.16 | 75.43 | 95.12 |
| 550 | da | 0.16 | 81.58 | 155.49 | 0.16 | 69.25 | 94.98 |
| 551 | un | 0.45 | 73.44 | 158.29 | 0.39 | 67.61 | 174.13 |
| 552 | se | 0.25 | 72.37 | 181.68 | 0.15 | 60.84 | x |
| 553 | mut | 0.28 | 79.19 | 213.52 | 0.22 | 74.66 | 103.20 |
| 554 | i | 0.28 | 70.59 | 181.37 | 0.07 | 66.32 | 103.03 |
| 555 | tu | 0.32 | 78.86 | 157.04 | 0.19 | 68.51 | 100.07 |
| 556 | pun | 0.49 | 77.00 | 144.18 | 0.40 | 70.87 | 170.46 |
| 557 | me | 0.20 | 76.63 | 121.43 | 0.24 | 65.44 | 110.47 |
| 558 | man | 0.38 | 81.29 | 118.35 | 0.27 | 80.04 | 185.36 |
| 559 | jat | 0.37 | 74.55 | 140.94 | 0.28 | 74.34 | 223.34 |
| 560 | ke | 0.10 | 67.86 | 140.67 | 0.09 | 70.07 | x |
| 561 | a | 0.19 | 78.32 | 130.48 | 0.12 | 70.10 | x |
| 562 | tas | 0.22 | 75.09 | 129.15 | 0.16 | 69.43 | 109.17 |
| 563 | da | 0.14 | 80.93 | 128.05 | 0.11 | 73.49 | 104.25 |
| 564 | un | 0.34 | 79.65 | 126.28 | 0.16 | 72.26 | 126.23 |
| 565 | ter | 0.15 | 73.60 | 120.47 | 0.09 | 71.05 | 127.63 |
| 566 | se | 0.29 | 72.30 | 149.73 | 0.18 | 68.35 | 91.87 |
| 567 | but | 0.37 | 74.55 | 200.44 | 0.28 | 70.79 | 185.25 |
| 568 | dan | 0.45 | 76.58 | 160.13 | 0.27 | 72.49 | 116.65 |
| 569 | ak | 0.29 | 69.44 | 117.48 | 0.18 | 67.18 | x |
| 570 | hir | 0.21 | 81.05 | 183.23 | 0.14 | 73.94 | 110.53 |
| 571 | nya | 0.58 | 76.76 | 138.13 | 0.43 | 75.43 | 206.88 |
| 572 | ti | 0.26 | 73.84 | 191.16 | 0.17 | 73.91 | 231.26 |
| 573 | ba | 0.51 | 76.00 | 179.99 | 0.30 | 83.88 | 170.98 |

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|---|---|---|---|---|---|---|---|
| 574 | de | 0.17 | 72.71 | 125.04 | 0.10 | 82.90 | 131.40 |
| 575 | ngan | 0.14 | 86.57 | 133.06 | 0.19 | 77.50 | 121.72 |
| 576 | se | 0.20 | 77.53 | 128.06 | 0.06 | 75.63 | 115.23 |
| 577 | la | 0.20 | 83.92 | 162.81 | 0.09 | 76.82 | 108.11 |
| 578 | mat | 0.35 | 76.38 | 164.73 | 0.33 | 71.90 | 106.80 |
| 579 | di | 0.24 | 71.04 | 125.77 | 0.17 | 66.65 | 104.26 |
| 580 | te | 0.20 | 76.97 | 132.35 | 0.11 | 71.29 | 100.86 |
| 581 | bing | 0.20 | 82.93 | 133.43 | 0.08 | 71.65 | 96.91 |
| 582 | su | 0.18 | 74.70 | 154.89 | 0.20 | 69.26 | 94.20 |
| 583 | ngai | 0.45 | 72.07 | 119.93 | 0.71 | 62.90 | 92.31 |
| 584 | be | 0.15 | 74.73 | 129.61 | 0.12 | 64.42 | 98.01 |
| 585 | be | 0.10 | 75.89 | 129.00 | 0.07 | 71.00 | 97.33 |
| 586 | ra | 0.34 | 81.29 | 223.75 | 0.16 | 69.64 | 101.86 |
| 587 | pa | 0.18 | 82.53 | 256.08 | 0.10 | 77.25 | 135.37 |
| 588 | ha | 0.24 | 80.47 | 203.53 | 0.11 | 82.00 | 135.22 |
| 589 | ri | 0.30 | 74.80 | 142.65 | 0.13 | 81.28 | 138.68 |
| 590 | ke | 0.13 | 74.82 | 167.04 | 0.13 | 75.56 | 143.06 |
| 591 | mu | 0.23 | 79.03 | 186.99 | 0.07 | 83.80 | 144.69 |
| 592 | di | 0.09 | 81.23 | 175.06 | 0.09 | 84.90 | 149.83 |
| 593 | an | 0.43 | 76.77 | 160.43 | 0.32 | 76.92 | 232.29 |
| 594 | se | 0.21 | 67.98 | 124.63 | 0.15 | 63.46 | 96.23 |
| 595 | o | 0.22 | 82.21 | 143.65 | 0.10 | 74.12 | 102.65 |
| 596 | rang | 0.29 | 76.79 | 225.05 | 0.19 | 80.51 | 145.72 |
| 597 | pem | 0.19 | 79.79 | 199.00 | 0.15 | 82.70 | 156.80 |
| 598 | bu | 0.24 | 82.00 | 189.24 | 0.23 | 81.84 | 166.96 |
| 599 | ru | 0.43 | 76.45 | 167.16 | 0.30 | 73.50 | 246.49 |
| 600 | me | 0.15 | 78.52 | 130.46 | 0.11 | 79.43 | 232.71 |
| 601 | li | 0.17 | 82.29 | 172.65 | 0.14 | 81.46 | 240.46 |
| 602 | hat | 0.53 | 76.02 | 194.07 | 0.28 | 74.62 | 246.51 |
| 603 | se | 0.26 | 70.02 | 169.98 | 0.08 | 68.02 | x |
| 604 | e | 0.16 | 81.74 | 168.92 | 0.11 | 71.36 | 115.86 |
| 605 | kor | 0.19 | 77.89 | 182.97 | 0.10 | 72.60 | 124.27 |
| 606 | mer | 0.19 | 83.05 | 203.55 | 0.22 | 75.05 | 122.63 |
| 607 | pa | 0.35 | 75.82 | 204.45 | 0.24 | 70.56 | 129.99 |
| 608 | ti | 0.41 | 69.62 | 179.03 | 0.33 | 68.70 | 234.18 |
| 609 | dan | 0.27 | 79.96 | 138.23 | 0.27 | 79.67 | 144.31 |
| 610 | i | 0.24 | 76.05 | 163.02 | 0.15 | 79.03 | 204.43 |
| 611 | ngin | 0.46 | 75.16 | 202.26 | 0.22 | 83.15 | 256.73 |
| 612 | me | 0.17 | 79.04 | 140.92 | 0.14 | 77.26 | 106.08 |
| 613 | nem | 0.28 | 83.29 | 134.57 | 0.13 | 78.31 | 97.73 |
| 614 | bak | 0.29 | 80.06 | 169.88 | 0.19 | 70.82 | 126.39 |
| 615 | nya | 0.49 | 73.21 | 140.57 | 0.22 | 59.24 | 132.18 |
| 616 | na | 0.27 | 79.55 | 132.64 | 0.18 | 62.41 | 265.49 |
| 617 | mun | 0.58 | 75.22 | 167.35 | 0.46 | 75.53 | 208.10 |
| 618 | se | 0.25 | 71.80 | 158.55 | 0.23 | 66.55 | 106.42 |
| 619 | mut | 0.26 | 73.37 | 205.34 | 0.27 | 77.88 | 141.42 |
| 620 | ter | 0.16 | 77.34 | 160.96 | 0.11 | 79.65 | 180.70 |
| 621 | li | 0.18 | 85.17 | 163.01 | 0.10 | 81.43 | 200.81 |
| 622 | hat | 0.52 | 77.29 | 148.95 | 0.43 | 73.89 | 176.19 |
| 623 | a | 0.24 | 71.43 | 145.39 | 0.12 | 67.73 | 112.62 |
| 624 | kan | 0.29 | 78.38 | 167.97 | 0.18 | 72.01 | 128.20 |
| 625 | per | 0.14 | 75.86 | 143.89 | 0.08 | 72.28 | 116.53 |
| 626 | la | 0.31 | 75.87 | 147.05 | 0.15 | 68.34 | 108.71 |
| 627 | ku | 0.12 | 80.04 | 160.93 | 0.08 | 65.96 | 120.70 |
| 628 | an | 0.46 | 77.93 | 156.65 | 0.15 | 72.43 | 100.67 |
| 629 | pem | 0.20 | 79.16 | 125.82 | 0.09 | 64.12 | 94.45 |
| 630 | bu | 0.20 | 83.52 | 147.20 | 0.09 | 70.77 | 94.33 |
| 631 | ru | 0.22 | 82.65 | 170.03 | 0.11 | 67.29 | 91.94 |
| 632 | i | 0.28 | 73.45 | 227.04 | 0.18 | 67.18 | 95.81 |
| 633 | tu | 0.29 | 66.74 | 209.79 | 0.21 | 59.18 | 92.35 |
| 634 | se | 0.20 | 72.46 | 173.80 | 0.25 | 61.83 | x |
| 635 | mut | 0.35 | 77.10 | 203.59 | 0.26 | 67.17 | 104.69 |
| 636 | pun | 0.52 | 74.98 | 164.81 | 0.38 | 71.86 | 165.96 |
| 637 | lan | 0.44 | 75.74 | 186.15 | 0.30 | 70.12 | 117.17 |
| 638 | tas | 0.39 | 72.79 | 196.53 | 0.18 | 73.82 | 141.01 |
| 639 | meng | 0.30 | 81.87 | 131.78 | 0.36 | 79.85 | 133.58 |
| 640 | gi | 0.20 | 79.30 | 181.78 | 0.37 | 74.11 | 287.12 |
| 641 | git | 0.36 | 77.38 | 235.63 | 0.31 | 73.36 | 353.49 |

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|---|---|---|---|---|---|---|---|
| 642 | ka | 0.25 | 74.04 | 147.71 | 0.17 | 74.07 | 120.59 |
| 643 | ki | 0.28 | 76.96 | 158.49 | 0.18 | 74.11 | 126.33 |
| 644 | pem | 0.11 | 78.72 | 136.49 | 0.06 | 72.98 | 110.95 |
| 645 | bu | 0.18 | 80.68 | 125.19 | 0.11 | 74.21 | 106.85 |
| 646 | ru | 0.14 | 76.73 | 123.05 | 0.09 | 72.96 | 103.80 |
| 647 | i | 0.39 | 70.31 | 178.45 | 0.22 | 69.84 | 95.97 |
| 648 | tu | 0.64 | 59.43 | 218.81 | 0.17 | 61.12 | 184.03 |
| 649 | dan | 0.67 | 75.03 | 131.07 | 0.38 | 75.08 | 152.59 |
| 650 | tem | 0.25 | 76.58 | 120.29 | 0.16 | 79.89 | 135.90 |
| 651 | ba | 0.22 | 78.97 | 130.38 | 0.17 | 74.37 | 122.03 |
| 652 | kan | 0.26 | 80.50 | 175.16 | 0.14 | 75.12 | 120.19 |
| 653 | nya | 0.36 | 72.69 | 183.57 | 0.31 | 73.61 | 213.31 |
| 654 | ter | 0.12 | 74.45 | 146.04 | 0.10 | 76.90 | 153.35 |
| 655 | sa | 0.30 | 76.15 | 159.31 | 0.23 | 74.97 | 131.86 |
| 656 | sar | 0.52 | 72.36 | 113.54 | 0.86 | 70.88 | 94.18 |
| 657 | mer | 0.26 | 75.04 | 126.60 | 0.19 | 66.94 | 101.60 |
| 658 | pa | 0.31 | 73.90 | 170.99 | 0.22 | 74.38 | 122.66 |
| 659 | ti | 0.48 | 76.04 | 200.31 | 0.13 | 76.88 | 205.82 |
| 660 | yang | 0.37 | 78.42 | 156.19 | 0.21 | 80.47 | 196.96 |
| 661 | ter | 0.20 | 75.71 | 131.58 | 0.14 | 78.84 | 129.17 |
| 662 | de | 0.10 | 81.23 | 130.52 | 0.10 | 84.21 | 137.71 |
| 663 | ngar | 0.49 | 77.69 | 127.53 | 0.37 | 79.15 | 180.11 |
| 664 | je | 0.25 | 71.84 | 130.19 | 0.17 | 74.22 | 107.81 |
| 665 | ri | 0.19 | 80.98 | 155.36 | 0.14 | 73.45 | 124.97 |
| 666 | tan | 0.32 | 77.97 | 124.62 | 0.20 | 74.82 | 166.87 |
| 667 | pem | 0.21 | 76.33 | 118.41 | 0.13 | 71.90 | 134.33 |
| 668 | bu | 0.14 | 79.54 | 123.83 | 0.15 | 71.85 | 106.68 |
| 669 | ru | 0.11 | 75.89 | 120.16 | 0.13 | 75.02 | 102.54 |
| 670 | i | 0.27 | 71.65 | 151.09 | 0.19 | 68.37 | 95.05 |
| 671 | tu | 0.39 | 74.26 | 203.49 | 0.32 | 72.52 | 176.84 |
| 672 | se | 0.28 | 75.51 | 187.43 | 0.30 | 79.35 | 238.21 |
| 673 | ge | 0.18 | 75.90 | 210.53 | 0.09 | 75.20 | 311.58 |
| 674 | ra | 0.48 | 76.39 | 171.15 | 0.37 | 82.30 | 228.57 |
| 675 | ter | 0.18 | 77.33 | 153.27 | 0.18 | 76.79 | 121.58 |
| 676 | bang | 0.52 | 81.34 | 183.79 | 0.18 | 78.43 | 110.58 |
| 677 | ber | 0.19 | 78.55 | 124.94 | 0.07 | 77.81 | 107.11 |
| 678 | e | 0.27 | 77.78 | 137.81 | 0.13 | 74.31 | 101.99 |
| 679 | dar | 0.40 | 78.45 | 154.54 | 0.21 | 69.51 | 89.54 |
| 680 | da | 0.25 | 75.95 | 124.97 | 0.07 | 66.95 | 87.76 |
| 681 | ri | 0.16 | 76.99 | 124.43 | 0.09 | 67.14 | 84.23 |
| 682 | si | 0.37 | 72.28 | 154.80 | 0.25 | 53.05 | 82.80 |
| 683 | tu | 0.28 | 66.97 | 105.16 | 0.20 | 57.31 | 301.40 |

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data Female Storyteller 1 (Fst1)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.14 | 66.72 | x | 0.11 | 70.23 | x |
| 2 | a | 0.19 | 70.11 | 251.71 | 0.16 | 74.60 | 293.95 |
| 3 | tu | 0.10 | 66.76 | 307.33 | 0.07 | 73.41 | 378.66 |
| 4 | ma | 0.19 | 73.50 | 271.56 | 0.12 | 75.79 | 365.20 |
| 5 | sa | 0.21 | 64.15 | 236.96 | 0.18 | 69.46 | 309.89 |
| 6 | da | 0.21 | 72.43 | 208.86 | 0.15 | 75.22 | 214.52 |
| 7 | hu | 0.13 | 68.59 | 188.12 | 0.14 | 70.82 | 186.20 |
| 8 | lu | 0.34 | 63.64 | 180.12 | 0.48 | 67.04 | 257.62 |
| 9 | ting | 0.16 | 68.05 | 206.36 | 0.16 | 70.80 | 238.27 |
| 10 | gal | 0.23 | 68.07 | 215.08 | 0.18 | 78.91 | 239.93 |
| 11 | se | 0.09 | 69.31 | 206.02 | 0.14 | 69.65 | 241.23 |
| 12 | o | 0.08 | 71.11 | 219.22 | 0.09 | 71.73 | 227.84 |
| 13 | rang | 0.22 | 67.67 | 217.40 | 0.16 | 72.13 | 229.38 |
| 14 | pe | 0.13 | 67.07 | 202.42 | 0.15 | 68.84 | 222.13 |
| 15 | ta | 0.18 | 73.78 | 206.96 | 0.15 | 79.03 | 213.49 |
| 16 | ni | 0.13 | 69.58 | 212.33 | 0.23 | 76.85 | 257.68 |
| 17 | yang | 0.21 | 73.70 | 199.15 | 0.11 | 76.77 | 223.42 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18 | me | 0.12 | 72.11 | 191.22 | 0.14 | 73.46 | 202.11 |
| 19 | me | 0.14 | 68.49 | 187.52 | 0.09 | 74.34 | 196.92 |
| 20 | li | 0.12 | 69.67 | 187.84 | 0.15 | 75.20 | 193.77 |
| 21 | ha | 0.22 | 73.69 | 201.67 | 0.19 | 74.62 | 232.19 |
| 22 | ra | 0.17 | 68.92 | 206.44 | 0.24 | 69.40 | 263.06 |
| 23 | se | 0.11 | 62.80 | 211.90 | 0.11 | 71.69 | 303.79 |
| 24 | e | 0.22 | 68.02 | 195.29 | 0.17 | 64.81 | 189.91 |
| 25 | kor | 0.15 | 66.36 | 194.26 | 0.20 | 66.89 | 199.26 |
| 26 | ang | 0.25 | 70.75 | 182.60 | 0.16 | 75.48 | 249.48 |
| 27 | sa | 0.29 | 61.64 | 193.13 | 0.38 | 67.85 | 237.32 |
| 28 | pa | 0.14 | 75.15 | 189.54 | 0.15 | 78.36 | 246.48 |
| 29 | da | 0.11 | 72.47 | 231.57 | 0.15 | 76.49 | 373.34 |
| 30 | su | 0.11 | 67.39 | 229.14 | 0.08 | 70.25 | 391.93 |
| 31 | a | 0.12 | 71.44 | 207.20 | 0.17 | 75.86 | 339.96 |
| 32 | tu | 0.06 | 67.69 | 204.76 | 0.14 | 74.81 | 339.16 |
| 33 | ha | 0.24 | 72.99 | 192.01 | 0.13 | 79.69 | 336.01 |
| 34 | ri | 0.25 | 66.31 | 214.92 | 0.45 | 66.04 | 343.74 |
| 35 | ke | 0.12 | 65.25 | 194.60 | 0.14 | 67.37 | 255.92 |
| 36 | ti | 0.16 | 59.23 | 195.74 | 0.14 | 66.36 | 239.91 |
| 37 | ka | 0.15 | 70.89 | 201.01 | 0.15 | 70.77 | 226.53 |
| 38 | i | 0.18 | 66.77 | 196.30 | 0.18 | 67.46 | 191.43 |
| 39 | tu | 0.22 | 70.01 | 215.43 | 0.25 | 68.98 | 202.78 |
| 40 | di | 0.07 | 66.43 | 205.13 | 0.10 | 67.84 | 206.66 |
| 41 | a | 0.11 | 72.30 | 196.36 | 0.10 | 76.03 | 225.64 |
| 42 | i | 0.17 | 67.85 | 185.16 | 0.12 | 72.68 | 220.40 |
| 43 | ngin | 0.17 | 72.55 | 195.41 | 0.28 | 74.41 | 238.60 |
| 44 | me | 0.14 | 69.44 | 182.33 | 0.07 | 71.34 | 206.37 |
| 45 | ngam | 0.19 | 67.78 | 178.44 | 0.19 | 74.91 | 195.18 |
| 46 | bil | 0.22 | 70.97 | 192.40 | 0.17 | 70.53 | 196.13 |
| 47 | te | 0.12 | 68.64 | 184.53 | 0.10 | 69.27 | 192.70 |
| 48 | lur | 0.13 | 68.00 | 179.02 | 0.13 | 73.97 | 184.74 |
| 49 | ang | 0.24 | 68.60 | 166.06 | 0.21 | 70.56 | 179.89 |
| 50 | sa | 0.28 | 63.03 | 188.51 | 0.29 | 67.94 | 191.56 |
| 51 | nya | 0.19 | 65.45 | 210.45 | 0.22 | 63.18 | 174.12 |
| 52 | si | 0.23 | 61.80 | 226.09 | 0.12 | 73.14 | 358.59 |
| 53 | pe | 0.19 | 70.07 | 219.03 | 0.10 | 75.48 | 364.24 |
| 54 | ta | 0.14 | 76.50 | 208.67 | 0.15 | 81.74 | 357.80 |
| 55 | ni | 0.13 | 71.63 | 214.58 | 0.22 | 77.32 | 393.52 |
| 56 | men | 0.23 | 71.50 | 211.93 | 0.12 | 79.15 | 341.43 |
| 57 | da | 0.17 | 73.06 | 193.07 | 0.09 | 80.08 | 288.42 |
| 58 | pa | 0.21 | 71.44 | 192.14 | 0.21 | 73.66 | 288.69 |
| 59 | ti | 0.21 | 64.19 | 208.36 | 0.16 | 65.48 | 323.17 |
| 60 | te | 0.10 | 70.42 | 198.34 | 0.07 | 73.81 | 200.90 |
| 61 | lur | 0.17 | 72.20 | 191.37 | 0.21 | 75.00 | 289.74 |
| 62 | i | 0.25 | 64.27 | 243.71 | 0.22 | 64.71 | 317.33 |
| 63 | tu | 0.21 | 62.78 | 211.17 | 0.17 | 71.16 | 333.47 |
| 64 | ke | 0.16 | 66.72 | 186.99 | 0.11 | 65.71 | 300.98 |
| 65 | li | 0.09 | 69.81 | 184.93 | 0.07 | 73.09 | 297.86 |
| 66 | ha | 0.21 | 67.05 | 181.07 | 0.19 | 72.02 | 297.15 |
| 67 | tan | 0.13 | 70.42 | 178.65 | 0.14 | 75.59 | 308.29 |
| 68 | a | 0.24 | 69.10 | 175.73 | 0.16 | 79.36 | 378.16 |
| 69 | neh | 0.22 | 61.83 | 159.74 | 0.32 | 69.91 | 291.61 |
| 70 | war | 0.24 | 75.00 | 190.13 | 0.19 | 79.58 | 293.93 |
| 71 | na | 0.18 | 71.14 | 235.93 | 0.24 | 79.49 | 396.54 |
| 72 | nya | 0.21 | 67.93 | 248.91 | 0.30 | 74.22 | 362.74 |
| 73 | ku | 0.13 | 64.61 | 271.51 | 0.26 | 71.40 | 365.17 |
| 74 | ning | 0.21 | 73.00 | 250.83 | 0.17 | 74.70 | 399.23 |
| 75 | ke | 0.13 | 66.48 | 228.88 | 0.09 | 71.07 | 364.80 |
| 76 | e | 0.12 | 71.04 | 211.03 | 0.14 | 75.62 | 332.05 |
| 77 | ma | 0.18 | 71.15 | 210.45 | 0.19 | 80.13 | 330.42 |
| 78 | san | 0.22 | 70.24 | 205.16 | 0.25 | 75.05 | 334.28 |
| 79 | dan | 0.17 | 73.17 | 191.13 | 0.25 | 78.28 | 281.18 |
| 80 | be | 0.14 | 71.82 | 205.88 | 0.14 | 77.45 | 353.88 |
| 81 | rat | 0.31 | 64.99 | 268.93 | 0.34 | 77.30 | 364.10 |
| 82 | di | 0.10 | 72.84 | 207.02 | 0.09 | 77.45 | 320.72 |
| 83 | a | 0.08 | 75.11 | 230.41 | 0.09 | 79.73 | 431.22 |
| 84 | me | 0.16 | 71.98 | 221.20 | 0.09 | 77.15 | 435.19 |
| 85 | nyang | 0.25 | 70.32 | 201.48 | 0.25 | 74.95 | 380.74 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 86 | ka | 0.21 | 66.50 | 210.55 | 0.32 | 77.44 | 455.19 |
| 87 | ji | 0.16 | 70.56 | 197.04 | 0.16 | 77.21 | 342.00 |
| 88 | ran | 0.19 | 73.21 | 202.39 | 0.15 | 78.83 | 315.21 |
| 89 | nya | 0.18 | 69.73 | 206.42 | 0.13 | 76.49 | 398.61 |
| 90 | cu | 0.17 | 66.16 | 195.59 | 0.11 | 74.35 | 361.21 |
| 91 | ba | 0.17 | 69.14 | 193.79 | 0.12 | 70.55 | 241.33 |
| 92 | ber | 0.16 | 68.10 | 184.40 | 0.22 | 70.01 | 196.91 |
| 93 | gu | 0.14 | 66.06 | 186.63 | 0.11 | 66.57 | 176.30 |
| 94 | rau | 0.22 | 74.15 | 193.19 | 0.47 | 73.81 | 236.98 |
| 95 | la | 0.14 | 75.54 | 184.53 | 0.11 | 76.06 | 215.70 |
| 96 | lu | 0.25 | 66.43 | 178.38 | 0.14 | 77.99 | 243.76 |
| 97 | ber | 0.18 | 65.75 | 169.23 | 0.14 | 74.03 | 242.26 |
| 98 | ca | 0.26 | 70.09 | 185.66 | 0.19 | 77.79 | 237.93 |
| 99 | dang | 0.24 | 70.46 | 192.17 | 0.21 | 78.04 | 243.87 |
| 100 | un | 0.18 | 64.33 | 103.58 | 0.11 | 70.89 | 200.08 |
| 101 | tuk | 0.14 | 68.08 | 161.51 | 0.11 | 72.31 | 211.57 |
| 102 | mem | 0.20 | 66.45 | 144.76 | 0.11 | 74.19 | 200.27 |
| 103 | bu | 0.10 | 62.12 | 196.85 | 0.13 | 72.35 | 206.60 |
| 104 | ang | 0.23 | 70.70 | 211.87 | 0.23 | 74.85 | 268.41 |
| 105 | te | 0.12 | 67.06 | 186.05 | 0.07 | 70.71 | 206.50 |
| 106 | lur | 0.12 | 67.34 | 182.14 | 0.12 | 73.55 | 213.76 |
| 107 | i | 0.17 | 64.63 | 98.06 | 0.16 | 69.32 | 309.40 |
| 108 | tu | 0.19 | 59.06 | 152.96 | 0.23 | 65.77 | 86.01 |
| 109 | na | 0.14 | 75.14 | 169.75 | 0.17 | 79.57 | 287.94 |
| 110 | mun | 0.16 | 74.51 | 246.73 | 0.11 | 75.96 | 316.61 |
| 111 | se | 0.12 | 66.51 | 239.02 | 0.09 | 71.40 | 322.12 |
| 112 | le | 0.16 | 67.82 | 214.82 | 0.15 | 73.84 | 292.38 |
| 113 | pas | 0.21 | 68.07 | 213.53 | 0.20 | 75.41 | 285.84 |
| 114 | ber | 0.11 | 68.20 | 202.06 | 0.14 | 75.31 | 268.76 |
| 115 | fi | 0.25 | 65.04 | 198.07 | 0.22 | 66.74 | 269.90 |
| 116 | kir | 0.34 | 71.62 | 224.64 | 0.44 | 76.05 | 316.62 |
| 117 | di | 0.08 | 66.18 | 217.34 | 0.06 | 73.88 | 246.83 |
| 118 | a | 0.12 | 71.93 | 196.93 | 0.08 | 77.97 | 239.66 |
| 119 | mem | 0.25 | 72.96 | 195.85 | 0.13 | 79.00 | 234.42 |
| 120 | ba | 0.14 | 75.23 | 188.11 | 0.15 | 82.53 | 240.88 |
| 121 | wa | 0.20 | 71.32 | 192.41 | 0.15 | 77.57 | 269.80 |
| 122 | te | 0.10 | 69.65 | 191.99 | 0.09 | 71.15 | 260.27 |
| 123 | lur | 0.20 | 70.90 | 185.83 | 0.14 | 76.33 | 231.74 |
| 124 | i | 0.22 | 68.30 | 173.57 | 0.15 | 72.74 | 213.99 |
| 125 | tu | 0.19 | 66.35 | 199.26 | 0.16 | 69.50 | 216.21 |
| 126 | pu | 0.12 | 66.43 | 191.87 | 0.13 | 71.33 | 221.71 |
| 127 | lang | 0.23 | 73.59 | 194.01 | 0.14 | 74.34 | 223.13 |
| 128 | ke | 0.18 | 66.50 | 189.57 | 0.20 | 69.51 | 205.81 |
| 129 | ru | 0.12 | 67.49 | 181.07 | 0.11 | 71.56 | 199.98 |
| 130 | mah | 0.24 | 71.33 | 188.03 | 0.27 | 75.85 | 271.58 |
| 131 | un | 0.18 | 60.18 | 148.36 | 0.22 | 65.81 | 277.93 |
| 132 | tuk | 0.20 | 65.80 | 234.45 | 0.16 | 75.64 | 405.02 |
| 133 | di | 0.18 | 55.68 | 158.82 | 0.14 | 67.50 | 218.53 |
| 134 | pe | 0.10 | 66.04 | 170.87 | 0.09 | 73.62 | 203.65 |
| 135 | rik | 0.16 | 72.20 | 165.59 | 0.12 | 73.01 | 191.60 |
| 136 | sa | 0.27 | 60.71 | 112.70 | 0.35 | 64.69 | x |
| 137 | si | 0.10 | 64.40 | 496.50 | 0.28 | 74.34 | 338.90 |
| 138 | pe | 0.14 | 66.96 | 228.04 | 0.14 | 73.94 | 324.00 |
| 139 | ta | 0.15 | 75.82 | 223.68 | 0.18 | 79.68 | 302.07 |
| 140 | ni | 0.21 | 71.42 | 234.43 | 0.27 | 76.51 | 276.05 |
| 141 | be | 0.12 | 73.99 | 211.14 | 0.10 | 77.13 | 287.51 |
| 142 | ra | 0.12 | 75.86 | 200.28 | 0.18 | 81.53 | 298.85 |
| 143 | sa | 0.34 | 64.56 | 126.43 | 0.19 | 71.45 | 318.50 |
| 144 | ter | 0.17 | 68.65 | 195.20 | 0.24 | 70.88 | 310.96 |
| 145 | ke | 0.18 | 65.82 | 191.17 | 0.29 | 70.55 | 335.91 |
| 146 | jut | 0.17 | 74.22 | 211.78 | 0.27 | 81.45 | 375.56 |
| 147 | a | 0.14 | 69.18 | 178.75 | 0.15 | 73.99 | 288.24 |
| 148 | pa | 0.16 | 65.16 | 174.59 | 0.12 | 73.38 | 330.92 |
| 149 | bi | 0.09 | 68.60 | 183.57 | 0.10 | 78.31 | 323.57 |
| 150 | la | 0.17 | 72.43 | 193.31 | 0.21 | 78.96 | 353.58 |
| 151 | men | 0.18 | 69.93 | 184.24 | 0.16 | 77.83 | 288.12 |
| 152 | da | 0.19 | 68.70 | 177.63 | 0.17 | 81.09 | 238.72 |
| 153 | pa | 0.19 | 66.89 | 152.78 | 0.24 | 77.03 | 196.49 |

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|---|---|---|---|---|---|---|---|
| 154 | ti | 0.16 | 67.39 | 96.98 | 0.15 | 75.34 | 282.26 |
| 155 | i | 0.22 | 62.11 | 177.32 | 0.25 | 70.70 | 288.84 |
| 156 | tu | 0.15 | 68.08 | 200.16 | 0.14 | 74.63 | 360.02 |
| 157 | a | 0.14 | 73.09 | 275.77 | 0.12 | 83.01 | 261.45 |
| 158 | da | 0.11 | 67.92 | 181.58 | 0.08 | 78.87 | 233.91 |
| 159 | lah | 0.18 | 67.73 | 179.13 | 0.24 | 77.81 | 243.08 |
| 160 | te | 0.14 | 65.03 | 167.07 | 0.08 | 78.56 | 227.78 |
| 161 | lur | 0.12 | 69.06 | 165.58 | 0.25 | 78.42 | 249.43 |
| 162 | e | 0.15 | 69.94 | 190.33 | 0.13 | 77.01 | 361.50 |
| 163 | mas | 0.21 | 62.45 | 166.30 | 0.50 | 76.11 | 383.02 |
| 164 | si | 0.17 | 60.29 | 200.40 | 0.19 | 80.68 | 403.52 |
| 165 | pe | 0.13 | 69.24 | 212.15 | 0.19 | 78.01 | 374.40 |
| 166 | ta | 0.16 | 74.26 | 205.27 | 0.18 | 85.30 | 337.26 |
| 167 | ni | 0.16 | 69.31 | 207.75 | 0.25 | 73.11 | 339.71 |
| 168 | sung | 0.25 | 67.27 | 194.13 | 0.22 | 73.93 | 410.46 |
| 169 | guh | 0.17 | 72.78 | 194.04 | 0.20 | 81.67 | 341.87 |
| 170 | gem | 0.20 | 67.81 | 192.28 | 0.17 | 78.65 | 237.40 |
| 171 | bi | 0.12 | 70.12 | 195.09 | 0.13 | 80.99 | 232.63 |
| 172 | ra | 0.28 | 64.21 | 187.83 | 0.32 | 75.59 | 182.63 |
| 173 | ha | 0.19 | 70.22 | 217.41 | 0.17 | 80.12 | 375.04 |
| 174 | ri | 0.15 | 71.55 | 241.48 | 0.14 | 84.35 | 364.75 |
| 175 | de | 0.11 | 74.19 | 218.81 | 0.11 | 81.48 | 306.73 |
| 176 | mi | 0.18 | 69.58 | 218.34 | 0.11 | 82.55 | 274.55 |
| 177 | ha | 0.17 | 73.78 | 208.78 | 0.19 | 85.40 | 240.16 |
| 178 | ri | 0.14 | 69.58 | 217.43 | 0.19 | 76.77 | 225.81 |
| 179 | se | 0.11 | 63.09 | 211.98 | 0.09 | 72.13 | 237.98 |
| 180 | le | 0.19 | 66.38 | 197.59 | 0.15 | 76.71 | 213.01 |
| 181 | pas | 0.23 | 68.29 | 202.35 | 0.18 | 75.94 | 176.70 |
| 182 | i | 0.22 | 60.96 | 151.19 | 0.26 | 63.08 | 192.84 |
| 183 | tu | 0.18 | 66.20 | 225.40 | 0.41 | 75.88 | 320.20 |
| 184 | si | 0.22 | 64.53 | 202.38 | 0.19 | 71.68 | 380.11 |
| 185 | ang | 0.21 | 71.71 | 141.40 | 0.12 | 77.36 | 298.56 |
| 186 | sa | 0.29 | 65.50 | 199.56 | 0.23 | 71.02 | 182.92 |
| 187 | te | 0.09 | 67.33 | 199.00 | 0.09 | 79.17 | 339.30 |
| 188 | rus | 0.24 | 64.72 | 200.66 | 0.40 | 82.20 | 442.84 |
| 189 | ber | 0.21 | 64.25 | 185.59 | 0.16 | 71.14 | 268.73 |
| 190 | te | 0.11 | 67.64 | 183.33 | 0.07 | 79.12 | 241.46 |
| 191 | lur | 0.11 | 71.72 | 185.59 | 0.12 | 80.64 | 222.32 |
| 192 | e | 0.16 | 69.70 | 193.69 | 0.12 | 78.16 | 200.86 |
| 193 | mas | 0.25 | 66.31 | 199.10 | 0.23 | 70.00 | 180.38 |
| 194 | si | 0.21 | 63.02 | 248.76 | 0.13 | 71.21 | 298.85 |
| 195 | pe | 0.14 | 68.60 | 206.97 | 0.10 | 69.51 | 267.66 |
| 196 | ta | 0.17 | 75.23 | 199.63 | 0.11 | 84.21 | 253.62 |
| 197 | ni | 0.13 | 75.62 | 192.17 | 0.21 | 80.98 | 282.48 |
| 198 | mu | 0.18 | 73.93 | 195.97 | 0.08 | 78.17 | 277.78 |
| 199 | la | 0.16 | 73.25 | 202.02 | 0.20 | 79.03 | 304.98 |
| 200 | men | 0.22 | 71.91 | 191.82 | 0.11 | 78.47 | 245.36 |
| 201 | ja | 0.15 | 70.59 | 183.83 | 0.10 | 75.69 | 239.67 |
| 202 | di | 0.18 | 62.74 | 179.17 | 0.13 | 71.30 | 247.49 |
| 203 | ta | 0.15 | 73.46 | 185.67 | 0.09 | 80.91 | 329.13 |
| 204 | mak | 0.24 | 64.79 | 171.52 | 0.34 | 75.59 | 383.68 |
| 205 | si | 0.23 | 63.52 | 207.58 | 0.11 | 80.04 | 391.13 |
| 206 | pe | 0.12 | 71.68 | 206.04 | 0.17 | 74.90 | 383.20 |
| 207 | ta | 0.17 | 72.32 | 204.43 | 0.21 | 84.20 | 341.62 |
| 208 | ni | 0.21 | 70.51 | 209.92 | 0.13 | 77.75 | 348.83 |
| 209 | me | 0.14 | 72.00 | 200.17 | 0.19 | 79.67 | 285.60 |
| 210 | ngam | 0.18 | 72.90 | 188.97 | 0.18 | 82.16 | 241.29 |
| 211 | bil | 0.19 | 69.48 | 193.94 | 0.28 | 70.74 | 246.88 |
| 212 | pi | 0.15 | 67.58 | 190.98 | 0.24 | 72.01 | 293.15 |
| 213 | sau | 0.28 | 69.76 | 201.28 | 0.31 | 79.19 | 251.80 |
| 214 | dan | 0.23 | 69.03 | 184.28 | 0.19 | 78.69 | 209.84 |
| 215 | me | 0.12 | 65.51 | 175.22 | 0.13 | 76.27 | 213.77 |
| 216 | nyem | 0.22 | 64.88 | 175.41 | 0.19 | 75.59 | 214.86 |
| 217 | be | 0.12 | 70.82 | 193.36 | 0.12 | 77.95 | 301.55 |
| 218 | lih | 0.16 | 73.65 | 197.36 | 0.29 | 77.14 | 265.88 |
| 219 | ang | 0.23 | 70.15 | 177.30 | 0.16 | 76.15 | 235.85 |
| 220 | sa | 0.24 | 59.77 | 187.73 | 0.30 | 72.47 | 326.70 |
| 221 | ber | 0.22 | 63.45 | 192.86 | 0.11 | 73.67 | 232.16 |

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|---|---|---|---|---|---|---|---|
| 222 | tu | 0.08 | 64.74 | 177.60 | 0.10 | 69.81 | 233.12 |
| 223 | ah | 0.21 | 66.79 | 178.04 | 0.15 | 79.82 | 211.88 |
| 224 | nya | 0.22 | 59.70 | 201.92 | 0.29 | 69.51 | 201.24 |
| 225 | a | 0.11 | 72.82 | 185.63 | 0.15 | 71.68 | 203.88 |
| 226 | pa | 0.17 | 68.55 | 200.73 | 0.13 | 75.49 | 215.26 |
| 227 | bi | 0.07 | 69.53 | 202.13 | 0.09 | 79.34 | 240.88 |
| 228 | la | 0.15 | 71.32 | 210.58 | 0.13 | 81.03 | 255.33 |
| 229 | men | 0.28 | 70.37 | 211.26 | 0.23 | 79.30 | 240.13 |
| 230 | da | 0.17 | 72.71 | 188.52 | 0.16 | 79.84 | 210.51 |
| 231 | pa | 0.20 | 69.55 | 185.22 | 0.17 | 76.06 | 220.37 |
| 232 | ti | 0.20 | 63.01 | 212.88 | 0.15 | 67.67 | 236.73 |
| 233 | ti | 0.08 | 60.16 | 200.07 | 0.10 | 65.94 | 250.33 |
| 234 | a | 0.16 | 72.16 | 185.33 | 0.10 | 78.21 | 242.97 |
| 235 | da | 0.20 | 68.26 | 186.94 | 0.14 | 74.11 | 246.56 |
| 236 | se | 0.15 | 63.41 | 179.66 | 0.22 | 68.61 | 204.57 |
| 237 | bi | 0.16 | 62.89 | 178.20 | 0.19 | 73.66 | 233.61 |
| 238 | ji | 0.25 | 63.37 | 212.19 | 0.23 | 75.99 | 282.97 |
| 239 | pun | 0.22 | 66.58 | 198.00 | 0.18 | 67.92 | 257.07 |
| 240 | te | 0.07 | 67.97 | 185.39 | 0.06 | 73.68 | 253.01 |
| 241 | lur | 0.21 | 68.33 | 181.01 | 0.14 | 77.71 | 247.98 |
| 242 | e | 0.13 | 66.12 | 183.30 | 0.15 | 77.80 | 240.37 |
| 243 | mas | 0.33 | 67.90 | 196.37 | 0.38 | 77.44 | 263.00 |
| 244 | di | 0.14 | 58.99 | 180.44 | 0.13 | 66.42 | 223.42 |
| 245 | da | 0.10 | 75.10 | 179.91 | 0.12 | 81.86 | 230.25 |
| 246 | lam | 0.24 | 72.04 | 184.51 | 0.21 | 77.10 | 236.30 |
| 247 | pe | 0.09 | 65.43 | 183.30 | 0.09 | 73.79 | 232.28 |
| 248 | rut | 0.16 | 67.28 | 184.89 | 0.16 | 75.79 | 319.39 |
| 249 | ang | 0.23 | 66.49 | 312.63 | 0.26 | 70.41 | 163.19 |
| 250 | sa | 0.15 | 64.07 | 382.87 | 0.14 | 67.53 | 294.88 |
| 251 | i | 0.21 | 63.17 | 361.63 | 0.22 | 61.15 | 201.39 |
| 252 | tu | 0.33 | 63.07 | 290.97 | 0.28 | 69.42 | 310.53 |
| 253 | si | 0.22 | 60.73 | 223.15 | 0.21 | 71.09 | 370.12 |
| 254 | pe | 0.14 | 69.52 | 212.16 | 0.11 | 74.40 | 361.16 |
| 255 | ta | 0.15 | 73.93 | 204.99 | 0.10 | 84.95 | 355.28 |
| 256 | ni | 0.16 | 70.62 | 208.50 | 0.14 | 78.15 | 339.05 |
| 257 | mu | 0.17 | 73.39 | 201.74 | 0.18 | 75.89 | 313.98 |
| 258 | la | 0.15 | 73.39 | 205.81 | 0.25 | 81.87 | 353.08 |
| 259 | me | 0.23 | 72.02 | 190.53 | 0.17 | 77.54 | 332.25 |
| 260 | nye | 0.14 | 66.17 | 177.85 | 0.15 | 77.62 | 289.51 |
| 261 | da | 0.17 | 76.54 | 187.85 | 0.14 | 80.99 | 271.77 |
| 262 | ri | 0.18 | 68.23 | 193.95 | 0.15 | 75.06 | 269.68 |
| 263 | ke | 0.10 | 62.46 | 213.63 | 0.14 | 69.02 | 245.74 |
| 264 | si | 0.16 | 61.23 | 90.53 | 0.12 | 66.90 | 225.06 |
| 265 | la | 0.29 | 65.86 | 165.14 | 0.30 | 71.05 | 197.00 |
| 266 | pan | 0.15 | 75.79 | 193.59 | 0.20 | 77.97 | 284.22 |
| 267 | nya | 0.17 | 72.18 | 196.51 | 0.33 | 73.08 | 301.85 |
| 268 | dan | 0.21 | 69.60 | 176.90 | 0.18 | 78.23 | 302.12 |
| 269 | be | 0.08 | 65.69 | 175.08 | 0.05 | 75.19 | 300.58 |
| 270 | ra | 0.20 | 72.66 | 177.05 | 0.12 | 82.71 | 306.44 |
| 271 | sa | 0.19 | 63.04 | 174.88 | 0.17 | 74.92 | 277.20 |
| 272 | sa | 0.22 | 67.01 | 170.48 | 0.23 | 73.49 | 225.65 |
| 273 | ngat | 0.17 | 68.25 | 169.49 | 0.12 | 73.95 | 202.66 |
| 274 | me | 0.15 | 64.32 | 209.16 | 0.12 | 74.80 | 195.98 |
| 275 | nye | 0.10 | 64.12 | 168.99 | 0.10 | 78.06 | 194.00 |
| 276 | sal | 0.33 | 63.48 | 286.29 | 0.40 | 68.34 | 151.02 |
| 277 | su | 0.18 | 50.10 | x | 0.16 | 62.87 | 303.65 |
| 278 | a | 0.20 | 74.71 | 226.63 | 0.19 | 74.82 | 318.93 |
| 279 | tu | 0.13 | 73.14 | 268.29 | 0.16 | 79.48 | 415.65 |
| 280 | ha | 0.18 | 74.15 | 249.13 | 0.14 | 81.33 | 296.60 |
| 281 | ri | 0.25 | 71.61 | 243.86 | 0.36 | 73.19 | 224.49 |
| 282 | se | 0.19 | 64.26 | 367.71 | 0.10 | 70.44 | 221.48 |
| 283 | e | 0.11 | 69.90 | 227.58 | 0.19 | 72.34 | 215.67 |
| 284 | kor | 0.20 | 66.73 | 220.80 | 0.12 | 71.64 | 246.73 |
| 285 | an | 0.21 | 74.69 | 209.43 | 0.16 | 76.73 | 226.71 |
| 286 | jing | 0.22 | 68.99 | 220.24 | 0.18 | 76.01 | 274.04 |
| 287 | ter | 0.20 | 68.76 | 206.14 | 0.18 | 74.55 | 216.26 |
| 288 | jum | 0.23 | 65.27 | 201.73 | 0.32 | 73.12 | 263.99 |
| 289 | pa | 0.23 | 67.42 | 217.38 | 0.11 | 76.42 | 334.56 |

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|---|---|---|---|---|---|---|---|
| 290 | se | 0.12 | 65.95 | 206.50 | 0.23 | 69.40 | 277.63 |
| 291 | ke | 0.19 | 62.13 | 202.39 | 0.13 | 67.74 | 218.41 |
| 292 | tul | 0.18 | 69.78 | 196.44 | 0.14 | 72.90 | 205.56 |
| 293 | da | 0.16 | 74.22 | 187.63 | 0.16 | 77.30 | 289.14 |
| 294 | ging | 0.30 | 63.35 | 208.40 | 0.30 | 70.36 | 145.10 |
| 295 | di | 0.10 | 67.87 | 194.79 | 0.15 | 72.10 | 215.84 |
| 296 | a | 0.17 | 76.71 | 235.33 | 0.13 | 81.50 | 240.78 |
| 297 | meng | 0.15 | 72.05 | 206.67 | 0.19 | 73.80 | 209.75 |
| 298 | gong | 0.25 | 70.50 | 196.04 | 0.24 | 76.93 | 224.36 |
| 299 | gong | 0.21 | 73.63 | 206.48 | 0.21 | 80.30 | 266.44 |
| 300 | da | 0.18 | 73.14 | 188.06 | 0.17 | 79.64 | 233.93 |
| 301 | ging | 0.14 | 70.77 | 192.03 | 0.17 | 76.18 | 227.67 |
| 302 | i | 0.23 | 63.40 | 189.25 | 0.16 | 69.08 | 218.56 |
| 303 | tu | 0.19 | 65.38 | 215.73 | 0.12 | 71.81 | 233.46 |
| 304 | di | 0.16 | 65.59 | 182.85 | 0.16 | 71.82 | 202.12 |
| 305 | mu | 0.21 | 65.62 | 176.98 | 0.17 | 73.38 | 183.19 |
| 306 | lut | 0.19 | 68.36 | 195.04 | 0.43 | 66.14 | 283.06 |
| 307 | un | 0.22 | 64.19 | 193.56 | 0.22 | 70.74 | 303.67 |
| 308 | tuk | 0.16 | 70.52 | 218.71 | 0.10 | 78.64 | 310.56 |
| 309 | me | 0.15 | 70.01 | 160.24 | 0.12 | 78.90 | 281.05 |
| 310 | ma | 0.28 | 63.79 | 181.39 | 0.28 | 73.87 | 278.55 |
| 311 | kan | 0.20 | 69.80 | 218.91 | 0.20 | 76.40 | 363.79 |
| 312 | nya | 0.21 | 69.95 | 209.17 | 0.21 | 77.22 | 274.00 |
| 313 | di | 0.19 | 55.44 | 193.57 | 0.16 | 69.05 | 233.88 |
| 314 | tem | 0.19 | 61.20 | 193.88 | 0.19 | 66.28 | 224.77 |
| 315 | pat | 0.15 | 73.17 | 190.05 | 0.14 | 77.07 | 229.25 |
| 316 | yang | 0.20 | 69.07 | 173.07 | 0.12 | 74.20 | 203.10 |
| 317 | se | 0.21 | 62.22 | 182.40 | 0.17 | 70.11 | 196.61 |
| 318 | la | 0.11 | 70.91 | 179.26 | 0.12 | 77.97 | 183.39 |
| 319 | mat | 0.23 | 64.65 | 169.96 | 0.29 | 67.63 | 172.32 |
| 320 | da | 0.10 | 76.18 | 193.99 | 0.16 | 81.71 | 282.01 |
| 321 | lam | 0.21 | 73.43 | 213.80 | 0.19 | 78.50 | 362.74 |
| 322 | per | 0.14 | 71.61 | 205.71 | 0.14 | 76.59 | 324.88 |
| 323 | ja | 0.15 | 73.79 | 194.74 | 0.16 | 78.46 | 288.78 |
| 324 | la | 0.20 | 77.88 | 192.51 | 0.20 | 81.84 | 280.93 |
| 325 | nan | 0.34 | 71.67 | 209.20 | 0.54 | 71.81 | 368.89 |
| 326 | di | 0.11 | 62.35 | 155.06 | 0.10 | 69.44 | 206.98 |
| 327 | a | 0.18 | 71.25 | 204.69 | 0.14 | 76.16 | 249.38 |
| 328 | la | 0.10 | 77.88 | 191.15 | 0.16 | 85.82 | 244.69 |
| 329 | lu | 0.20 | 70.64 | 195.13 | 0.17 | 76.66 | 282.61 |
| 330 | di | 0.17 | 62.49 | 184.99 | 0.18 | 72.44 | 272.68 |
| 331 | te | 0.16 | 62.48 | 190.34 | 0.14 | 70.55 | 225.12 |
| 332 | pi | 0.19 | 69.37 | 197.59 | 0.14 | 75.36 | 257.64 |
| 333 | a | 0.16 | 71.62 | 146.14 | 0.09 | 78.95 | 194.35 |
| 334 | nak | 0.16 | 70.03 | 178.08 | 0.10 | 76.41 | 149.86 |
| 335 | su | 0.13 | 65.18 | 192.98 | 0.21 | 70.41 | 186.82 |
| 336 | ngai | 0.26 | 66.80 | 173.66 | 0.29 | 67.40 | 171.92 |
| 337 | se | 0.13 | 59.52 | 208.75 | 0.10 | 76.38 | 278.83 |
| 338 | ma | 0.14 | 73.65 | 211.83 | 0.12 | 77.97 | 324.98 |
| 339 | sa | 0.21 | 63.51 | 226.13 | 0.13 | 74.97 | 379.02 |
| 340 | ber | 0.15 | 68.55 | 204.23 | 0.15 | 75.42 | 315.72 |
| 341 | ja | 0.18 | 73.85 | 195.22 | 0.17 | 81.54 | 195.81 |
| 342 | lan | 0.22 | 75.57 | 224.82 | 0.56 | 70.96 | 252.42 |
| 343 | an | 0.16 | 69.48 | 208.42 | 0.14 | 75.47 | 215.39 |
| 344 | jing | 0.21 | 70.55 | 194.94 | 0.11 | 74.35 | 219.83 |
| 345 | i | 0.17 | 67.71 | 192.14 | 0.22 | 68.83 | 215.08 |
| 346 | tu | 0.15 | 65.11 | 199.43 | 0.16 | 74.24 | 371.43 |
| 347 | me | 0.16 | 71.30 | 195.15 | 0.09 | 79.10 | 289.20 |
| 348 | li | 0.08 | 69.29 | 189.01 | 0.11 | 79.63 | 231.30 |
| 349 | hat | 0.20 | 70.34 | 196.74 | 0.21 | 77.81 | 231.51 |
| 350 | ke | 0.14 | 63.06 | 186.73 | 0.11 | 71.27 | 214.75 |
| 351 | da | 0.09 | 74.05 | 183.35 | 0.09 | 81.15 | 198.11 |
| 352 | lam | 0.20 | 73.80 | 184.17 | 0.13 | 77.44 | 186.08 |
| 353 | a | 0.13 | 72.45 | 186.90 | 0.17 | 78.00 | 240.33 |
| 354 | ir | 0.32 | 65.08 | 180.65 | 0.32 | 75.40 | 396.03 |
| 355 | a | 0.18 | 72.57 | 157.43 | 0.22 | 76.19 | 333.18 |
| 356 | da | 0.13 | 74.06 | 210.41 | 0.11 | 76.86 | 367.11 |
| 357 | se | 0.21 | 67.57 | 268.75 | 0.25 | 73.16 | 341.34 |

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|---|---|---|---|---|---|---|---|
| 358 | e | 0.12 | 68.37 | 254.46 | 0.17 | 74.63 | 335.34 |
| 359 | kor | 0.15 | 66.43 | 202.48 | 0.19 | 75.67 | 351.33 |
| 360 | an | 0.20 | 73.28 | 198.06 | 0.15 | 78.13 | 307.34 |
| 361 | jing | 0.20 | 68.40 | 185.54 | 0.18 | 75.22 | 287.67 |
| 362 | la | 0.13 | 76.45 | 177.29 | 0.23 | 82.10 | 302.65 |
| 363 | in | 0.22 | 73.46 | 206.73 | 0.38 | 74.60 | 248.39 |
| 364 | de | 0.10 | 69.94 | 206.99 | 0.11 | 76.32 | 255.03 |
| 365 | ngan | 0.25 | 67.01 | 179.65 | 0.22 | 79.39 | 290.81 |
| 366 | da | 0.21 | 71.94 | 174.13 | 0.16 | 81.97 | 319.83 |
| 367 | ging | 0.24 | 71.67 | 202.81 | 0.22 | 76.87 | 371.15 |
| 368 | di | 0.19 | 64.99 | 179.88 | 0.18 | 78.50 | 245.32 |
| 369 | mu | 0.12 | 64.52 | 171.99 | 0.14 | 77.98 | 229.73 |
| 370 | lut | 0.15 | 73.73 | 200.27 | 0.17 | 78.90 | 228.44 |
| 371 | nya | 0.23 | 67.88 | 202.18 | 0.24 | 77.28 | 229.46 |
| 372 | di | 0.15 | 63.33 | 210.42 | 0.14 | 69.72 | 235.57 |
| 373 | da | 0.13 | 71.09 | 204.10 | 0.10 | 83.30 | 235.25 |
| 374 | lam | 0.20 | 70.47 | 171.56 | 0.19 | 80.13 | 263.03 |
| 375 | a | 0.13 | 69.76 | 150.21 | 0.09 | 81.68 | 273.54 |
| 376 | ir | 0.13 | 65.92 | 174.89 | 0.14 | 77.56 | 286.26 |
| 377 | i | 0.21 | 61.52 | 197.50 | 0.11 | 70.95 | 356.39 |
| 378 | tu | 0.11 | 55.36 | 151.00 | 0.31 | 71.81 | 273.36 |
| 379 | di | 0.07 | 70.91 | 208.90 | 0.09 | 74.83 | 247.74 |
| 380 | a | 0.15 | 73.80 | 238.40 | 0.10 | 82.12 | 461.88 |
| 381 | ti | 0.15 | 65.81 | 220.15 | 0.07 | 77.69 | 423.18 |
| 382 | dak | 0.20 | 70.76 | 198.72 | 0.19 | 81.73 | x |
| 383 | ta | 0.09 | 71.73 | 195.03 | 0.20 | 77.51 | 186.62 |
| 384 | hu | 0.16 | 73.54 | 198.84 | 0.26 | 75.89 | 253.54 |
| 385 | i | 0.23 | 66.41 | 157.31 | 0.21 | 67.79 | 200.51 |
| 386 | tu | 0.20 | 69.37 | 211.90 | 0.13 | 76.50 | 314.73 |
| 387 | i | 0.11 | 70.40 | 189.66 | 0.09 | 78.28 | 218.30 |
| 388 | a | 0.12 | 73.13 | 185.88 | 0.10 | 81.56 | 204.05 |
| 389 | lah | 0.19 | 72.82 | 188.33 | 0.16 | 77.54 | 200.42 |
| 390 | ba | 0.13 | 74.93 | 180.53 | 0.10 | 79.14 | 194.42 |
| 391 | yang | 0.26 | 71.36 | 180.22 | 0.21 | 74.76 | 188.58 |
| 392 | ba | 0.13 | 74.61 | 177.03 | 0.08 | 79.42 | 183.05 |
| 393 | yang | 0.22 | 72.31 | 185.75 | 0.19 | 76.18 | 186.08 |
| 394 | nya | 0.12 | 69.67 | 190.33 | 0.15 | 74.61 | 192.28 |
| 395 | sen | 0.23 | 66.62 | 184.94 | 0.17 | 70.30 | 190.83 |
| 396 | di | 0.13 | 68.01 | 182.87 | 0.13 | 75.15 | 200.88 |
| 397 | ri | 0.26 | 62.88 | 273.96 | 0.33 | 70.97 | 360.86 |
| 398 | di | 0.07 | 65.42 | 208.86 | 0.10 | 72.96 | 247.36 |
| 399 | a | 0.16 | 75.97 | 213.87 | 0.11 | 81.72 | 342.59 |
| 400 | ma | 0.16 | 74.91 | 200.36 | 0.21 | 82.75 | 279.73 |
| 401 | hu | 0.19 | 72.23 | 207.38 | 0.16 | 79.20 | 360.08 |
| 402 | men | 0.18 | 71.75 | 191.18 | 0.17 | 80.04 | 218.02 |
| 403 | da | 0.21 | 66.41 | 180.39 | 0.14 | 77.42 | 211.02 |
| 404 | pat | 0.15 | 71.29 | 188.30 | 0.15 | 75.87 | 324.13 |
| 405 | kan | 0.21 | 69.77 | 191.52 | 0.15 | 75.43 | 202.62 |
| 406 | da | 0.12 | 72.88 | 180.50 | 0.14 | 76.05 | 187.41 |
| 407 | ging | 0.18 | 65.20 | 176.95 | 0.18 | 70.02 | 187.35 |
| 408 | i | 0.26 | 65.45 | 187.59 | 0.12 | 68.82 | 188.44 |
| 409 | tu | 0.22 | 59.61 | 309.62 | 0.23 | 64.17 | 174.69 |
| 410 | di | 0.09 | 70.56 | 185.27 | 0.12 | 75.22 | 199.74 |
| 411 | a | 0.12 | 62.48 | 188.75 | 0.23 | 78.82 | 211.58 |
| 412 | pun | 0.16 | 74.74 | 208.67 | 0.12 | 76.35 | 245.33 |
| 413 | me | 0.20 | 72.06 | 191.15 | 0.30 | 77.45 | 217.28 |
| 414 | nya | 0.14 | 74.43 | 187.56 | 0.25 | 82.55 | 287.11 |
| 415 | lak | 0.26 | 71.60 | 178.64 | 0.36 | 82.15 | 387.61 |
| 416 | ke | 0.11 | 61.98 | 191.00 | 0.14 | 66.77 | 292.31 |
| 417 | pa | 0.13 | 73.81 | 183.83 | 0.15 | 78.04 | 285.18 |
| 418 | da | 0.09 | 72.53 | 187.34 | 0.09 | 79.18 | 289.74 |
| 419 | an | 0.23 | 69.14 | 185.45 | 0.16 | 80.26 | 296.25 |
| 420 | jing | 0.24 | 70.65 | 195.78 | 0.22 | 73.77 | 299.62 |
| 421 | di | 0.09 | 65.19 | 188.22 | 0.14 | 75.73 | 266.93 |
| 422 | da | 0.16 | 71.58 | 181.92 | 0.12 | 84.14 | 242.77 |
| 423 | lam | 0.15 | 72.24 | 177.41 | 0.12 | 82.36 | 235.68 |
| 424 | a | 0.18 | 69.03 | 180.99 | 0.12 | 80.30 | 235.42 |
| 425 | ir | 0.31 | 68.33 | 240.38 | 0.30 | 74.00 | 188.63 |

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|---|---|---|---|---|---|---|---|
| 426 | se | 0.12 | 67.63 | 198.54 | 0.20 | 71.70 | 224.06 |
| 427 | ba | 0.08 | 75.62 | 202.86 | 0.09 | 85.49 | 276.51 |
| 428 | ik | 0.14 | 76.20 | 210.83 | 0.24 | 81.24 | 341.73 |
| 429 | sa | 0.24 | 69.10 | 158.75 | 0.20 | 80.36 | 234.40 |
| 430 | ja | 0.23 | 69.02 | 197.43 | 0.18 | 78.92 | 310.22 |
| 431 | di | 0.07 | 64.27 | 192.67 | 0.06 | 78.51 | 290.40 |
| 432 | a | 0.17 | 74.36 | 191.98 | 0.12 | 80.41 | 297.10 |
| 433 | mem | 0.23 | 69.33 | 182.59 | 0.16 | 80.17 | 279.56 |
| 434 | bu | 0.18 | 61.32 | 178.61 | 0.13 | 71.76 | 275.60 |
| 435 | ka | 0.17 | 62.34 | 183.14 | 0.15 | 75.20 | 279.93 |
| 436 | mu | 0.12 | 67.97 | 182.69 | 0.09 | 78.47 | 267.14 |
| 437 | lut | 0.30 | 70.44 | 206.18 | 0.32 | 74.61 | 336.68 |
| 438 | da | 0.20 | 70.87 | 183.17 | 0.20 | 79.46 | 239.33 |
| 439 | ging | 0.22 | 71.35 | 190.89 | 0.20 | 75.98 | 249.43 |
| 440 | di | 0.15 | 67.71 | 179.98 | 0.12 | 74.59 | 238.28 |
| 441 | mu | 0.10 | 63.25 | 173.17 | 0.14 | 74.37 | 223.63 |
| 442 | lut | 0.20 | 72.13 | 196.06 | 0.15 | 79.51 | 335.82 |
| 443 | nya | 0.19 | 71.37 | 193.62 | 0.26 | 74.63 | 326.08 |
| 444 | ter | 0.14 | 65.95 | 180.41 | 0.13 | 73.53 | 269.90 |
| 445 | ja | 0.28 | 66.17 | 175.87 | 0.26 | 74.51 | 264.30 |
| 446 | tuh | 0.23 | 62.86 | 176.47 | 0.36 | 68.98 | 363.97 |
| 447 | ke | 0.11 | 64.06 | 171.99 | 0.11 | 67.87 | 195.84 |
| 448 | da | 0.10 | 74.81 | 162.40 | 0.12 | 80.72 | 209.99 |
| 449 | lam | 0.20 | 69.03 | 159.40 | 0.14 | 78.37 | 297.50 |
| 450 | a | 0.11 | 72.52 | 172.22 | 0.11 | 80.08 | 277.33 |
| 451 | ir | 0.22 | 67.11 | 150.66 | 0.29 | 70.47 | 191.45 |
| 452 | se | 0.18 | 63.08 | 226.90 | 0.15 | 68.95 | x |
| 453 | e | 0.23 | 71.78 | 297.49 | 0.16 | 74.24 | x |
| 454 | kor | 0.20 | 67.21 | 287.48 | 0.11 | 73.61 | 413.31 |
| 455 | se | 0.08 | 65.88 | 251.72 | 0.21 | 70.68 | 356.01 |
| 456 | mut | 0.19 | 72.04 | 235.24 | 0.09 | 77.23 | 302.26 |
| 457 | yang | 0.27 | 69.85 | 212.35 | 0.21 | 78.28 | 277.08 |
| 458 | ke | 0.11 | 65.73 | 207.62 | 0.10 | 74.62 | 266.33 |
| 459 | hau | 0.25 | 72.85 | 197.03 | 0.21 | 77.46 | 233.69 |
| 460 | san | 0.33 | 67.48 | 206.64 | 0.58 | 71.72 | 217.34 |
| 461 | i | 0.17 | 69.87 | 147.64 | 0.10 | 73.79 | 256.43 |
| 462 | ngin | 0.18 | 70.96 | 210.24 | 0.21 | 78.74 | 288.12 |
| 463 | me | 0.15 | 70.41 | 189.58 | 0.08 | 75.58 | 242.15 |
| 464 | mi | 0.10 | 69.21 | 185.41 | 0.12 | 77.16 | 228.45 |
| 465 | num | 0.19 | 71.77 | 192.30 | 0.18 | 74.64 | 220.98 |
| 466 | a | 0.22 | 73.67 | 182.29 | 0.19 | 77.18 | 254.70 |
| 467 | ir | 0.20 | 73.28 | 189.53 | 0.22 | 76.30 | 233.87 |
| 468 | da | 0.23 | 74.87 | 178.87 | 0.11 | 78.30 | 224.17 |
| 469 | ri | 0.14 | 67.67 | 172.85 | 0.18 | 77.72 | 220.14 |
| 470 | a | 0.16 | 68.58 | 274.30 | 0.12 | 78.14 | 182.60 |
| 471 | ir | 0.25 | 64.60 | 177.73 | 0.28 | 73.10 | 208.70 |
| 472 | ter | 0.16 | 56.48 | 171.24 | 0.15 | 69.09 | 193.51 |
| 473 | jun | 0.21 | 65.76 | 181.34 | 0.15 | 76.75 | 217.28 |
| 474 | yang | 0.20 | 65.84 | 174.45 | 0.22 | 76.38 | 204.79 |
| 475 | ber | 0.08 | 64.25 | 175.20 | 0.10 | 75.76 | 190.35 |
| 476 | ham | 0.26 | 62.14 | 172.19 | 0.23 | 71.39 | 200.24 |
| 477 | pi | 0.11 | 61.86 | 197.11 | 0.11 | 76.39 | 311.41 |
| 478 | ran | 0.20 | 64.13 | 169.27 | 0.30 | 76.00 | 332.35 |
| 479 | na | 0.14 | 71.33 | 150.95 | 0.27 | 81.44 | 274.70 |
| 480 | mun | 0.28 | 72.47 | 206.54 | 0.41 | 76.58 | 293.66 |
| 481 | na | 0.15 | 69.65 | 182.59 | 0.14 | 75.43 | 239.06 |
| 482 | sib | 0.24 | 66.32 | 174.86 | 0.28 | 73.38 | 270.94 |
| 483 | nya | 0.17 | 69.66 | 189.50 | 0.18 | 79.39 | 276.65 |
| 484 | ma | 0.18 | 73.67 | 209.58 | 0.29 | 82.38 | 248.14 |
| 485 | lang | 0.16 | 75.32 | 195.80 | 0.43 | 78.11 | 268.41 |
| 486 | a | 0.16 | 69.91 | 173.62 | 0.15 | 75.84 | 204.39 |
| 487 | pa | 0.13 | 63.95 | 175.04 | 0.12 | 74.02 | 253.88 |
| 488 | bi | 0.16 | 66.80 | 177.80 | 0.08 | 75.63 | 258.94 |
| 489 | la | 0.19 | 68.03 | 182.55 | 0.21 | 73.50 | 255.56 |
| 490 | ka | 0.19 | 69.07 | 177.85 | 0.29 | 72.10 | 250.09 |
| 491 | ki | 0.16 | 64.91 | 190.12 | 0.23 | 82.18 | 429.51 |
| 492 | nya | 0.23 | 69.93 | 197.61 | 0.25 | 77.44 | 236.95 |
| 493 | ter | 0.18 | 64.81 | 193.89 | 0.22 | 73.79 | 315.38 |

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|---|---|---|---|---|---|---|---|
| 494 | ge | 0.12 | 65.72 | 178.20 | 0.16 | 78.76 | 333.13 |
| 495 | lin | 0.22 | 62.41 | 179.80 | 0.23 | 71.78 | 334.11 |
| 496 | cir | 0.23 | 67.17 | 195.94 | 0.24 | 73.81 | 359.80 |
| 497 | dan | 0.19 | 70.81 | 173.32 | 0.25 | 76.06 | 332.81 |
| 498 | ter | 0.14 | 62.47 | 305.37 | 0.20 | 75.32 | 219.23 |
| 499 | ja | 0.28 | 64.07 | 227.13 | 0.41 | 69.42 | 305.51 |
| 500 | tuh | 0.18 | 67.94 | 201.78 | 0.21 | 82.75 | 325.51 |
| 501 | di | 0.18 | 58.10 | 336.22 | 0.11 | 75.77 | 289.01 |
| 502 | da | 0.16 | 70.52 | 212.94 | 0.10 | 82.72 | 306.61 |
| 503 | lam | 0.21 | 69.19 | 169.08 | 0.19 | 82.07 | 331.53 |
| 504 | a | 0.11 | 66.75 | x | 0.08 | 83.08 | 323.70 |
| 505 | ir | 0.18 | 67.60 | 174.35 | 0.17 | 82.46 | 342.89 |
| 506 | ter | 0.17 | 63.06 | 102.08 | 0.20 | 74.93 | 309.14 |
| 507 | jun | 0.20 | 66.03 | 181.57 | 0.20 | 75.49 | 263.15 |
| 508 | yang | 0.21 | 65.27 | 173.08 | 0.19 | 78.47 | 343.96 |
| 509 | de | 0.08 | 69.51 | 186.31 | 0.11 | 80.91 | 399.27 |
| 510 | ras | 0.28 | 64.08 | 171.43 | 0.39 | 76.50 | 422.08 |
| 511 | a | 0.12 | 67.93 | 190.64 | 0.13 | 76.17 | 231.11 |
| 512 | pa | 0.11 | 70.01 | 207.42 | 0.08 | 73.55 | 252.58 |
| 513 | bi | 0.13 | 73.45 | 209.22 | 0.11 | 74.39 | 252.90 |
| 514 | la | 0.18 | 72.54 | 217.91 | 0.14 | 77.69 | 266.22 |
| 515 | di | 0.07 | 68.40 | 201.03 | 0.05 | 77.65 | 257.62 |
| 516 | a | 0.10 | 75.29 | 206.85 | 0.10 | 79.25 | 264.54 |
| 517 | ham | 0.27 | 69.16 | 199.73 | 0.13 | 77.38 | 250.40 |
| 518 | pir | 0.13 | 70.75 | 201.97 | 0.06 | 75.74 | 263.72 |
| 519 | ham | 0.22 | 71.67 | 190.60 | 0.21 | 76.87 | 247.52 |
| 520 | pir | 0.08 | 71.89 | 194.93 | 0.13 | 77.41 | 238.53 |
| 521 | le | 0.18 | 73.65 | 188.13 | 0.14 | 78.18 | 258.02 |
| 522 | mas | 0.35 | 68.28 | 206.40 | 0.41 | 72.47 | 299.67 |
| 523 | se | 0.15 | 61.12 | 102.10 | 0.10 | 71.91 | 98.13 |
| 524 | e | 0.12 | 70.09 | 198.56 | 0.08 | 80.22 | x |
| 525 | kor | 0.17 | 65.38 | 202.55 | 0.13 | 70.94 | 243.65 |
| 526 | mer | 0.18 | 70.80 | 194.77 | 0.16 | 74.98 | 217.84 |
| 527 | pa | 0.20 | 69.37 | 188.09 | 0.26 | 71.60 | 228.16 |
| 528 | ti | 0.10 | 66.58 | 195.94 | 0.35 | 64.57 | 248.09 |
| 529 | yang | 0.17 | 70.42 | 187.54 | 0.19 | 69.17 | 202.87 |
| 530 | ber | 0.18 | 63.67 | 179.99 | 0.17 | 67.92 | 184.63 |
| 531 | teng | 0.23 | 67.89 | 188.39 | 0.20 | 80.99 | 219.95 |
| 532 | gek | 0.20 | 66.08 | 198.82 | 0.22 | 78.01 | 253.33 |
| 533 | ti | 0.17 | 59.31 | 187.27 | 0.08 | 69.06 | 219.53 |
| 534 | dak | 0.21 | 66.89 | 176.20 | 0.17 | 81.82 | 316.04 |
| 535 | ja | 0.12 | 70.34 | 99.40 | 0.19 | 83.36 | 221.73 |
| 536 | uh | 0.20 | 71.11 | 163.53 | 0.11 | 81.43 | 272.38 |
| 537 | da | 0.10 | 73.15 | 192.41 | 0.11 | 81.85 | 236.07 |
| 538 | ri | 0.23 | 65.12 | 186.11 | 0.11 | 75.17 | 225.98 |
| 539 | po | 0.15 | 61.67 | 178.49 | 0.17 | 67.02 | 155.57 |
| 540 | kok | 0.15 | 65.42 | 330.86 | 0.17 | 70.89 | 341.44 |
| 541 | i | 0.21 | 61.34 | 300.02 | 0.19 | 74.54 | 361.40 |
| 542 | tu | 0.18 | 67.83 | 155.16 | 0.20 | 80.97 | 408.34 |
| 543 | men | 0.23 | 68.63 | 186.68 | 0.19 | 78.99 | 242.76 |
| 544 | ja | 0.24 | 66.94 | 174.40 | 0.31 | 70.00 | 212.54 |
| 545 | tuh | 0.19 | 66.03 | 194.73 | 0.21 | 77.45 | 416.45 |
| 546 | kan | 0.23 | 69.46 | 192.43 | 0.29 | 77.51 | 248.19 |
| 547 | se | 0.16 | 65.93 | 182.73 | 0.17 | 71.56 | 191.58 |
| 548 | he | 0.17 | 66.36 | 179.17 | 0.08 | 79.10 | 206.78 |
| 549 | lai | 0.12 | 74.14 | 178.66 | 0.16 | 82.86 | 327.00 |
| 550 | da | 0.20 | 71.22 | 184.75 | 0.13 | 82.83 | 352.64 |
| 551 | un | 0.23 | 65.21 | 164.56 | 0.27 | 74.66 | 236.33 |
| 552 | se | 0.11 | 70.49 | 206.96 | 0.08 | 71.31 | 270.94 |
| 553 | mut | 0.16 | 72.12 | 213.16 | 0.15 | 79.64 | 274.58 |
| 554 | i | 0.15 | 65.03 | 199.58 | 0.16 | 78.23 | 286.08 |
| 555 | tu | 0.17 | 64.24 | 201.47 | 0.12 | 69.25 | 288.30 |
| 556 | pun | 0.16 | 72.09 | 213.29 | 0.14 | 75.41 | 285.25 |
| 557 | me | 0.15 | 71.34 | 204.28 | 0.25 | 79.49 | 267.97 |
| 558 | man | 0.22 | 74.16 | 190.77 | 0.34 | 77.81 | 285.70 |
| 559 | jat | 0.22 | 67.61 | 196.02 | 0.33 | 79.60 | 333.40 |
| 560 | ke | 0.11 | 65.07 | 191.73 | 0.09 | 79.08 | 284.55 |
| 561 | a | 0.12 | 73.81 | 265.15 | 0.15 | 83.04 | 269.01 |

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|---|---|---|---|---|---|---|---|
| 562 | tas | 0.30 | 65.59 | 189.11 | 0.21 | 75.89 | 274.08 |
| 563 | da | 0.12 | 72.27 | 181.52 | 0.10 | 78.36 | 254.92 |
| 564 | un | 0.15 | 64.26 | 180.91 | 0.12 | 74.81 | 249.64 |
| 565 | ter | 0.13 | 67.16 | 184.13 | 0.11 | 76.94 | 235.03 |
| 566 | se | 0.19 | 67.99 | 194.56 | 0.26 | 72.98 | 214.77 |
| 567 | but | 0.23 | 67.87 | 264.73 | 0.48 | 66.98 | 245.47 |
| 568 | dan | 0.19 | 69.41 | 176.25 | 0.23 | 80.64 | 209.28 |
| 569 | ak | 0.14 | 70.19 | 155.79 | 0.25 | 84.34 | 203.99 |
| 570 | hir | 0.21 | 71.38 | 193.98 | 0.20 | 82.18 | 359.28 |
| 571 | nya | 0.26 | 66.39 | 199.61 | 0.30 | 77.13 | 408.73 |
| 572 | ti | 0.16 | 62.35 | 193.53 | 0.24 | 71.85 | 310.68 |
| 573 | ba | 0.19 | 70.73 | 194.36 | 0.19 | 79.91 | 334.50 |
| 574 | de | 0.08 | 69.08 | 185.48 | 0.10 | 80.40 | 292.91 |
| 575 | ngan | 0.15 | 66.78 | 179.53 | 0.23 | 76.41 | 238.74 |
| 576 | se | 0.21 | 58.86 | 176.34 | 0.11 | 79.43 | 219.96 |
| 577 | la | 0.18 | 74.03 | 181.64 | 0.17 | 80.35 | 213.87 |
| 578 | mat | 0.17 | 73.75 | 189.86 | 0.20 | 79.92 | 223.79 |
| 579 | di | 0.20 | 58.11 | 183.95 | 0.20 | 69.08 | 200.92 |
| 580 | te | 0.15 | 62.69 | 341.09 | 0.07 | 75.02 | 202.63 |
| 581 | bing | 0.08 | 71.47 | 170.93 | 0.17 | 76.51 | 200.89 |
| 582 | su | 0.25 | 63.62 | 157.33 | 0.19 | 69.90 | 196.75 |
| 583 | ngai | 0.22 | 64.97 | 159.86 | 0.31 | 71.32 | 181.99 |
| 584 | be | 0.17 | 72.44 | 217.62 | 0.08 | 76.01 | 230.97 |
| 585 | be | 0.10 | 76.99 | 223.86 | 0.09 | 80.40 | 224.87 |
| 586 | ra | 0.20 | 73.16 | 219.18 | 0.16 | 78.73 | 239.69 |
| 587 | pa | 0.09 | 72.69 | 226.88 | 0.07 | 79.16 | 278.81 |
| 588 | ha | 0.14 | 75.29 | 225.98 | 0.12 | 82.76 | 281.49 |
| 589 | ri | 0.19 | 74.92 | 214.13 | 0.17 | 75.34 | 274.01 |
| 590 | ke | 0.14 | 70.53 | 211.61 | 0.08 | 75.02 | 271.25 |
| 591 | mu | 0.21 | 72.51 | 202.05 | 0.16 | 78.32 | 241.50 |
| 592 | di | 0.07 | 73.46 | 202.66 | 0.08 | 75.32 | 219.96 |
| 593 | an | 0.23 | 76.48 | 245.19 | 0.30 | 74.65 | 231.79 |
| 594 | se | 0.22 | 66.59 | 241.67 | 0.18 | 68.23 | 441.10 |
| 595 | o | 0.12 | 68.13 | 240.04 | 0.12 | 80.25 | 340.75 |
| 596 | rang | 0.29 | 70.72 | 204.60 | 0.17 | 78.58 | 330.94 |
| 597 | pem | 0.19 | 72.77 | 195.13 | 0.14 | 78.18 | 291.37 |
| 598 | bu | 0.14 | 74.56 | 204.63 | 0.12 | 79.29 | 297.03 |
| 599 | ru | 0.10 | 73.31 | 213.31 | 0.09 | 80.14 | 354.94 |
| 600 | me | 0.17 | 72.35 | 206.22 | 0.19 | 79.80 | 304.48 |
| 601 | li | 0.17 | 73.35 | 196.57 | 0.07 | 78.05 | 265.34 |
| 602 | hat | 0.24 | 67.46 | 199.54 | 0.33 | 76.88 | 288.20 |
| 603 | se | 0.09 | 68.00 | 330.27 | 0.09 | 76.35 | 224.58 |
| 604 | e | 0.16 | 65.48 | 264.93 | 0.16 | 74.26 | 218.51 |
| 605 | kor | 0.19 | 68.04 | 208.51 | 0.11 | 69.69 | 247.63 |
| 606 | mer | 0.18 | 68.22 | 189.84 | 0.20 | 75.18 | 231.36 |
| 607 | pa | 0.17 | 71.04 | 190.18 | 0.20 | 76.03 | 200.71 |
| 608 | ti | 0.18 | 63.76 | 201.98 | 0.14 | 74.75 | 264.13 |
| 609 | dan | 0.19 | 71.07 | 181.25 | 0.26 | 73.29 | 218.52 |
| 610 | i | 0.10 | 66.39 | 183.45 | 0.13 | 72.42 | 301.02 |
| 611 | ngin | 0.27 | 73.47 | 192.68 | 0.21 | 79.31 | 354.15 |
| 612 | me | 0.10 | 68.51 | 179.75 | 0.11 | 80.38 | 232.75 |
| 613 | nem | 0.23 | 65.28 | 171.41 | 0.17 | 80.45 | 234.48 |
| 614 | bak | 0.18 | 75.13 | 130.04 | 0.21 | 79.10 | 274.73 |
| 615 | nya | 0.25 | 61.13 | 160.52 | 0.37 | 71.87 | 396.73 |
| 616 | na | 0.17 | 73.23 | 180.59 | 0.17 | 77.88 | 218.40 |
| 617 | mun | 0.21 | 74.36 | 196.79 | 0.45 | 77.66 | 201.46 |
| 618 | se | 0.20 | 66.98 | 196.81 | 0.21 | 69.76 | 228.36 |
| 619 | mut | 0.23 | 69.95 | 193.91 | 0.21 | 78.56 | 256.69 |
| 620 | ter | 0.13 | 70.68 | 182.82 | 0.17 | 78.61 | 224.15 |
| 621 | li | 0.16 | 70.26 | 182.53 | 0.12 | 80.34 | 244.59 |
| 622 | hat | 0.19 | 73.54 | 191.54 | 0.25 | 80.92 | 332.40 |
| 623 | a | 0.22 | 67.85 | 145.37 | 0.13 | 75.55 | 191.40 |
| 624 | kan | 0.24 | 64.74 | 177.35 | 0.21 | 73.48 | 207.03 |
| 625 | per | 0.09 | 70.87 | 202.63 | 0.11 | 77.98 | 204.36 |
| 626 | la | 0.24 | 71.74 | 215.99 | 0.13 | 79.97 | 204.76 |
| 627 | ku | 0.06 | 58.01 | 210.15 | 0.10 | 65.03 | 206.85 |
| 628 | an | 0.25 | 69.57 | 195.62 | 0.16 | 78.25 | 304.50 |
| 629 | pem | 0.15 | 68.05 | 184.22 | 0.09 | 72.96 | 258.40 |

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|---|---|---|---|---|---|---|---|
| 630 | bu | 0.13 | 66.77 | 182.71 | 0.13 | 73.85 | 216.77 |
| 631 | ru | 0.10 | 69.84 | 179.01 | 0.08 | 75.70 | 229.63 |
| 632 | i | 0.21 | 66.55 | 246.75 | 0.19 | 71.75 | 212.19 |
| 633 | tu | 0.22 | 62.07 | 123.03 | 0.20 | 64.51 | 173.33 |
| 634 | se | 0.13 | 70.34 | 145.50 | 0.18 | 69.91 | 315.72 |
| 635 | mut | 0.21 | 70.48 | 188.65 | 0.22 | 74.56 | 182.38 |
| 636 | pun | 0.16 | 72.31 | 204.50 | 0.11 | 76.71 | 213.69 |
| 637 | lan | 0.23 | 73.07 | 186.10 | 0.29 | 80.36 | 211.73 |
| 638 | tas | 0.21 | 70.59 | 165.54 | 0.21 | 80.79 | 244.05 |
| 639 | meng | 0.22 | 66.35 | 180.52 | 0.26 | 76.35 | 217.41 |
| 640 | gi | 0.12 | 66.42 | 189.22 | 0.28 | 76.64 | 282.33 |
| 641 | git | 0.22 | 70.24 | 209.01 | 0.26 | 79.17 | 399.25 |
| 642 | ka | 0.15 | 71.00 | 144.33 | 0.16 | 79.36 | 309.00 |
| 643 | ki | 0.30 | 63.69 | 197.02 | 0.18 | 71.52 | 284.08 |
| 644 | pem | 0.18 | 65.68 | 184.03 | 0.06 | 74.53 | 281.14 |
| 645 | bu | 0.14 | 68.52 | 183.07 | 0.11 | 76.74 | 255.50 |
| 646 | ru | 0.15 | 70.57 | 186.78 | 0.11 | 79.62 | 275.51 |
| 647 | i | 0.18 | 65.03 | 190.38 | 0.18 | 75.47 | 273.96 |
| 648 | tu | 0.14 | 67.76 | 191.09 | 0.12 | 74.14 | 266.98 |
| 649 | dan | 0.24 | 67.51 | 181.29 | 0.19 | 80.84 | 237.55 |
| 650 | tem | 0.15 | 68.37 | 178.67 | 0.21 | 80.16 | 222.34 |
| 651 | ba | 0.24 | 67.77 | 295.43 | 0.29 | 72.26 | 219.96 |
| 652 | kan | 0.18 | 70.79 | 198.09 | 0.19 | 82.05 | 432.82 |
| 653 | nya | 0.20 | 70.14 | 190.92 | 0.24 | 79.15 | 398.96 |
| 654 | ter | 0.10 | 67.84 | 183.28 | 0.05 | 74.18 | 343.04 |
| 655 | sa | 0.20 | 67.35 | 177.65 | 0.24 | 76.76 | 290.43 |
| 656 | sar | 0.35 | 65.68 | 176.35 | 0.41 | 74.86 | 288.00 |
| 657 | mer | 0.21 | 67.59 | 165.07 | 0.20 | 74.68 | 218.11 |
| 658 | pa | 0.22 | 68.16 | 184.41 | 0.24 | 77.29 | 225.43 |
| 659 | ti | 0.09 | 66.40 | 191.78 | 0.06 | 72.41 | 247.71 |
| 660 | yang | 0.21 | 71.90 | 186.92 | 0.21 | 77.79 | 239.13 |
| 661 | ter | 0.21 | 64.72 | 185.18 | 0.23 | 73.19 | 231.83 |
| 662 | de | 0.10 | 69.93 | 185.02 | 0.16 | 76.77 | 309.03 |
| 663 | ngar | 0.18 | 72.39 | 188.28 | 0.18 | 82.11 | 357.90 |
| 664 | je | 0.14 | 68.06 | 184.39 | 0.13 | 76.39 | 336.15 |
| 665 | ri | 0.18 | 62.97 | 181.59 | 0.13 | 75.36 | 303.02 |
| 666 | tan | 0.23 | 66.50 | 181.62 | 0.16 | 78.13 | 308.94 |
| 667 | pem | 0.19 | 64.70 | 178.44 | 0.11 | 73.55 | 289.12 |
| 668 | bu | 0.08 | 66.51 | 179.64 | 0.11 | 75.87 | 284.20 |
| 669 | ru | 0.10 | 69.95 | 183.25 | 0.10 | 75.06 | 291.20 |
| 670 | i | 0.18 | 66.80 | 198.63 | 0.25 | 73.87 | 344.37 |
| 671 | tu | 0.12 | 65.20 | 226.10 | 0.21 | 77.80 | 377.02 |
| 672 | se | 0.19 | 63.77 | 205.08 | 0.17 | 71.29 | 282.66 |
| 673 | ge | 0.15 | 66.59 | 186.38 | 0.11 | 74.61 | 229.37 |
| 674 | ra | 0.17 | 67.80 | 183.33 | 0.17 | 77.29 | 226.75 |
| 675 | ter | 0.15 | 66.75 | 185.52 | 0.18 | 73.20 | 291.23 |
| 676 | bang | 0.23 | 70.89 | 185.06 | 0.23 | 79.66 | 262.21 |
| 677 | ber | 0.09 | 69.30 | 177.56 | 0.08 | 72.22 | 197.68 |
| 678 | e | 0.16 | 69.96 | 175.35 | 0.18 | 77.95 | 227.75 |
| 679 | dar | 0.22 | 71.64 | 175.78 | 0.17 | 85.87 | 286.74 |
| 680 | da | 0.12 | 75.17 | 169.85 | 0.14 | 78.18 | 196.73 |
| 681 | ri | 0.09 | 69.10 | 168.92 | 0.12 | 74.58 | 207.43 |
| 682 | si | 0.25 | 61.23 | 171.21 | 0.17 | 70.05 | 215.31 |
| 683 | tu | 0.19 | 56.25 | 341.45 | 0.20 | 65.27 | 178.72 |

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data Female Storyteller 2 (Fst2)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.11 | 56.78 | 275.80 | 0.12 | 58.89 | 275.90 |
| 2 | a | 0.12 | 70.80 | 247.90 | 0.42 | 67.94 | 221.94 |
| 3 | tu | 0.14 | 60.33 | 254.14 | 0.10 | 70.93 | 335.68 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | ma | 0.21 | 68.68 | 253.27 | 0.16 | 70.32 | 368.54 |
| 5 | sa | 0.21 | 60.65 | 249.29 | 0.19 | 65.95 | 343.46 |
| 6 | da | 0.13 | 69.57 | 242.30 | 0.13 | 72.93 | 273.40 |
| 7 | hu | 0.17 | 70.42 | 241.92 | 0.19 | 71.24 | 224.13 |
| 8 | lu | 0.44 | 66.43 | 299.54 | 0.75 | 55.12 | 280.35 |
| 9 | ting | 0.26 | 66.58 | 249.26 | 0.35 | 68.14 | 227.09 |
| 10 | gal | 0.23 | 73.54 | 264.22 | 0.18 | 73.32 | 308.55 |
| 11 | se | 0.13 | 58.83 | 273.40 | 0.08 | 62.12 | 361.93 |
| 12 | o | 0.17 | 68.93 | 172.97 | 0.11 | 68.70 | 364.45 |
| 13 | rang | 0.26 | 65.98 | 249.25 | 0.14 | 72.62 | 307.05 |
| 14 | pe | 0.14 | 61.67 | 253.16 | 0.17 | 56.60 | 302.63 |
| 15 | ta | 0.15 | 69.34 | 243.07 | 0.11 | 69.96 | 294.25 |
| 16 | ni | 0.14 | 68.83 | 260.67 | 0.49 | 59.48 | 319.98 |
| 17 | yang | 0.21 | 67.01 | 272.33 | 0.14 | 68.82 | 251.27 |
| 18 | me | 0.16 | 67.06 | 238.23 | 0.14 | 71.51 | 240.88 |
| 19 | me | 0.10 | 67.78 | 238.12 | 0.11 | 71.41 | 235.90 |
| 20 | li | 0.16 | 69.70 | 241.63 | 0.08 | 71.32 | 237.41 |
| 21 | ha | 0.20 | 69.96 | 245.23 | 0.17 | 68.97 | 231.55 |
| 22 | ra | 0.17 | 69.80 | 272.38 | 0.41 | 58.22 | 322.56 |
| 23 | se | 0.14 | 61.72 | 255.54 | 0.09 | 66.17 | 303.80 |
| 24 | e | 0.14 | 62.74 | 292.28 | 0.28 | 63.46 | 301.44 |
| 25 | kor | 0.14 | 64.93 | 243.87 | 0.17 | 71.21 | 351.38 |
| 26 | ang | 0.30 | 65.91 | 233.09 | 0.22 | 70.95 | 220.28 |
| 27 | sa | 0.31 | 65.06 | 223.08 | 0.76 | 46.97 | 192.96 |
| 28 | pa | 0.14 | 74.18 | 232.99 | 0.29 | 71.50 | 211.38 |
| 29 | da | 0.05 | 73.01 | 245.45 | 0.52 | 59.82 | 292.46 |
| 30 | su | 0.18 | 69.67 | 256.08 | 0.07 | 53.18 | 291.00 |
| 31 | a | 0.18 | 67.92 | 240.11 | 0.08 | 71.86 | 266.84 |
| 32 | tu | 0.10 | 70.38 | 246.75 | 0.18 | 66.68 | 245.43 |
| 33 | ha | 0.17 | 67.63 | 237.35 | 0.18 | 69.11 | 210.42 |
| 34 | ri | 0.32 | 66.71 | 290.82 | 0.65 | 53.79 | 284.17 |
| 35 | ke | 0.19 | 59.30 | 283.19 | 0.12 | 65.27 | 244.14 |
| 36 | ti | 0.16 | 53.34 | 236.88 | 0.20 | 61.82 | 227.59 |
| 37 | ka | 0.09 | 72.06 | 306.39 | 0.11 | 67.92 | 224.99 |
| 38 | i | 0.22 | 61.32 | 342.90 | 0.21 | 63.29 | 210.88 |
| 39 | tu | 0.29 | 68.61 | 305.62 | 0.36 | 62.89 | 278.80 |
| 40 | di | 0.12 | 66.32 | 252.56 | 0.11 | 54.86 | 220.63 |
| 41 | a | 0.22 | 71.55 | 226.49 | 0.11 | 68.06 | 216.38 |
| 42 | i | 0.09 | 69.00 | 218.37 | 0.14 | 68.84 | 211.95 |
| 43 | ngin | 0.15 | 71.16 | 250.38 | 0.16 | 72.79 | 220.00 |
| 44 | me | 0.16 | 70.00 | 244.46 | 0.11 | 67.40 | 222.91 |
| 45 | ngam | 0.24 | 69.36 | 233.78 | 0.14 | 73.85 | 212.11 |
| 46 | bil | 0.23 | 68.78 | 246.48 | 0.23 | 69.83 | 199.28 |
| 47 | te | 0.13 | 66.23 | 238.21 | 0.09 | 64.77 | 174.42 |
| 48 | lur | 0.26 | 70.77 | 237.52 | 0.11 | 71.58 | 213.68 |
| 49 | ang | 0.24 | 65.24 | 227.66 | 0.20 | 67.91 | 220.50 |
| 50 | sa | 0.20 | 63.04 | 236.35 | 0.16 | 66.35 | 295.13 |
| 51 | nya | 0.27 | 64.75 | 216.03 | 0.87 | 56.26 | 285.62 |
| 52 | si | 0.21 | 61.59 | 245.08 | 0.21 | 59.70 | 241.87 |
| 53 | pe | 0.16 | 69.11 | 248.46 | 0.11 | 67.72 | 229.31 |
| 54 | ta | 0.12 | 72.61 | 242.79 | 0.12 | 66.71 | 216.09 |
| 55 | ni | 0.11 | 71.11 | 251.28 | 0.16 | 70.34 | 205.68 |
| 56 | men | 0.17 | 71.34 | 265.27 | 0.20 | 70.33 | 207.09 |
| 57 | da | 0.17 | 68.83 | 240.63 | 0.17 | 66.57 | 213.94 |
| 58 | pa | 0.22 | 65.48 | 240.01 | 0.23 | 61.81 | 216.84 |
| 59 | ti | 0.32 | 55.75 | 254.17 | 0.49 | 57.77 | 318.19 |
| 60 | te | 0.09 | 71.27 | 249.18 | 0.10 | 68.35 | 257.25 |
| 61 | lur | 0.20 | 68.33 | 233.74 | 0.13 | 72.52 | 243.07 |
| 62 | i | 0.22 | 57.49 | 135.49 | 0.21 | 66.04 | 232.33 |
| 63 | tu | 0.20 | 63.01 | 245.18 | 0.21 | 59.93 | 278.63 |
| 64 | ke | 0.04 | 64.88 | 250.80 | 0.13 | 65.54 | 282.51 |
| 65 | li | 0.12 | 67.60 | 239.23 | 0.06 | 66.99 | 295.77 |
| 66 | ha | 0.20 | 64.79 | 234.28 | 0.22 | 67.68 | 310.88 |
| 67 | tan | 0.12 | 67.30 | 233.83 | 0.19 | 69.07 | 368.29 |
| 68 | a | 0.17 | 65.28 | 185.57 | 0.19 | 69.63 | 213.31 |
| 69 | neh | 0.23 | 70.21 | 216.58 | 0.27 | 66.77 | 202.19 |
| 70 | war | 0.18 | 72.50 | 236.24 | 0.20 | 72.00 | 216.13 |
| 71 | na | 0.17 | 70.84 | 240.17 | 0.11 | 72.04 | 222.85 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 72 | nya | 0.16 | 68.55 | 244.28 | 0.27 | 65.70 | 204.69 |
| 73 | ku | 0.16 | 63.61 | 251.34 | 0.14 | 70.25 | 210.56 |
| 74 | ning | 0.30 | 69.40 | 245.96 | 0.41 | 68.45 | 265.81 |
| 75 | ke | 0.07 | 63.61 | 253.66 | 0.09 | 62.31 | 233.68 |
| 76 | e | 0.12 | 65.92 | 255.96 | 0.10 | 64.38 | 151.78 |
| 77 | ma | 0.20 | 68.20 | 236.10 | 0.23 | 71.83 | 217.77 |
| 78 | san | 0.19 | 63.63 | 240.64 | 0.33 | 66.77 | 247.51 |
| 79 | dan | 0.27 | 67.80 | 231.44 | 0.21 | 71.80 | 248.66 |
| 80 | be | 0.18 | 71.01 | 226.17 | 0.09 | 73.82 | 326.34 |
| 81 | rat | 0.25 | 65.29 | 219.21 | 0.35 | 68.01 | 397.80 |
| 82 | di | 0.07 | 68.95 | 229.41 | 0.06 | 68.07 | 220.74 |
| 83 | a | 0.11 | 75.07 | 257.76 | 0.15 | 72.46 | 291.59 |
| 84 | me | 0.13 | 72.74 | 252.14 | 0.13 | 71.36 | 261.08 |
| 85 | nyang | 0.24 | 70.43 | 240.83 | 0.25 | 71.19 | 214.48 |
| 86 | ka | 0.11 | 69.93 | 257.91 | 0.46 | 66.75 | 274.13 |
| 87 | ji | 0.24 | 69.73 | 235.87 | 0.19 | 66.43 | 253.25 |
| 88 | ran | 0.23 | 71.55 | 242.50 | 0.19 | 71.03 | 241.11 |
| 89 | nya | 0.24 | 69.29 | 286.34 | 0.16 | 68.66 | 266.69 |
| 90 | cu | 0.26 | 62.58 | 287.12 | 0.21 | 62.81 | 272.50 |
| 91 | ba | 0.18 | 74.84 | 237.21 | 0.16 | 73.27 | 246.02 |
| 92 | ber | 0.16 | 74.56 | 238.05 | 0.18 | 70.32 | 230.48 |
| 93 | gu | 0.22 | 71.94 | 238.88 | 0.14 | 70.86 | 246.24 |
| 94 | rau | 0.30 | 73.69 | 275.71 | 0.38 | 71.21 | 314.18 |
| 95 | la | 0.15 | 71.73 | 259.67 | 0.18 | 68.01 | 156.13 |
| 96 | lu | 0.18 | 69.78 | 242.47 | 0.23 | 73.67 | 216.12 |
| 97 | ber | 0.20 | 69.63 | 238.32 | 0.18 | 70.49 | 212.86 |
| 98 | ca | 0.18 | 66.55 | 241.40 | 0.16 | 66.35 | 221.88 |
| 99 | dang | 0.29 | 69.25 | 239.12 | 0.29 | 69.71 | 283.26 |
| 100 | un | 0.13 | 60.17 | 236.18 | 0.19 | 61.34 | 136.79 |
| 101 | tuk | 0.10 | 68.42 | 377.29 | 0.14 | 66.34 | 281.20 |
| 102 | mem | 0.21 | 65.78 | 274.88 | 0.24 | 67.15 | 280.18 |
| 103 | bu | 0.07 | 65.67 | 226.38 | 0.06 | 72.56 | 355.81 |
| 104 | ang | 0.24 | 68.40 | 233.82 | 0.25 | 72.98 | 315.78 |
| 105 | te | 0.12 | 62.12 | 234.85 | 0.12 | 67.22 | 247.39 |
| 106 | lur | 0.19 | 68.20 | 226.77 | 0.16 | 70.00 | 220.88 |
| 107 | i | 0.21 | 56.09 | 221.99 | 0.15 | 69.51 | 151.67 |
| 108 | tu | 0.26 | 59.26 | 211.06 | 0.34 | 63.49 | 156.77 |
| 109 | na | 0.14 | 67.08 | 231.52 | 0.27 | 72.98 | 250.61 |
| 110 | mun | 0.16 | 72.39 | 241.82 | 0.37 | 70.08 | 258.43 |
| 111 | se | 0.22 | 64.35 | 248.28 | 0.11 | 58.88 | 273.06 |
| 112 | le | 0.13 | 65.30 | 228.56 | 0.11 | 70.28 | 267.38 |
| 113 | pas | 0.14 | 66.77 | 231.98 | 0.19 | 68.58 | 262.96 |
| 114 | ber | 0.19 | 68.75 | 221.03 | 0.23 | 69.11 | 240.64 |
| 115 | fi | 0.24 | 60.28 | 224.49 | 0.19 | 62.38 | 242.86 |
| 116 | kir | 0.35 | 65.49 | 303.92 | 0.35 | 65.56 | 234.88 |
| 117 | di | 0.06 | 63.75 | 235.10 | 0.07 | 66.26 | 233.85 |
| 118 | a | 0.11 | 73.91 | 248.92 | 0.13 | 74.05 | 255.96 |
| 119 | mem | 0.20 | 71.27 | 245.66 | 0.17 | 73.20 | 253.52 |
| 120 | ba | 0.15 | 72.66 | 236.05 | 0.16 | 72.73 | 277.80 |
| 121 | wa | 0.26 | 70.18 | 251.78 | 0.27 | 70.69 | 363.48 |
| 122 | te | 0.10 | 69.22 | 252.46 | 0.09 | 71.45 | 320.11 |
| 123 | lur | 0.21 | 71.53 | 238.70 | 0.20 | 69.46 | 278.16 |
| 124 | i | 0.12 | 61.73 | 229.14 | 0.19 | 62.99 | 139.18 |
| 125 | tu | 0.24 | 57.80 | 257.23 | 0.28 | 69.17 | 295.10 |
| 126 | pu | 0.11 | 64.81 | 242.54 | 0.08 | 66.85 | 291.88 |
| 127 | lang | 0.23 | 69.15 | 237.70 | 0.24 | 66.59 | 284.93 |
| 128 | ke | 0.12 | 67.67 | 241.18 | 0.09 | 68.48 | 255.49 |
| 129 | ru | 0.11 | 69.14 | 235.40 | 0.12 | 70.43 | 224.30 |
| 130 | mah | 0.28 | 65.18 | 238.43 | 0.31 | 66.39 | 270.89 |
| 131 | un | 0.20 | 62.47 | 226.23 | 0.26 | 65.55 | 280.47 |
| 132 | tuk | 0.09 | 66.52 | 194.71 | 0.17 | 69.92 | 334.69 |
| 133 | di | 0.24 | 60.38 | 211.98 | 0.15 | 66.12 | 234.03 |
| 134 | pe | 0.04 | 66.83 | 237.95 | 0.10 | 69.24 | 218.85 |
| 135 | rik | 0.18 | 63.78 | 225.60 | 0.14 | 64.81 | 226.53 |
| 136 | sa | 0.40 | 57.41 | 187.52 | 0.34 | 60.49 | 218.99 |
| 137 | si | 0.20 | 61.59 | 251.51 | 0.19 | 61.43 | 241.98 |
| 138 | pe | 0.16 | 69.67 | 251.65 | 0.15 | 66.60 | 239.39 |
| 139 | ta | 0.15 | 72.89 | 236.59 | 0.13 | 73.32 | 217.22 |

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|---|---|---|---|---|---|---|---|
| 140 | ni | 0.31 | 68.21 | 266.10 | 0.31 | 67.88 | 196.54 |
| 141 | be | 0.06 | 69.16 | 247.63 | 0.07 | 64.25 | 138.90 |
| 142 | ra | 0.21 | 65.48 | 244.26 | 0.12 | 69.19 | 222.84 |
| 143 | sa | 0.16 | 66.83 | 244.72 | 0.19 | 61.50 | 238.14 |
| 144 | ter | 0.14 | 69.25 | 242.23 | 0.12 | 65.40 | 297.87 |
| 145 | ke | 0.23 | 67.65 | 233.43 | 0.15 | 65.67 | 331.61 |
| 146 | jut | 0.32 | 63.40 | 287.11 | 0.32 | 69.72 | 375.62 |
| 147 | a | 0.18 | 58.70 | 119.28 | 0.15 | 62.91 | 259.51 |
| 148 | pa | 0.06 | 70.06 | 247.65 | 0.06 | 70.87 | 246.17 |
| 149 | bi | 0.16 | 69.15 | 232.08 | 0.13 | 70.43 | 229.47 |
| 150 | la | 0.17 | 69.85 | 242.49 | 0.12 | 68.95 | 223.29 |
| 151 | men | 0.15 | 68.25 | 238.57 | 0.20 | 75.12 | 212.83 |
| 152 | da | 0.23 | 65.80 | 234.77 | 0.17 | 65.71 | 209.20 |
| 153 | pa | 0.24 | 61.95 | 235.16 | 0.17 | 65.88 | 216.78 |
| 154 | ti | 0.22 | 60.72 | 246.36 | 0.31 | 62.01 | 298.92 |
| 155 | i | 0.20 | 55.20 | 231.12 | 0.18 | 58.05 | 267.49 |
| 156 | tu | 0.13 | 65.59 | 285.52 | 0.09 | 72.02 | 311.05 |
| 157 | a | 0.21 | 66.81 | 286.73 | 0.16 | 70.95 | 250.65 |
| 158 | da | 0.10 | 68.52 | 235.56 | 0.07 | 68.92 | 241.99 |
| 159 | lah | 0.25 | 62.99 | 232.62 | 0.25 | 66.65 | 234.79 |
| 160 | te | 0.07 | 68.04 | 242.31 | 0.11 | 70.65 | 254.52 |
| 161 | lur | 0.20 | 68.96 | 236.75 | 0.17 | 68.81 | 256.63 |
| 162 | e | 0.14 | 62.97 | 236.60 | 0.08 | 69.41 | 362.74 |
| 163 | mas | 0.35 | 62.23 | 220.27 | 0.39 | 67.70 | 301.08 |
| 164 | si | 0.22 | 58.41 | 246.58 | 0.12 | 65.92 | 254.01 |
| 165 | pe | 0.15 | 68.41 | 245.67 | 0.11 | 63.24 | 257.56 |
| 166 | ta | 0.11 | 71.80 | 234.33 | 0.10 | 69.89 | 270.96 |
| 167 | ni | 0.24 | 70.34 | 265.02 | 0.09 | 71.69 | 264.28 |
| 168 | sung | 0.29 | 64.46 | 274.38 | 0.29 | 64.89 | 313.70 |
| 169 | guh | 0.16 | 71.52 | 244.67 | 0.39 | 71.70 | 347.51 |
| 170 | gem | 0.27 | 71.44 | 230.18 | 0.17 | 73.14 | 234.26 |
| 171 | bi | 0.12 | 69.72 | 227.94 | 0.20 | 75.07 | 212.67 |
| 172 | ra | 0.30 | 65.95 | 163.37 | 0.30 | 65.14 | 149.85 |
| 173 | ha | 0.19 | 69.51 | 233.47 | 0.15 | 65.23 | 239.72 |
| 174 | ri | 0.16 | 69.45 | 250.38 | 0.11 | 69.96 | 241.28 |
| 175 | de | 0.12 | 69.64 | 246.94 | 0.13 | 70.36 | 225.70 |
| 176 | mi | 0.23 | 70.58 | 239.56 | 0.19 | 72.49 | 220.69 |
| 177 | ha | 0.19 | 68.66 | 236.20 | 0.15 | 68.99 | 223.37 |
| 178 | ri | 0.12 | 66.60 | 236.66 | 0.16 | 73.68 | 215.75 |
| 179 | se | 0.15 | 63.53 | 243.20 | 0.15 | 63.91 | 222.91 |
| 180 | le | 0.15 | 66.44 | 238.53 | 0.13 | 66.09 | 214.73 |
| 181 | pas | 0.20 | 63.22 | 238.34 | 0.16 | 65.83 | 218.53 |
| 182 | i | 0.20 | 58.17 | 165.82 | 0.21 | 56.94 | 189.96 |
| 183 | tu | 0.31 | 68.92 | 294.96 | 0.24 | 69.14 | 314.28 |
| 184 | si | 0.19 | 62.60 | 274.20 | 0.15 | 57.49 | 266.12 |
| 185 | ang | 0.23 | 67.55 | 232.69 | 0.24 | 71.89 | 245.73 |
| 186 | sa | 0.35 | 63.88 | 247.36 | 0.32 | | x |
| 187 | te | 0.07 | 73.27 | 246.63 | 0.12 | 64.56 | 260.63 |
| 188 | rus | 0.35 | 65.71 | 240.08 | 0.24 | 69.78 | 311.89 |
| 189 | ber | 0.24 | 65.97 | 225.14 | 0.23 | 64.79 | 216.58 |
| 190 | te | 0.20 | 67.17 | 234.80 | 0.10 | 68.94 | 216.40 |
| 191 | lur | 0.13 | 73.65 | 236.85 | 0.14 | 69.56 | 207.64 |
| 192 | e | 0.15 | 62.74 | 236.26 | 0.13 | 63.07 | 190.33 |
| 193 | mas | 0.38 | 65.99 | 215.81 | 0.42 | 62.67 | 106.24 |
| 194 | si | 0.19 | 62.80 | 240.13 | 0.19 | 63.11 | 226.70 |
| 195 | pe | 0.06 | 75.52 | 246.89 | 0.10 | 64.76 | 219.10 |
| 196 | ta | 0.20 | 67.70 | 240.99 | 0.12 | 69.99 | 226.05 |
| 197 | ni | 0.21 | 71.46 | 249.23 | 0.16 | 71.23 | 220.78 |
| 198 | mu | 0.18 | 69.32 | 240.80 | 0.25 | 72.16 | 227.88 |
| 199 | la | 0.21 | 69.69 | 237.77 | 0.37 | 72.76 | 295.76 |
| 200 | men | 0.18 | 69.21 | 234.12 | 0.09 | 70.37 | 225.01 |
| 201 | ja | 0.19 | 71.10 | 229.45 | 0.10 | 76.06 | 214.91 |
| 202 | di | 0.24 | 64.27 | 223.85 | 0.21 | 68.46 | 200.85 |
| 203 | ta | 0.10 | 67.12 | 230.23 | 0.12 | 71.06 | 213.78 |
| 204 | mak | 0.29 | 65.66 | 223.01 | 0.27 | 64.26 | 200.68 |
| 205 | si | 0.18 | 63.14 | 242.55 | 0.21 | 61.60 | 237.29 |
| 206 | pe | 0.16 | 67.33 | 244.21 | 0.08 | 71.41 | 240.71 |
| 207 | ta | 0.09 | 72.28 | 240.72 | 0.18 | 68.72 | 233.72 |

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|---|---|---|---|---|---|---|---|
| 208 | ni | 0.17 | 71.19 | 249.13 | 0.21 | 71.05 | 265.88 |
| 209 | me | 0.18 | 70.88 | 252.83 | 0.10 | 70.16 | 315.12 |
| 210 | ngam | 0.17 | 68.81 | 232.40 | 0.24 | 71.34 | 241.91 |
| 211 | bil | 0.23 | 70.02 | 232.82 | 0.19 | 68.57 | 229.69 |
| 212 | pi | 0.18 | 59.69 | 231.58 | 0.14 | 66.08 | 213.86 |
| 213 | sau | 0.29 | 66.10 | 248.38 | 0.37 | 67.90 | 243.26 |
| 214 | dan | 0.20 | 68.19 | 233.73 | 0.17 | 69.34 | 230.98 |
| 215 | me | 0.11 | 66.62 | 229.86 | 0.16 | 69.08 | 223.87 |
| 216 | nyem | 0.20 | 67.55 | 229.12 | 0.19 | 67.90 | 228.48 |
| 217 | be | 0.14 | 70.12 | 231.91 | 0.06 | 75.34 | 265.36 |
| 218 | lih | 0.27 | 66.55 | 242.93 | 0.22 | 73.92 | 318.83 |
| 219 | ang | 0.30 | 61.50 | 225.06 | 0.18 | 67.89 | 270.53 |
| 220 | sa | 0.08 | 70.66 | 244.14 | 0.28 | 67.29 | 223.33 |
| 221 | ber | 0.28 | 62.41 | 223.68 | 0.10 | 71.19 | 206.51 |
| 222 | tu | 0.05 | 70.26 | 240.42 | 0.14 | 61.14 | 199.77 |
| 223 | ah | 0.18 | 67.08 | 225.80 | 0.13 | 71.04 | 209.78 |
| 224 | nya | 0.30 | 70.31 | 214.18 | 0.33 | 66.27 | 188.94 |
| 225 | a | 0.21 | 64.35 | 234.37 | 0.18 | 66.64 | 220.78 |
| 226 | pa | 0.08 | 78.84 | 245.98 | 0.14 | 70.58 | 227.53 |
| 227 | bi | 0.15 | 70.53 | 237.53 | 0.14 | 68.37 | 220.71 |
| 228 | la | 0.11 | 70.06 | 242.76 | 0.13 | 72.90 | 220.15 |
| 229 | men | 0.17 | 71.07 | 241.86 | 0.10 | 76.28 | 217.14 |
| 230 | da | 0.28 | 66.93 | 237.19 | 0.23 | 70.70 | 214.33 |
| 231 | pa | 0.25 | 61.17 | 242.01 | 0.21 | 63.81 | 216.35 |
| 232 | ti | 0.19 | 61.56 | 259.12 | 0.24 | 66.73 | 282.36 |
| 233 | ti | 0.07 | 62.95 | 250.24 | 0.06 | 62.86 | 250.03 |
| 234 | a | 0.14 | 71.80 | 240.79 | 0.10 | 71.27 | 228.70 |
| 235 | da | 0.15 | 71.56 | 234.45 | 0.09 | 67.89 | 217.37 |
| 236 | se | 0.14 | 62.17 | 245.84 | 0.16 | 65.34 | 219.43 |
| 237 | bi | 0.27 | 67.18 | 224.06 | 0.25 | 70.64 | 211.69 |
| 238 | ji | 0.25 | 59.90 | 304.64 | 0.29 | 63.15 | 305.99 |
| 239 | pun | 0.28 | 64.96 | 249.36 | 0.23 | 69.30 | 292.05 |
| 240 | te | 0.07 | 70.95 | 246.76 | 0.05 | 68.85 | 239.78 |
| 241 | lur | 0.16 | 67.73 | 237.99 | 0.18 | 68.35 | 187.60 |
| 242 | e | 0.12 | 62.57 | 142.72 | 0.09 | 65.55 | 211.83 |
| 243 | mas | 0.33 | 63.28 | 233.80 | 0.34 | 69.42 | 221.92 |
| 244 | di | 0.11 | 66.25 | 227.11 | 0.13 | 67.78 | 220.15 |
| 245 | da | 0.09 | 69.36 | 230.60 | 0.10 | 75.64 | 242.25 |
| 246 | lam | 0.26 | 66.31 | 226.95 | 0.25 | 70.03 | 224.58 |
| 247 | pe | 0.09 | 66.83 | 234.67 | 0.05 | 70.66 | 240.98 |
| 248 | rut | 0.09 | 69.07 | 238.82 | 0.07 | 72.50 | 252.87 |
| 249 | ang | 0.25 | 63.51 | 215.35 | 0.17 | 67.21 | 260.98 |
| 250 | sa | 0.18 | 61.52 | 203.48 | 0.22 | 67.98 | 191.84 |
| 251 | i | 0.21 | 57.78 | 114.27 | 0.20 | 60.05 | 153.83 |
| 252 | tu | 0.16 | 66.13 | 265.02 | 0.30 | 67.96 | 291.87 |
| 253 | si | 0.15 | 60.84 | 253.07 | 0.20 | 59.84 | 255.30 |
| 254 | pe | 0.19 | 57.51 | 237.50 | 0.12 | 64.93 | 260.31 |
| 255 | ta | 0.11 | 65.77 | 237.78 | 0.13 | 71.64 | 266.56 |
| 256 | ni | 0.30 | 64.39 | 247.61 | 0.13 | 71.81 | 269.27 |
| 257 | mu | 0.13 | 65.14 | 239.04 | 0.20 | 70.41 | 273.00 |
| 258 | la | 0.18 | 72.19 | 244.45 | 0.32 | 71.57 | 279.09 |
| 259 | me | 0.09 | 68.92 | 238.84 | 0.05 | 69.31 | 231.52 |
| 260 | nye | 0.16 | 71.34 | 233.34 | 0.13 | 75.53 | 215.02 |
| 261 | da | 0.25 | 71.10 | 227.55 | 0.23 | 72.09 | 204.88 |
| 262 | ri | 0.15 | 66.79 | 261.57 | 0.28 | 64.96 | 152.95 |
| 263 | ke | 0.10 | 67.24 | 252.25 | 0.13 | 65.33 | 226.06 |
| 264 | si | 0.14 | 58.23 | 238.94 | 0.12 | 61.35 | 225.08 |
| 265 | la | 0.24 | 62.13 | 233.43 | 0.24 | 68.79 | 207.08 |
| 266 | pan | 0.17 | 66.40 | 232.84 | 0.12 | 71.31 | 212.29 |
| 267 | nya | 0.35 | 61.91 | 284.11 | 0.31 | 68.75 | 274.03 |
| 268 | dan | 0.16 | 67.31 | 232.16 | 0.09 | 69.44 | 257.48 |
| 269 | be | 0.08 | 70.37 | 227.86 | 0.18 | 73.46 | 257.00 |
| 270 | ra | 0.12 | 69.46 | 235.69 | 0.10 | 70.29 | 266.75 |
| 271 | sa | 0.16 | 59.26 | 239.33 | 0.12 | 63.60 | 277.59 |
| 272 | sa | 0.16 | 57.72 | 236.13 | 0.30 | 64.26 | 295.65 |
| 273 | ngat | 0.18 | 64.41 | 227.19 | 0.29 | 68.37 | 316.54 |
| 274 | me | 0.17 | 63.33 | 221.95 | 0.09 | 66.00 | 155.21 |
| 275 | nye | 0.14 | 73.13 | 214.33 | 0.22 | 71.89 | 205.36 |

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|---|---|---|---|---|---|---|---|
| 276 | sal | 0.36 | 59.76 | 215.21 | 0.35 | 62.60 | 203.55 |
| 277 | su | 0.12 | 59.66 | 487.30 | 0.12 | 59.05 | 305.80 |
| 278 | a | 0.23 | 68.25 | 239.82 | 0.21 | 70.88 | 312.68 |
| 279 | tu | 0.12 | 68.96 | 241.63 | 0.08 | 66.37 | 326.44 |
| 280 | ha | 0.20 | 69.10 | 233.74 | 0.27 | 70.76 | 250.43 |
| 281 | ri | 0.18 | 66.59 | 281.82 | 0.46 | 66.88 | 265.42 |
| 282 | se | 0.18 | 62.61 | 308.53 | 0.12 | 58.84 | 263.80 |
| 283 | e | 0.22 | 61.03 | 154.50 | 0.22 | 67.71 | 238.30 |
| 284 | kor | 0.16 | 67.15 | 233.97 | 0.12 | 67.83 | 230.10 |
| 285 | an | 0.27 | 67.57 | 230.87 | 0.22 | 69.99 | 208.77 |
| 286 | jing | 0.33 | 66.28 | 294.05 | 0.42 | 65.25 | 257.30 |
| 287 | ter | 0.22 | 71.08 | 239.48 | 0.18 | 70.35 | 227.76 |
| 288 | jum | 0.32 | 63.33 | 238.22 | 0.33 | 71.06 | 217.92 |
| 289 | pa | 0.22 | 64.19 | 264.88 | 0.37 | 64.84 | 277.82 |
| 290 | se | 0.16 | 61.89 | 242.68 | 0.14 | 62.90 | 232.44 |
| 291 | ke | 0.18 | 59.03 | 240.81 | 0.17 | 65.95 | 230.64 |
| 292 | tul | 0.25 | 70.78 | 232.64 | 0.08 | 73.88 | 246.29 |
| 293 | da | 0.21 | 68.27 | 220.66 | 0.23 | 69.67 | 318.70 |
| 294 | ging | 0.32 | 63.93 | 216.96 | 0.37 | 67.05 | 274.71 |
| 295 | di | 0.12 | 69.34 | 233.33 | 0.11 | 69.06 | 232.58 |
| 296 | a | 0.18 | 74.75 | 262.03 | 0.10 | 75.82 | 242.34 |
| 297 | meng | 0.18 | 70.34 | 241.19 | 0.24 | 69.63 | 229.82 |
| 298 | gong | 0.34 | 69.37 | 231.82 | 0.31 | 70.29 | 275.83 |
| 299 | gong | 0.28 | 68.71 | 268.75 | 0.26 | 73.37 | 346.15 |
| 300 | da | 0.14 | 70.19 | 241.11 | 0.11 | 72.10 | 237.92 |
| 301 | ging | 0.27 | 65.75 | 267.40 | 0.15 | 70.06 | 223.43 |
| 302 | i | 0.20 | 50.27 | 439.28 | 0.26 | 67.83 | 205.91 |
| 303 | tu | 0.19 | 64.81 | 262.79 | 0.37 | 65.59 | 272.71 |
| 304 | di | 0.22 | 63.25 | 233.90 | 0.24 | 65.91 | 239.21 |
| 305 | mu | 0.21 | 62.64 | 228.64 | 0.13 | 70.09 | 222.53 |
| 306 | lut | 0.23 | 66.65 | 288.59 | 0.34 | 70.73 | 228.15 |
| 307 | un | 0.27 | 56.36 | 231.11 | 0.25 | 58.42 | 258.23 |
| 308 | tuk | 0.18 | 66.25 | 256.65 | 0.14 | 66.73 | 262.24 |
| 309 | me | 0.17 | 66.39 | 237.68 | 0.09 | 69.14 | 244.31 |
| 310 | ma | 0.26 | 58.70 | 227.38 | 0.22 | 66.54 | 240.37 |
| 311 | kan | 0.31 | 68.92 | 255.77 | 0.18 | 70.11 | 267.68 |
| 312 | nya | 0.23 | 68.01 | 273.21 | 0.19 | 67.76 | 275.50 |
| 313 | di | 0.19 | 61.31 | 233.78 | 0.13 | 66.25 | 256.05 |
| 314 | tem | 0.22 | 62.45 | 234.88 | 0.16 | 60.94 | 259.72 |
| 315 | pat | 0.19 | 65.15 | 251.33 | 0.08 | 68.69 | 115.18 |
| 316 | yang | 0.21 | 66.69 | 264.74 | 0.18 | 64.66 | 293.07 |
| 317 | se | 0.19 | 63.11 | 228.59 | 0.06 | 67.63 | 343.45 |
| 318 | la | 0.16 | 72.20 | 218.83 | 0.12 | 72.21 | 366.12 |
| 319 | mat | 0.28 | 65.71 | 214.73 | 0.31 | 66.48 | 290.75 |
| 320 | da | 0.19 | 70.75 | 225.08 | 0.14 | 69.98 | 261.41 |
| 321 | lam | 0.19 | 70.61 | 229.56 | 0.23 | 70.88 | 282.52 |
| 322 | per | 0.15 | 73.00 | 231.51 | 0.12 | 69.03 | 221.31 |
| 323 | ja | 0.18 | 72.08 | 227.19 | 0.17 | 69.13 | 140.07 |
| 324 | la | 0.15 | 72.09 | 222.22 | 0.19 | 69.89 | 100.10 |
| 325 | nan | 0.42 | 65.31 | 290.46 | 0.43 | 66.60 | 206.25 |
| 326 | di | 0.07 | 63.30 | 215.26 | 0.10 | 67.59 | 221.37 |
| 327 | a | 0.15 | 73.95 | 231.58 | 0.08 | 71.40 | 220.48 |
| 328 | la | 0.18 | 72.42 | 226.34 | 0.24 | 74.53 | 213.33 |
| 329 | lu | 0.20 | 67.95 | 247.66 | 0.14 | 70.02 | 244.51 |
| 330 | di | 0.21 | 62.57 | 231.80 | 0.14 | 67.07 | 242.72 |
| 331 | te | 0.21 | 62.57 | 236.80 | 0.10 | 66.69 | 233.30 |
| 332 | pi | 0.20 | 63.54 | 239.90 | 0.15 | 59.97 | 177.55 |
| 333 | a | 0.12 | 68.16 | 234.26 | 0.13 | 66.08 | 179.50 |
| 334 | nak | 0.19 | 66.31 | 224.19 | 0.11 | 68.49 | 224.71 |
| 335 | su | 0.22 | 60.40 | 230.61 | 0.21 | 64.53 | 308.32 |
| 336 | ngai | 0.35 | 61.25 | 222.19 | 0.47 | 65.48 | 243.18 |
| 337 | se | 0.16 | 61.13 | 237.32 | 0.17 | 59.36 | 276.08 |
| 338 | ma | 0.24 | 69.65 | 222.98 | 0.13 | 71.30 | 290.29 |
| 339 | sa | 0.26 | 67.02 | 251.22 | 0.21 | 65.43 | 297.58 |
| 340 | ber | 0.15 | 73.84 | 238.22 | 0.10 | 73.37 | 239.12 |
| 341 | ja | 0.28 | 70.33 | 224.28 | 0.28 | 69.68 | 209.88 |
| 342 | lan | 0.32 | 64.49 | 257.32 | 0.41 | 66.16 | 213.22 |
| 343 | an | 0.26 | 68.41 | 224.60 | 0.16 | 67.16 | 289.25 |

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|---|---|---|---|---|---|---|---|
| 344 | jing | 0.16 | 68.68 | 234.68 | 0.10 | 69.76 | 239.91 |
| 345 | i | 0.18 | 63.14 | 222.43 | 0.19 | 65.20 | 244.85 |
| 346 | tu | 0.19 | 67.92 | 273.23 | 0.06 | 64.37 | 280.40 |
| 347 | me | 0.11 | 71.22 | 242.75 | 0.16 | 71.30 | 261.17 |
| 348 | li | 0.20 | 67.74 | 231.58 | 0.28 | 70.63 | 270.05 |
| 349 | hat | 0.29 | 64.35 | 248.63 | 0.25 | 67.86 | 339.69 |
| 350 | ke | 0.14 | 68.85 | 232.85 | 0.13 | 69.62 | 242.22 |
| 351 | da | 0.10 | 69.76 | 228.03 | 0.08 | 74.41 | 219.47 |
| 352 | lam | 0.26 | 69.19 | 221.89 | 0.15 | 72.46 | 210.44 |
| 353 | a | 0.15 | 67.65 | 221.13 | 0.20 | 67.85 | 122.65 |
| 354 | ir | 0.32 | 64.75 | 160.97 | 0.32 | 62.79 | 97.74 |
| 355 | a | 0.18 | 70.97 | 223.07 | 0.14 | 65.35 | 314.04 |
| 356 | da | 0.14 | 72.81 | 274.18 | 0.11 | 69.91 | 218.65 |
| 357 | se | 0.13 | 62.87 | 272.61 | 0.10 | 66.98 | 216.88 |
| 358 | e | 0.29 | 65.26 | 227.00 | 0.17 | 66.51 | 106.38 |
| 359 | kor | 0.19 | 69.07 | 261.59 | 0.06 | 61.43 | 108.78 |
| 360 | an | 0.22 | 67.18 | 168.99 | 0.24 | 72.87 | 191.32 |
| 361 | jing | 0.17 | 69.86 | 224.11 | 0.17 | 71.67 | 212.78 |
| 362 | la | 0.30 | 71.69 | 219.56 | 0.12 | 71.13 | 202.16 |
| 363 | in | 0.28 | 69.22 | 269.98 | 0.31 | 69.70 | 254.09 |
| 364 | de | 0.12 | 71.86 | 244.38 | 0.18 | 68.42 | 271.94 |
| 365 | ngan | 0.20 | 69.15 | 222.50 | 0.21 | 71.30 | 244.68 |
| 366 | da | 0.31 | 72.38 | 217.17 | 0.20 | 70.75 | 245.98 |
| 367 | ging | 0.25 | 68.16 | 267.99 | 0.17 | 70.37 | 315.68 |
| 368 | di | 0.11 | 69.08 | 233.37 | 0.16 | 72.16 | 251.95 |
| 369 | mu | 0.17 | 66.59 | 225.41 | 0.18 | 74.30 | 207.93 |
| 370 | lut | 0.26 | 69.15 | 191.78 | 0.14 | 69.78 | 199.10 |
| 371 | nya | 0.39 | 66.50 | 251.56 | 0.36 | 64.54 | 201.65 |
| 372 | di | 0.11 | 66.61 | 221.41 | 0.16 | 66.69 | 216.52 |
| 373 | da | 0.28 | 72.46 | 223.08 | 0.10 | 72.07 | 214.34 |
| 374 | lam | 0.23 | 69.66 | 220.52 | 0.18 | 69.49 | 206.95 |
| 375 | a | 0.21 | 69.27 | 194.03 | 0.13 | 66.28 | 102.93 |
| 376 | ir | 0.17 | 66.61 | 221.64 | 0.16 | 70.58 | 100.55 |
| 377 | i | 0.19 | 58.98 | 106.96 | 0.23 | 63.06 | 103.98 |
| 378 | tu | 0.32 | 64.22 | 217.09 | 0.31 | 62.49 | 162.80 |
| 379 | di | 0.16 | 67.21 | 212.72 | 0.07 | 65.57 | 261.93 |
| 380 | a | 0.27 | 69.16 | 260.98 | 0.09 | 66.42 | 295.14 |
| 381 | ti | 0.08 | 62.05 | 239.24 | 0.11 | 70.88 | 320.04 |
| 382 | dak | 0.23 | 65.90 | 228.74 | 0.18 | 68.45 | 257.28 |
| 383 | ta | 0.14 | 65.28 | 232.51 | 0.15 | 68.86 | 229.20 |
| 384 | hu | 0.28 | 64.06 | 266.33 | 0.38 | 65.18 | 236.37 |
| 385 | i | 0.25 | 56.90 | 226.05 | 0.16 | 61.15 | 230.56 |
| 386 | tu | 0.18 | 66.66 | 289.59 | 0.14 | 65.96 | 280.96 |
| 387 | i | 0.14 | 67.53 | 231.07 | 0.10 | 70.05 | 256.93 |
| 388 | a | 0.14 | 67.53 | 231.07 | 0.10 | 70.05 | 256.93 |
| 389 | lah | 0.19 | 71.41 | 253.53 | 0.19 | 71.69 | 232.18 |
| 390 | ba | 0.19 | 71.33 | 228.76 | 0.13 | 73.63 | 224.01 |
| 391 | yang | 0.14 | 66.63 | 227.75 | 0.15 | 69.33 | 226.98 |
| 392 | ba | 0.21 | 71.42 | 223.55 | 0.09 | 71.99 | 225.01 |
| 393 | yang | 0.18 | 69.39 | 224.94 | 0.12 | 70.82 | 225.92 |
| 394 | nya | 0.20 | 65.79 | 223.83 | 0.17 | 69.47 | 229.47 |
| 395 | sen | 0.25 | 67.97 | 223.28 | 0.20 | 67.65 | 268.63 |
| 396 | di | 0.24 | 72.65 | 213.53 | 0.18 | 75.41 | 368.99 |
| 397 | ri | 0.26 | 64.63 | 212.23 | 0.36 | 67.91 | 307.04 |
| 398 | di | 0.05 | 67.04 | 221.42 | 0.07 | 62.14 | 226.23 |
| 399 | a | 0.21 | 74.87 | 246.43 | 0.16 | 71.26 | 272.45 |
| 400 | ma | 0.21 | 67.05 | 228.73 | 0.16 | 73.86 | 308.76 |
| 401 | hu | 0.17 | 70.17 | 246.91 | 0.20 | 73.08 | 404.63 |
| 402 | men | 0.20 | 70.72 | 228.56 | 0.09 | 71.91 | 263.15 |
| 403 | da | 0.22 | 67.12 | 222.75 | 0.19 | 71.92 | 230.85 |
| 404 | pat | 0.22 | 62.58 | 221.63 | 0.15 | 68.69 | x |
| 405 | kan | 0.27 | 67.50 | 258.09 | 0.08 | 67.67 | 140.50 |
| 406 | da | 0.20 | 71.49 | 229.27 | 0.14 | 73.96 | 217.10 |
| 407 | ging | 0.21 | 68.62 | 221.35 | 0.27 | 72.00 | 198.13 |
| 408 | i | 0.20 | 61.54 | 211.01 | 0.20 | 63.53 | 174.42 |
| 409 | tu | 0.31 | 64.95 | 219.09 | 0.35 | 62.85 | 206.10 |
| 410 | di | 0.13 | 67.10 | 212.25 | 0.09 | 65.73 | 208.39 |
| 411 | a | 0.29 | 68.45 | 243.73 | 0.18 | 68.61 | 213.97 |

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|---|---|---|---|---|---|---|---|
| 412 | pun | 0.23 | 71.80 | 248.18 | 0.12 | 73.10 | 217.30 |
| 413 | me | 0.12 | 68.66 | 228.98 | 0.12 | 75.55 | 212.87 |
| 414 | nya | 0.28 | 70.45 | 221.80 | 0.31 | 75.32 | 263.61 |
| 415 | lak | 0.35 | 68.15 | 259.71 | 0.27 | 72.89 | 361.60 |
| 416 | ke | 0.13 | 62.54 | 189.23 | 0.11 | 62.55 | 251.01 |
| 417 | pa | 0.09 | 70.49 | 234.53 | 0.09 | 71.84 | 232.91 |
| 418 | da | 0.14 | 72.53 | 222.73 | 0.16 | 72.48 | 172.79 |
| 419 | an | 0.27 | 69.60 | 223.82 | 0.24 | 73.65 | 187.37 |
| 420 | jing | 0.23 | 71.66 | 244.61 | 0.22 | 71.92 | 218.54 |
| 421 | di | 0.10 | 67.05 | 232.46 | 0.13 | 71.87 | 208.61 |
| 422 | da | 0.26 | 71.00 | 218.27 | 0.12 | 71.30 | 205.24 |
| 423 | lam | 0.31 | 63.38 | 224.16 | 0.17 | 68.71 | 201.82 |
| 424 | a | 0.11 | 66.94 | 225.96 | 0.11 | 67.38 | 102.00 |
| 425 | ir | 0.29 | 65.16 | 170.14 | 0.32 | 64.53 | 127.58 |
| 426 | se | 0.19 | 65.75 | 232.37 | 0.21 | 59.36 | 213.69 |
| 427 | ba | 0.10 | 77.11 | 235.39 | 0.21 | 72.30 | 209.62 |
| 428 | ik | 0.14 | 69.05 | 292.92 | 0.16 | 69.73 | 217.99 |
| 429 | sa | 0.30 | 65.92 | 293.53 | 0.21 | 68.34 | 165.15 |
| 430 | ja | 0.20 | 69.03 | 268.27 | 0.16 | 68.88 | 201.54 |
| 431 | di | 0.11 | 65.30 | 263.32 | 0.08 | 70.22 | 203.18 |
| 432 | a | 0.16 | 71.77 | 238.05 | 0.10 | 70.99 | 201.63 |
| 433 | mem | 0.26 | 69.28 | 228.78 | 0.09 | 72.82 | 203.52 |
| 434 | bu | 0.13 | 64.72 | 228.41 | 0.19 | 69.13 | 197.95 |
| 435 | ka | 0.10 | 67.89 | 235.93 | 0.12 | 68.97 | 206.20 |
| 436 | mu | 0.25 | 71.17 | 220.43 | 0.18 | 74.01 | 200.05 |
| 437 | lut | 0.22 | 69.95 | 266.68 | 0.34 | 64.51 | 223.62 |
| 438 | da | 0.28 | 70.11 | 220.95 | 0.27 | 68.36 | 250.15 |
| 439 | ging | 0.20 | 70.02 | 242.48 | 0.19 | 70.19 | 266.38 |
| 440 | di | 0.16 | 69.57 | 221.58 | 0.14 | 71.04 | 267.97 |
| 441 | mu | 0.20 | 75.01 | 217.33 | 0.14 | 71.26 | 267.76 |
| 442 | lut | 0.15 | 72.64 | 218.97 | 0.18 | 68.25 | 264.67 |
| 443 | nya | 0.33 | 62.34 | 252.39 | 0.26 | 67.45 | 309.67 |
| 444 | ter | 0.23 | 67.29 | 223.52 | 0.21 | 67.41 | 304.00 |
| 445 | ja | 0.29 | 64.52 | 227.51 | 0.38 | 68.53 | 307.39 |
| 446 | tuh | 0.22 | 66.12 | 237.21 | 0.21 | 70.42 | 317.35 |
| 447 | ke | 0.12 | 67.02 | 224.96 | 0.07 | 66.45 | 260.19 |
| 448 | da | 0.14 | 65.64 | 221.97 | 0.19 | 71.24 | 211.96 |
| 449 | lam | 0.16 | 68.26 | 137.03 | 0.15 | 68.63 | 143.98 |
| 450 | a | 0.14 | 62.51 | 109.08 | 0.20 | 65.86 | 103.65 |
| 451 | ir | 0.30 | 65.56 | 108.28 | 0.35 | 66.86 | 102.82 |
| 452 | se | 0.18 | 66.43 | 270.09 | 0.20 | 59.29 | 302.50 |
| 453 | e | 0.17 | 67.59 | 254.43 | 0.19 | 69.84 | 308.62 |
| 454 | kor | 0.15 | 69.72 | 251.25 | 0.14 | 68.31 | 299.19 |
| 455 | se | 0.19 | 65.61 | 249.60 | 0.21 | 66.57 | 254.52 |
| 456 | mut | 0.23 | 68.84 | 286.58 | 0.54 | 66.65 | 222.79 |
| 457 | yang | 0.24 | 66.71 | 265.88 | 0.22 | 66.35 | 213.31 |
| 458 | ke | 0.11 | 65.07 | 248.21 | 0.08 | 65.33 | 238.80 |
| 459 | hau | 0.26 | 69.88 | 231.95 | 0.28 | 69.71 | 219.91 |
| 460 | san | 0.38 | 63.02 | 277.22 | 0.50 | 65.57 | 242.47 |
| 461 | i | 0.11 | 69.22 | 293.49 | 0.14 | 67.27 | 254.81 |
| 462 | ngin | 0.19 | 72.98 | 243.75 | 0.16 | 71.56 | 275.90 |
| 463 | me | 0.13 | 69.28 | 237.63 | 0.10 | 71.62 | 274.74 |
| 464 | mi | 0.13 | 70.36 | 232.38 | 0.10 | 69.73 | 272.36 |
| 465 | num | 0.28 | 66.07 | 242.20 | 0.21 | 65.19 | 274.05 |
| 466 | a | 0.15 | 70.72 | 235.20 | 0.19 | 69.80 | 268.56 |
| 467 | ir | 0.24 | 66.44 | 261.23 | 0.21 | 70.98 | 313.38 |
| 468 | da | 0.18 | 70.65 | 231.96 | 0.15 | 70.21 | 214.28 |
| 469 | ri | 0.14 | 66.90 | 236.75 | 0.19 | 68.60 | 223.22 |
| 470 | a | 0.15 | 68.49 | 238.44 | 0.10 | 71.37 | 108.37 |
| 471 | ir | 0.20 | 63.29 | 232.22 | 0.14 | 66.69 | 209.76 |
| 472 | ter | 0.19 | 66.20 | 228.64 | 0.14 | 68.77 | 219.43 |
| 473 | jun | 0.13 | 68.10 | 247.69 | 0.15 | 69.41 | 209.86 |
| 474 | yang | 0.15 | 67.86 | 230.48 | 0.12 | 73.12 | 209.49 |
| 475 | ber | 0.14 | 72.50 | 219.03 | 0.14 | 72.04 | 210.83 |
| 476 | ham | 0.29 | 70.79 | 217.18 | 0.25 | 68.92 | 207.39 |
| 477 | pi | 0.14 | 72.50 | 234.81 | 0.13 | 69.62 | 208.34 |
| 478 | ran | 0.34 | 64.64 | 218.87 | 0.32 | 62.93 | 203.51 |
| 479 | na | 0.14 | 67.52 | 223.91 | 0.17 | 70.58 | 274.89 |

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|---|---|---|---|---|---|---|---|
| 480 | mun | 0.33 | 71.02 | 250.88 | 0.51 | 67.41 | 279.49 |
| 481 | na | 0.23 | 68.17 | 252.72 | 0.18 | 65.96 | 232.43 |
| 482 | sib | 0.17 | 61.86 | 304.34 | 0.16 | 63.19 | 245.74 |
| 483 | nya | 0.18 | 66.92 | 234.13 | 0.12 | 69.95 | 243.97 |
| 484 | ma | 0.14 | 71.14 | 229.14 | 0.35 | 70.25 | 238.36 |
| 485 | lang | 0.21 | 71.21 | 250.54 | 0.40 | 66.40 | 247.35 |
| 486 | a | 0.20 | 61.60 | 192.53 | 0.16 | 65.33 | 231.07 |
| 487 | pa | 0.07 | 66.49 | 237.57 | 0.13 | 67.59 | 241.75 |
| 488 | bi | 0.15 | 68.01 | 224.86 | 0.11 | 70.55 | 246.94 |
| 489 | la | 0.16 | 70.08 | 241.06 | 0.11 | 74.63 | 245.93 |
| 490 | ka | 0.20 | 62.97 | 236.14 | 0.21 | 65.77 | 241.94 |
| 491 | ki | 0.19 | 61.39 | 240.56 | 0.17 | 65.84 | 240.52 |
| 492 | nya | 0.19 | 62.68 | 262.18 | 0.31 | 67.90 | 296.97 |
| 493 | ter | 0.14 | 69.33 | 238.96 | 0.14 | 71.36 | 307.94 |
| 494 | ge | 0.19 | 69.37 | 225.33 | 0.17 | 68.31 | 266.19 |
| 495 | lin | 0.17 | 64.86 | 228.08 | 0.19 | 68.73 | 226.11 |
| 496 | cir | 0.34 | 65.61 | 252.31 | 0.34 | 66.11 | 191.27 |
| 497 | dan | 0.22 | 67.40 | 227.23 | 0.19 | 63.97 | 243.46 |
| 498 | ter | 0.18 | 65.69 | 225.21 | 0.16 | 70.49 | 311.83 |
| 499 | ja | 0.27 | 59.33 | 230.48 | 0.37 | 67.63 | 331.61 |
| 500 | tuh | 0.16 | 68.63 | 268.75 | 0.12 | 72.94 | 390.00 |
| 501 | di | 0.15 | 66.85 | 238.59 | 0.17 | 72.25 | 271.84 |
| 502 | da | 0.13 | 67.19 | 230.99 | 0.20 | 71.50 | 230.55 |
| 503 | lam | 0.22 | 62.82 | 228.64 | 0.14 | 68.47 | 224.39 |
| 504 | a | 0.10 | 63.68 | 227.63 | 0.14 | 66.67 | 224.15 |
| 505 | ir | 0.18 | 63.02 | 230.21 | 0.14 | 66.79 | 222.43 |
| 506 | ter | 0.14 | 67.55 | 229.51 | 0.16 | 67.70 | 226.78 |
| 507 | jun | 0.12 | 64.47 | 237.34 | 0.14 | 67.96 | 224.39 |
| 508 | yang | 0.30 | 71.45 | 218.78 | 0.24 | 74.16 | 212.08 |
| 509 | de | 0.13 | 69.35 | 214.13 | 0.11 | 70.83 | 210.98 |
| 510 | ras | 0.28 | 55.21 | 132.96 | 0.31 | 62.33 | 152.73 |
| 511 | a | 0.17 | 65.98 | 232.28 | 0.11 | 69.36 | 237.20 |
| 512 | pa | 0.09 | 76.07 | 240.05 | 0.12 | 70.70 | 257.97 |
| 513 | bi | 0.11 | 72.28 | 233.30 | 0.19 | 69.76 | 282.08 |
| 514 | la | 0.30 | 71.32 | 267.33 | 0.15 | 73.36 | 356.08 |
| 515 | di | 0.06 | 67.46 | 267.90 | 0.06 | 70.61 | 345.71 |
| 516 | a | 0.14 | 73.61 | 255.76 | 0.13 | 72.58 | 315.87 |
| 517 | ham | 0.22 | 67.01 | 231.15 | 0.18 | 67.59 | 267.06 |
| 518 | pir | 0.09 | 72.34 | 245.94 | 0.11 | 70.74 | 260.42 |
| 519 | ham | 0.21 | 67.42 | 225.70 | 0.18 | 66.07 | 230.78 |
| 520 | pir | 0.15 | 71.42 | 231.19 | 0.12 | 72.64 | 238.36 |
| 521 | le | 0.06 | 68.62 | 222.30 | 0.10 | 70.27 | 228.26 |
| 522 | mas | 0.39 | 65.46 | 234.40 | 0.54 | 66.28 | 197.09 |
| 523 | se | 0.09 | 58.78 | 487.03 | 0.12 | 63.50 | 266.88 |
| 524 | e | 0.18 | 71.39 | 164.93 | 0.23 | 67.22 | 266.19 |
| 525 | kor | 0.16 | 68.50 | 249.42 | 0.11 | 70.66 | 334.65 |
| 526 | mer | 0.19 | 68.74 | 237.03 | 0.27 | 69.85 | 283.48 |
| 527 | pa | 0.20 | 64.75 | 238.21 | 0.28 | 62.36 | 230.14 |
| 528 | ti | 0.10 | 61.30 | 285.95 | 0.14 | 65.68 | 239.83 |
| 529 | yang | 0.15 | 68.76 | 272.16 | 0.26 | 65.10 | 260.61 |
| 530 | ber | 0.20 | 63.36 | 234.55 | 0.27 | 65.24 | 232.70 |
| 531 | teng | 0.19 | 70.93 | 240.39 | 0.19 | 69.76 | 284.89 |
| 532 | gek | 0.19 | 65.22 | 365.96 | 0.19 | 65.60 | 278.37 |
| 533 | ti | 0.16 | 63.84 | 230.99 | 0.08 | 67.91 | 265.96 |
| 534 | dak | 0.12 | 69.45 | 230.21 | 0.15 | 67.02 | 248.72 |
| 535 | ja | 0.19 | 70.78 | 231.61 | 0.18 | 72.15 | 244.98 |
| 536 | uh | 0.17 | 72.40 | 243.38 | 0.18 | 74.89 | 316.51 |
| 537 | da | 0.14 | 71.90 | 233.72 | 0.12 | 74.46 | 266.53 |
| 538 | ri | 0.15 | 62.75 | 228.35 | 0.21 | 62.65 | 230.88 |
| 539 | po | 0.16 | 66.05 | 231.29 | 0.20 | 62.94 | 231.80 |
| 540 | kok | 0.13 | 65.20 | 246.12 | 0.18 | 67.82 | 183.93 |
| 541 | i | 0.19 | 59.23 | 226.99 | 0.16 | 64.47 | 126.70 |
| 542 | tu | 0.20 | 65.96 | 281.92 | 0.34 | 62.81 | 226.46 |
| 543 | men | 0.14 | 69.92 | 236.39 | 0.13 | 65.02 | 231.14 |
| 544 | ja | 0.21 | 65.76 | 236.13 | 0.25 | 70.28 | 247.58 |
| 545 | tuh | 0.19 | 64.33 | 243.30 | 0.16 | 67.60 | 249.37 |
| 546 | kan | 0.23 | 64.17 | 249.46 | 0.22 | 66.47 | 285.96 |
| 547 | se | 0.14 | 65.83 | 243.98 | 0.13 | 64.47 | 288.53 |

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|---|---|---|---|---|---|---|---|
| 548 | he | 0.08 | 67.13 | 227.45 | 0.09 | 71.53 | 254.01 |
| 549 | lai | 0.18 | 71.67 | 219.20 | 0.19 | 74.10 | 238.33 |
| 550 | da | 0.12 | 71.29 | 217.85 | 0.17 | 73.71 | 295.48 |
| 551 | un | 0.30 | 65.48 | 156.93 | 0.39 | 68.81 | 273.32 |
| 552 | se | 0.15 | 68.11 | 250.86 | 0.15 | 63.59 | 227.54 |
| 553 | mut | 0.16 | 70.34 | 246.39 | 0.16 | 73.68 | 216.76 |
| 554 | i | 0.17 | 63.30 | 238.05 | 0.18 | 68.19 | 215.20 |
| 555 | tu | 0.20 | 61.04 | 252.10 | 0.16 | 67.66 | 239.51 |
| 556 | pun | 0.17 | 70.89 | 301.35 | 0.23 | 70.58 | 263.56 |
| 557 | me | 0.14 | 70.68 | 264.28 | 0.12 | 70.85 | 246.77 |
| 558 | man | 0.27 | 70.44 | 238.50 | 0.31 | 71.39 | 269.73 |
| 559 | jat | 0.19 | 68.17 | 264.19 | 0.27 | 69.95 | 271.31 |
| 560 | ke | 0.11 | 62.05 | 123.73 | 0.08 | 69.32 | 243.57 |
| 561 | a | 0.11 | 66.06 | x | 0.15 | 66.87 | x |
| 562 | tas | 0.13 | 63.59 | 248.53 | 0.20 | 69.40 | 233.43 |
| 563 | da | 0.20 | 68.67 | 225.63 | 0.12 | 72.03 | 224.35 |
| 564 | un | 0.20 | 66.38 | 226.73 | 0.16 | 73.13 | 216.54 |
| 565 | ter | 0.06 | 68.08 | 243.20 | 0.12 | 69.13 | 221.58 |
| 566 | se | 0.22 | 65.90 | 240.79 | 0.22 | 63.07 | 217.32 |
| 567 | but | 0.19 | 67.80 | 298.70 | 0.41 | 67.87 | 278.79 |
| 568 | dan | 0.19 | 67.85 | 197.63 | 0.17 | 70.27 | 239.02 |
| 569 | ak | 0.16 | 67.67 | 232.33 | 0.17 | 70.17 | 285.90 |
| 570 | hir | 0.16 | 71.74 | 241.88 | 0.16 | 69.34 | 318.19 |
| 571 | nya | 0.18 | 66.29 | 249.55 | 0.27 | 63.50 | 329.96 |
| 572 | ti | 0.12 | 63.40 | 242.93 | 0.22 | 70.90 | 321.38 |
| 573 | ba | 0.23 | 70.33 | 248.42 | 0.21 | 70.97 | 307.98 |
| 574 | de | 0.08 | 72.10 | 244.16 | 0.07 | 68.93 | 231.27 |
| 575 | ngan | 0.19 | 70.33 | 232.03 | 0.16 | 66.87 | 223.93 |
| 576 | se | 0.10 | 62.08 | 236.95 | 0.17 | 61.17 | 226.11 |
| 577 | la | 0.16 | 70.12 | 229.58 | 0.14 | 72.48 | 220.22 |
| 578 | mat | 0.21 | 67.64 | 236.38 | 0.25 | 68.12 | 212.07 |
| 579 | di | 0.18 | 61.21 | 219.96 | 0.17 | 63.83 | 216.96 |
| 580 | te | 0.14 | 67.02 | 224.30 | 0.14 | 67.69 | 218.56 |
| 581 | bing | 0.20 | 69.04 | 224.95 | 0.20 | 72.71 | 214.22 |
| 582 | su | 0.16 | 62.89 | 223.55 | 0.19 | 69.08 | 211.18 |
| 583 | ngai | 0.29 | 63.36 | 207.95 | 0.38 | 63.80 | 205.77 |
| 584 | be | 0.14 | 76.95 | 229.45 | 0.16 | 68.51 | 218.13 |
| 585 | be | 0.12 | 79.35 | 240.93 | 0.12 | 73.88 | 224.53 |
| 586 | ra | 0.19 | 71.50 | 237.98 | 0.20 | 68.43 | 228.45 |
| 587 | pa | 0.07 | 73.67 | 256.84 | 0.08 | 73.89 | 337.90 |
| 588 | ha | 0.14 | 71.82 | 245.68 | 0.19 | 73.77 | 341.74 |
| 589 | ri | 0.22 | 67.13 | 225.78 | 0.19 | 64.17 | 269.04 |
| 590 | ke | 0.10 | 65.26 | 216.83 | 0.10 | 66.07 | 232.66 |
| 591 | mu | 0.08 | 70.86 | 215.20 | 0.14 | 72.26 | 216.08 |
| 592 | di | 0.06 | 67.81 | 220.55 | 0.05 | 71.72 | 208.60 |
| 593 | an | 0.40 | 64.81 | 271.97 | 0.37 | 65.81 | 223.56 |
| 594 | se | 0.18 | 60.34 | 485.07 | 0.11 | 59.56 | 269.38 |
| 595 | o | 0.18 | 72.22 | 231.57 | 0.13 | 74.29 | 266.23 |
| 596 | rang | 0.18 | 68.93 | 261.73 | 0.20 | 71.75 | 264.13 |
| 597 | pem | 0.08 | 70.59 | 273.55 | 0.19 | 71.74 | 264.68 |
| 598 | bu | 0.22 | 72.69 | 242.21 | 0.15 | 71.19 | 264.63 |
| 599 | ru | 0.16 | 71.19 | 279.06 | 0.45 | 67.39 | 340.14 |
| 600 | me | 0.12 | 71.84 | 259.93 | 0.15 | 67.65 | 298.05 |
| 601 | li | 0.11 | 71.64 | 244.09 | 0.16 | 73.20 | 306.85 |
| 602 | hat | 0.17 | 68.70 | 235.37 | 0.19 | 74.95 | 308.62 |
| 603 | se | 0.12 | 62.20 | 237.26 | 0.18 | 62.90 | 303.58 |
| 604 | e | 0.18 | 65.06 | 213.72 | 0.14 | 67.22 | 290.21 |
| 605 | kor | 0.12 | 67.59 | 254.15 | 0.16 | 67.62 | 318.22 |
| 606 | mer | 0.22 | 68.37 | 230.32 | 0.17 | 66.82 | 300.58 |
| 607 | pa | 0.23 | 65.31 | 224.41 | 0.24 | 64.55 | 239.68 |
| 608 | ti | 0.16 | 67.31 | 296.83 | 0.44 | 64.63 | 307.71 |
| 609 | dan | 0.17 | 68.32 | 244.02 | 0.22 | 64.02 | 127.88 |
| 610 | i | 0.07 | 67.89 | 240.15 | 0.13 | 66.69 | 364.32 |
| 611 | ngin | 0.22 | 72.43 | 239.34 | 0.26 | 75.42 | 352.44 |
| 612 | me | 0.07 | 69.24 | 227.56 | 0.09 | 69.11 | 238.05 |
| 613 | nem | 0.22 | 68.78 | 222.36 | 0.25 | 68.67 | 222.61 |
| 614 | bak | 0.21 | 70.86 | 222.03 | 0.18 | 72.21 | 217.19 |
| 615 | nya | 0.37 | 65.55 | 213.09 | 0.33 | 63.72 | 100.98 |

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|---|---|---|---|---|---|---|---|
| 616 | na | 0.20 | 70.93 | 218.74 | 0.20 | 69.18 | 212.31 |
| 617 | mun | 0.41 | 70.03 | 269.09 | 0.47 | 70.23 | 236.25 |
| 618 | se | 0.23 | 63.18 | 253.46 | 0.16 | 67.69 | 255.46 |
| 619 | mut | 0.18 | 63.83 | 223.28 | 0.22 | 65.11 | 301.10 |
| 620 | ter | 0.09 | 71.74 | 235.37 | 0.08 | 72.84 | 244.41 |
| 621 | li | 0.19 | 69.11 | 229.24 | 0.17 | 69.58 | 235.00 |
| 622 | hat | 0.16 | 69.75 | 262.34 | 0.26 | 69.41 | 288.29 |
| 623 | a | 0.17 | 64.70 | 245.72 | 0.10 | 67.91 | 148.76 |
| 624 | kan | 0.22 | 67.29 | 232.36 | 0.22 | 67.52 | 216.34 |
| 625 | per | 0.14 | 71.14 | 233.66 | 0.14 | 68.32 | 223.33 |
| 626 | la | 0.21 | 66.27 | 227.49 | 0.27 | 65.91 | 224.47 |
| 627 | ku | 0.06 | 69.81 | 247.45 | 0.11 | 71.31 | 247.37 |
| 628 | an | 0.22 | 66.49 | 256.81 | 0.13 | 66.42 | 237.81 |
| 629 | pem | 0.08 | 71.23 | 254.40 | 0.13 | 69.81 | 251.14 |
| 630 | bu | 0.25 | 71.74 | 228.36 | 0.12 | 71.18 | 253.01 |
| 631 | ru | 0.09 | 67.07 | 229.17 | 0.08 | 71.37 | 264.01 |
| 632 | i | 0.24 | 64.41 | 191.88 | 0.18 | 65.85 | 277.33 |
| 633 | tu | 0.31 | 63.96 | 218.02 | 0.38 | 68.93 | 270.35 |
| 634 | se | 0.13 | 65.10 | 239.39 | 0.12 | 61.90 | 239.35 |
| 635 | mut | 0.26 | 66.00 | 229.42 | 0.23 | 69.79 | 230.96 |
| 636 | pun | 0.19 | 70.44 | 271.25 | 0.17 | 71.15 | 234.71 |
| 637 | lan | 0.27 | 69.18 | 235.65 | 0.32 | 67.58 | 227.73 |
| 638 | tas | 0.17 | 66.76 | 243.03 | 0.20 | 67.46 | 235.43 |
| 639 | meng | 0.15 | 67.72 | 230.85 | 0.27 | 63.80 | 211.39 |
| 640 | gi | 0.26 | 74.13 | 215.88 | 0.34 | 67.87 | 250.06 |
| 641 | git | 0.23 | 64.93 | 255.44 | 0.27 | 65.77 | 312.85 |
| 642 | ka | 0.15 | 66.61 | 240.69 | 0.13 | 69.03 | 238.73 |
| 643 | ki | 0.19 | 60.60 | 231.17 | 0.16 | 64.92 | 234.60 |
| 644 | pem | 0.10 | 66.57 | 229.82 | 0.14 | 66.22 | 230.04 |
| 645 | bu | 0.12 | 72.53 | 217.48 | 0.15 | 72.73 | 221.91 |
| 646 | ru | 0.11 | 69.32 | 222.83 | 0.07 | 70.74 | 222.26 |
| 647 | i | 0.26 | 64.45 | 159.94 | 0.26 | 68.09 | 202.10 |
| 648 | tu | 0.19 | 68.82 | 301.04 | 0.33 | 65.61 | 344.35 |
| 649 | dan | 0.18 | 68.07 | 241.28 | 0.26 | 66.14 | 284.77 |
| 650 | tem | 0.11 | 68.51 | 233.44 | 0.20 | 68.42 | 289.95 |
| 651 | ba | 0.18 | 70.44 | 188.83 | 0.15 | 68.87 | 265.68 |
| 652 | kan | 0.24 | 65.69 | 232.50 | 0.13 | 68.90 | 304.20 |
| 653 | nya | 0.18 | 68.68 | 232.23 | 0.29 | 65.03 | 312.58 |
| 654 | ter | 0.13 | 64.57 | 227.55 | 0.31 | 68.58 | 274.98 |
| 655 | sa | 0.27 | 61.07 | 217.67 | 0.26 | 66.17 | 224.24 |
| 656 | sar | 0.36 | 59.01 | 148.27 | 0.47 | 71.62 | 214.58 |
| 657 | mer | 0.19 | 66.22 | 228.32 | 0.22 | 64.65 | 252.22 |
| 658 | pa | 0.22 | 67.31 | 229.03 | 0.25 | 65.20 | 287.48 |
| 659 | ti | 0.07 | 61.24 | 299.65 | 0.10 | 70.21 | 377.70 |
| 660 | yang | 0.26 | 66.41 | 279.24 | 0.21 | 70.72 | 362.17 |
| 661 | ter | 0.15 | 71.19 | 245.13 | 0.09 | 69.54 | 311.14 |
| 662 | de | 0.08 | 74.76 | 238.39 | 0.24 | 70.35 | 278.46 |
| 663 | ngar | 0.23 | 72.69 | 243.36 | 0.13 | 73.29 | 274.27 |
| 664 | je | 0.15 | 72.16 | 230.79 | 0.17 | 71.04 | 263.60 |
| 665 | ri | 0.22 | 64.99 | 232.70 | 0.19 | 69.07 | 258.00 |
| 666 | tan | 0.17 | 68.72 | 236.66 | 0.24 | 65.82 | 250.76 |
| 667 | pem | 0.14 | 65.75 | 235.54 | 0.15 | 68.52 | 243.53 |
| 668 | bu | 0.16 | 72.34 | 226.00 | 0.10 | 69.51 | 232.34 |
| 669 | ru | 0.07 | 71.84 | 230.50 | 0.12 | 68.82 | 234.32 |
| 670 | i | 0.19 | 64.39 | 141.85 | 0.17 | 66.07 | 155.30 |
| 671 | tu | 0.15 | 65.36 | 287.30 | 0.28 | 66.80 | 324.02 |
| 672 | se | 0.17 | 63.54 | 252.12 | 0.13 | 64.49 | 291.28 |
| 673 | ge | 0.09 | 73.88 | 235.40 | 0.08 | 71.72 | 293.17 |
| 674 | ra | 0.17 | 69.15 | 231.09 | 0.23 | 68.65 | 301.17 |
| 675 | ter | 0.18 | 69.75 | 221.61 | 0.29 | 68.56 | 315.28 |
| 676 | bang | 0.22 | 69.84 | 256.06 | 0.25 | 75.88 | 339.99 |
| 677 | ber | 0.13 | 66.04 | 236.37 | 0.13 | 72.04 | 241.67 |
| 678 | e | 0.18 | 68.11 | 188.35 | 0.13 | 70.04 | 237.84 |
| 679 | dar | 0.17 | 70.76 | 226.02 | 0.24 | 72.83 | 219.46 |
| 680 | da | 0.15 | 69.91 | 218.97 | 0.08 | 70.07 | 211.28 |
| 681 | ri | 0.10 | 70.34 | 215.95 | 0.14 | 70.20 | 209.90 |
| 682 | si | 0.28 | 61.41 | 212.19 | 0.31 | 60.42 | 206.36 |
| 683 | tu | 0.27 | 61.30 | 209.18 | 0.27 | 63.88 | 123.70 |

**Duration, Intensity And Pitch Features For Neutral_Data & Story_Data**
**Female Storyteller 3 (Fst3)**

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.15 | 58.91 | 0.00 | 0.15 | 58.47 | 163.47 |
| 2 | a | 0.22 | 68.37 | 194.21 | 0.24 | 65.07 | 145.16 |
| 3 | tu | 0.29 | 63.84 | 255.10 | 0.16 | 71.05 | 223.21 |
| 4 | ma | 0.14 | 64.40 | 190.32 | 0.19 | 76.10 | 299.55 |
| 5 | sa | 0.30 | 63.60 | 188.23 | 0.21 | 70.03 | 277.70 |
| 6 | da | 0.29 | 61.66 | 172.08 | 0.19 | 70.58 | 253.05 |
| 7 | hu | 0.18 | 60.79 | 171.22 | 0.15 | 70.21 | 248.43 |
| 8 | lu | 0.27 | 59.60 | 204.16 | 0.51 | 66.27 | 223.76 |
| 9 | ting | 0.22 | 69.60 | 169.05 | 0.24 | 71.25 | 169.13 |
| 10 | gal | 0.26 | 71.62 | 192.40 | 0.25 | 68.85 | 174.25 |
| 11 | se | 0.24 | 62.79 | 194.45 | 0.20 | 65.38 | 267.90 |
| 12 | o | 0.14 | 63.87 | 188.85 | 0.15 | 70.83 | 204.43 |
| 13 | rang | 0.26 | 66.29 | 215.35 | 0.21 | 68.83 | 211.93 |
| 14 | pe | 0.16 | 57.35 | 214.06 | 0.16 | 61.00 | 222.78 |
| 15 | ta | 0.14 | 63.15 | 187.99 | 0.14 | 71.51 | 204.68 |
| 16 | ni | 0.22 | 59.42 | 177.42 | 0.31 | 71.72 | 210.60 |
| 17 | yang | 0.35 | 61.76 | 172.54 | 0.27 | 72.53 | 279.31 |
| 18 | me | 0.18 | 57.90 | 166.25 | 0.12 | 77.58 | 301.00 |
| 19 | me | 0.13 | 59.48 | 161.93 | 0.16 | 74.93 | 260.42 |
| 20 | li | 0.17 | 62.87 | 157.49 | 0.19 | 72.11 | 243.93 |
| 21 | ha | 0.22 | 58.19 | 171.54 | 0.17 | 65.77 | 230.47 |
| 22 | ra | 0.25 | 58.80 | 183.16 | 0.21 | 71.71 | 219.68 |
| 23 | se | 0.16 | 52.17 | 196.75 | 0.25 | 62.83 | 221.60 |
| 24 | e | 0.22 | 60.59 | 164.19 | 0.17 | 66.46 | 178.08 |
| 25 | kor | 0.19 | 63.97 | 156.72 | 0.29 | 69.52 | 300.28 |
| 26 | ang | 0.20 | 59.99 | 158.13 | 0.23 | 69.53 | 182.67 |
| 27 | sa | 0.33 | 56.32 | 155.08 | 0.45 | 62.33 | 159.90 |
| 28 | pa | 0.10 | 61.15 | 171.48 | 0.19 | 64.36 | 175.73 |
| 29 | da | 0.24 | 60.49 | 175.21 | 0.15 | 66.20 | 177.38 |
| 30 | su | 0.19 | 55.16 | 179.25 | 0.13 | 65.62 | 167.42 |
| 31 | a | 0.14 | 60.87 | 167.09 | 0.21 | 67.76 | 221.02 |
| 32 | tu | 0.19 | 55.58 | 161.62 | 0.07 | 71.87 | 244.18 |
| 33 | ha | 0.25 | 60.15 | 165.99 | 0.22 | 67.22 | 233.43 |
| 34 | ri | 0.34 | 62.62 | 229.84 | 0.53 | 62.14 | 233.16 |
| 35 | ke | 0.21 | 55.89 | 195.50 | 0.15 | 67.34 | 235.54 |
| 36 | ti | 0.14 | 58.94 | 205.22 | 0.13 | 69.57 | 155.68 |
| 37 | ka | 0.10 | 64.47 | 274.91 | 0.11 | 68.55 | 335.90 |
| 38 | i | 0.18 | 60.81 | 121.89 | 0.31 | 60.49 | 250.81 |
| 39 | tu | 0.29 | 60.34 | 197.60 | 0.22 | 69.83 | 266.64 |
| 40 | di | 0.15 | 60.12 | 184.00 | 0.17 | 60.41 | 247.16 |
| 41 | a | 0.29 | 67.48 | 177.08 | 0.16 | 67.66 | 218.18 |
| 42 | i | 0.23 | 59.96 | 171.05 | 0.11 | 70.63 | 210.41 |
| 43 | ngin | 0.24 | 66.34 | 169.42 | 0.15 | 74.40 | 210.01 |
| 44 | me | 0.20 | 64.81 | 159.26 | 0.23 | 72.01 | 206.84 |
| 45 | ngam | 0.25 | 66.99 | 166.68 | 0.28 | 74.05 | 255.02 |
| 46 | bil | 0.50 | 62.47 | 185.66 | 0.28 | 71.46 | 291.67 |
| 47 | te | 0.14 | 61.14 | 167.12 | 0.16 | 71.41 | 195.95 |
| 48 | lur | 0.20 | 63.10 | 165.13 | 0.17 | 70.58 | 175.21 |
| 49 | ang | 0.28 | 59.41 | 162.61 | 0.25 | 66.11 | 168.58 |
| 50 | sa | 0.36 | 60.83 | 167.58 | 0.26 | 66.87 | 173.27 |
| 51 | nya | 0.27 | 61.93 | 150.28 | 0.18 | 66.67 | 142.73 |
| 52 | si | 0.33 | 61.14 | 260.76 | 0.23 | 65.98 | 303.43 |
| 53 | pe | 0.23 | 61.76 | 206.43 | 0.11 | 69.28 | 343.36 |
| 54 | ta | 0.16 | 63.05 | 164.42 | 0.14 | 73.41 | 347.28 |
| 55 | ni | 0.33 | 63.82 | 201.54 | 0.22 | 73.50 | 363.83 |
| 56 | men | 0.23 | 63.50 | 169.91 | 0.19 | 75.91 | 348.20 |
| 57 | da | 0.28 | 58.60 | 165.50 | 0.16 | 66.27 | 277.23 |

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|---|---|---|---|---|---|---|---|
| 58 | pa | 0.18 | 62.27 | 193.83 | 0.15 | 66.79 | 280.24 |
| 59 | ti | 0.27 | 62.84 | 198.83 | 0.27 | 65.32 | 285.97 |
| 60 | te | 0.14 | 64.46 | 171.25 | 0.11 | 68.47 | 264.77 |
| 61 | lur | 0.23 | 64.24 | 85.73 | 0.14 | 69.07 | 263.93 |
| 62 | i | 0.25 | 58.61 | 145.52 | 0.17 | 62.21 | 259.73 |
| 63 | tu | 0.22 | 58.50 | 184.65 | 0.16 | 66.40 | 247.88 |
| 64 | ke | 0.09 | 62.99 | 170.50 | 0.06 | 71.50 | 329.63 |
| 65 | li | 0.14 | 64.67 | 161.06 | 0.11 | 72.69 | 346.17 |
| 66 | ha | 0.16 | 56.69 | 157.84 | 0.21 | 64.73 | 367.39 |
| 67 | tan | 0.29 | 59.92 | 154.79 | 0.18 | 72.97 | 348.68 |
| 68 | a | 0.09 | 62.35 | 167.98 | 0.16 | 67.01 | 230.88 |
| 69 | neh | 0.23 | 62.42 | 156.15 | 0.24 | 67.90 | 156.68 |
| 70 | war | 0.25 | 64.92 | 168.08 | 0.18 | 72.70 | 183.14 |
| 71 | na | 0.31 | 67.92 | 196.93 | 0.19 | 73.97 | 185.03 |
| 72 | nya | 0.44 | 66.17 | 211.78 | 0.36 | 72.84 | 256.16 |
| 73 | ku | 0.09 | 64.16 | 187.91 | 0.15 | 73.34 | 289.37 |
| 74 | ning | 0.46 | 62.99 | 183.93 | 0.32 | 69.30 | 301.82 |
| 75 | ke | 0.11 | 63.39 | 172.05 | 0.09 | 72.43 | 289.82 |
| 76 | e | 0.14 | 65.85 | 163.53 | 0.13 | 73.84 | 248.28 |
| 77 | ma | 0.18 | 66.29 | 164.30 | 0.11 | 73.28 | 254.43 |
| 78 | san | 0.38 | 63.56 | 210.94 | 0.41 | 67.67 | 257.82 |
| 79 | dan | 0.40 | 63.26 | 175.88 | 0.31 | 70.81 | 245.45 |
| 80 | be | 0.13 | 64.27 | 84.60 | 0.14 | 71.99 | 263.09 |
| 81 | rat | 0.19 | 61.20 | 74.74 | 0.34 | 67.94 | 405.46 |
| 82 | di | 0.17 | 63.82 | 31.60 | 0.11 | 68.34 | 205.30 |
| 83 | a | 0.25 | 67.32 | 177.63 | 0.15 | 71.83 | 313.02 |
| 84 | me | 0.16 | 70.93 | 188.00 | 0.15 | 71.85 | 350.36 |
| 85 | nyang | 0.36 | 64.23 | 192.17 | 0.24 | 72.55 | 245.54 |
| 86 | ka | 0.31 | 61.07 | 248.95 | 0.50 | 68.27 | 191.84 |
| 87 | ji | 0.22 | 56.50 | 205.30 | 0.19 | 69.23 | 199.61 |
| 88 | ran | 0.14 | 63.13 | 178.16 | 0.22 | 72.01 | 171.61 |
| 89 | nya | 0.46 | 59.11 | 180.14 | 0.34 | 69.82 | 161.46 |
| 90 | cu | 0.09 | 59.68 | 166.94 | 0.17 | 67.11 | 200.68 |
| 91 | ba | 0.30 | 62.22 | 168.81 | 0.15 | 69.90 | 159.63 |
| 92 | ber | 0.22 | 61.48 | 164.59 | 0.27 | 62.32 | 156.28 |
| 93 | gu | 0.19 | 59.39 | 172.23 | 0.11 | 70.61 | 314.28 |
| 94 | rau | 0.40 | 60.62 | 181.42 | 0.37 | 70.87 | 288.04 |
| 95 | la | 0.18 | 63.07 | 123.66 | 0.19 | 70.63 | 219.25 |
| 96 | lu | 0.25 | 64.81 | 176.01 | 0.14 | 67.34 | 241.87 |
| 97 | ber | 0.24 | 60.04 | 198.69 | 0.09 | 68.29 | 250.09 |
| 98 | ca | 0.28 | 57.45 | 201.75 | 0.30 | 68.16 | 276.04 |
| 99 | dang | 0.29 | 62.91 | 227.61 | 0.26 | 71.93 | 288.77 |
| 100 | un | 0.43 | 63.61 | 204.31 | 0.15 | 72.28 | 293.32 |
| 101 | tuk | 0.21 | 63.57 | 182.80 | 0.24 | 69.88 | 375.51 |
| 102 | mem | 0.24 | 55.73 | 168.93 | 0.10 | 70.82 | 199.33 |
| 103 | bu | 0.17 | 62.85 | 164.01 | 0.14 | 73.82 | 190.26 |
| 104 | ang | 0.42 | 63.80 | 170.25 | 0.41 | 68.57 | 161.45 |
| 105 | te | 0.10 | 62.18 | 159.68 | 0.11 | 66.08 | 169.44 |
| 106 | lur | 0.28 | 63.69 | 163.00 | 0.14 | 72.12 | 162.86 |
| 107 | i | 0.24 | 47.60 | 223.25 | 0.11 | 62.28 | 163.36 |
| 108 | tu | 0.22 | 51.79 | 151.55 | 0.20 | 59.85 | 145.58 |
| 109 | na | 0.22 | 63.25 | 145.08 | 0.35 | 71.69 | 213.50 |
| 110 | mun | 0.31 | 69.45 | 218.51 | 0.39 | 73.92 | 219.33 |
| 111 | se | 0.24 | 59.79 | 226.40 | 0.19 | 61.35 | 237.42 |
| 112 | le | 0.23 | 59.20 | 148.92 | 0.21 | 60.23 | 232.58 |
| 113 | pas | 0.24 | 62.96 | 121.11 | 0.27 | 64.56 | 328.74 |
| 114 | ber | 0.32 | 58.22 | 159.31 | 0.10 | 68.00 | 343.29 |
| 115 | fi | 0.26 | 51.30 | 157.40 | 0.30 | 65.86 | 303.48 |
| 116 | kir | 0.44 | 60.18 | 151.75 | 0.52 | 66.25 | 291.22 |
| 117 | di | 0.19 | 60.54 | 131.93 | 0.10 | 67.32 | 221.73 |
| 118 | a | 0.25 | 67.69 | 199.96 | 0.13 | 77.39 | 260.66 |
| 119 | mem | 0.31 | 66.76 | 186.76 | 0.15 | 74.89 | 261.63 |
| 120 | ba | 0.17 | 65.09 | 172.67 | 0.14 | 74.69 | 260.68 |
| 121 | wa | 0.38 | 65.22 | 169.83 | 0.18 | 68.64 | 263.63 |
| 122 | te | 0.13 | 63.71 | 177.27 | 0.14 | 71.57 | 255.63 |
| 123 | lur | 0.35 | 60.64 | 182.60 | 0.17 | 74.10 | 297.02 |
| 124 | i | 0.24 | 52.17 | 229.53 | 0.22 | 66.04 | 294.56 |
| 125 | tu | 0.26 | 60.69 | 210.80 | 0.34 | 69.53 | 246.53 |

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|---|---|---|---|---|---|---|---|
| 126 | pu | 0.07 | 63.16 | 190.49 | 0.09 | 67.78 | 236.39 |
| 127 | lang | 0.36 | 61.83 | 184.23 | 0.26 | 74.28 | 272.51 |
| 128 | ke | 0.19 | 57.93 | 168.01 | 0.15 | 71.85 | 291.23 |
| 129 | ru | 0.15 | 62.44 | 162.07 | 0.09 | 72.41 | 244.41 |
| 130 | mah | 0.18 | 58.07 | 163.08 | 0.22 | 69.28 | 234.24 |
| 131 | un | 0.27 | 54.47 | 178.05 | 0.25 | 67.49 | 218.22 |
| 132 | tuk | 0.25 | 59.15 | 165.23 | 0.21 | 66.48 | 250.11 |
| 133 | di | 0.29 | 56.53 | 157.96 | 0.17 | 59.54 | 200.45 |
| 134 | pe | 0.11 | 63.86 | 160.36 | 0.09 | 66.98 | 176.36 |
| 135 | rik | 0.27 | 62.12 | 235.65 | 0.14 | 65.70 | 227.44 |
| 136 | sa | 0.24 | 56.46 | 139.48 | 0.41 | 61.44 | 249.30 |
| 137 | si | 0.23 | 60.60 | 93.02 | 0.25 | 65.29 | 277.78 |
| 138 | pe | 0.22 | 62.59 | 172.65 | 0.19 | 67.04 | 253.56 |
| 139 | ta | 0.21 | 68.32 | 209.80 | 0.18 | 71.56 | 238.45 |
| 140 | ni | 0.18 | 68.17 | 262.19 | 0.17 | 75.18 | 248.10 |
| 141 | be | 0.21 | 63.52 | 219.43 | 0.13 | 72.16 | 244.86 |
| 142 | ra | 0.18 | 64.82 | 173.18 | 0.13 | 71.49 | 257.58 |
| 143 | sa | 0.30 | 61.02 | 179.41 | 0.25 | 65.54 | 293.61 |
| 144 | ter | 0.21 | 59.07 | 150.34 | 0.21 | 65.54 | 327.40 |
| 145 | ke | 0.21 | 59.45 | 128.43 | 0.13 | 70.02 | 390.26 |
| 146 | jut | 0.29 | 60.84 | 228.47 | 0.33 | 69.62 | 330.06 |
| 147 | a | 0.19 | 50.61 | 167.23 | 0.16 | 62.92 | 218.48 |
| 148 | pa | 0.20 | 61.12 | 166.85 | 0.11 | 71.17 | 265.98 |
| 149 | bi | 0.12 | 61.75 | 168.30 | 0.26 | 70.71 | 254.48 |
| 150 | la | 0.24 | 64.61 | 107.36 | 0.23 | 73.63 | 196.28 |
| 151 | men | 0.35 | 67.65 | 180.43 | 0.17 | 75.07 | 262.81 |
| 152 | da | 0.27 | 61.47 | 167.31 | 0.26 | 71.09 | 200.35 |
| 153 | pa | 0.18 | 60.76 | 168.60 | 0.21 | 66.59 | 165.23 |
| 154 | ti | 0.33 | 57.36 | 170.62 | 0.25 | 68.51 | 166.55 |
| 155 | i | 0.23 | 58.67 | 148.54 | 0.37 | 66.29 | 249.58 |
| 156 | tu | 0.29 | 58.94 | 233.24 | 0.36 | 64.01 | 243.81 |
| 157 | a | 0.16 | 61.98 | 73.23 | 0.15 | 67.83 | 183.41 |
| 158 | da | 0.17 | 61.73 | 165.14 | 0.10 | 69.16 | 163.40 |
| 159 | lah | 0.23 | 59.33 | 101.82 | 0.26 | 66.45 | 174.74 |
| 160 | te | 0.17 | 62.07 | 168.96 | 0.18 | 66.83 | 241.25 |
| 161 | lur | 0.28 | 63.81 | 172.26 | 0.13 | 69.02 | 278.33 |
| 162 | e | 0.10 | 65.45 | 192.99 | 0.10 | 68.15 | 374.23 |
| 163 | mas | 0.50 | 60.15 | 230.09 | 0.43 | 68.07 | 349.90 |
| 164 | si | 0.21 | 58.23 | 355.98 | 0.27 | 65.22 | 338.59 |
| 165 | pe | 0.23 | 57.90 | 182.98 | 0.11 | 68.39 | 349.29 |
| 166 | ta | 0.14 | 63.59 | 178.23 | 0.12 | 75.74 | 338.84 |
| 167 | ni | 0.29 | 66.76 | 187.63 | 0.11 | 78.29 | 338.65 |
| 168 | sung | 0.41 | 60.40 | 179.52 | 0.22 | 70.87 | 288.36 |
| 169 | guh | 0.31 | 60.91 | 169.19 | 0.28 | 74.80 | 319.14 |
| 170 | gem | 0.14 | 60.81 | 160.37 | 0.21 | 75.66 | 232.14 |
| 171 | bi | 0.28 | 64.88 | 157.42 | 0.14 | 73.60 | 186.87 |
| 172 | ra | 0.23 | 61.71 | 86.36 | 0.24 | 68.32 | 189.62 |
| 173 | ha | 0.16 | 66.56 | 197.27 | 0.17 | 71.98 | 264.06 |
| 174 | ri | 0.23 | 68.90 | 212.64 | 0.23 | 71.45 | 298.15 |
| 175 | de | 0.21 | 66.61 | 177.88 | 0.12 | 73.38 | 299.58 |
| 176 | mi | 0.17 | 67.64 | 162.38 | 0.22 | 78.08 | 290.80 |
| 177 | ha | 0.25 | 62.37 | 161.43 | 0.20 | 73.00 | 287.38 |
| 178 | ri | 0.37 | 61.08 | 181.25 | 0.13 | 71.55 | 291.58 |
| 179 | se | 0.32 | 55.71 | 175.84 | 0.16 | 69.22 | 302.83 |
| 180 | le | 0.10 | 63.82 | 160.58 | 0.16 | 64.59 | 292.73 |
| 181 | pas | 0.30 | 57.15 | 161.25 | 0.14 | 68.01 | 286.88 |
| 182 | i | 0.23 | 49.03 | 158.34 | 0.17 | 61.78 | 278.40 |
| 183 | tu | 0.28 | 57.27 | 173.84 | 0.27 | 67.56 | 274.35 |
| 184 | si | 0.31 | 59.40 | 261.06 | 0.22 | 64.66 | 274.53 |
| 185 | ang | 0.24 | 63.11 | 169.69 | 0.20 | 71.39 | 269.18 |
| 186 | sa | 0.36 | 61.70 | 192.70 | 0.29 | 66.22 | 284.19 |
| 187 | te | 0.13 | 63.50 | 172.37 | 0.13 | 67.45 | 360.22 |
| 188 | rus | 0.31 | 57.83 | 165.17 | 0.22 | 68.68 | 383.44 |
| 189 | ber | 0.27 | 57.99 | 153.51 | 0.21 | 68.28 | 196.02 |
| 190 | te | 0.20 | 61.35 | 156.57 | 0.07 | 70.55 | 195.59 |
| 191 | lur | 0.24 | 61.26 | 140.15 | 0.18 | 71.30 | 176.45 |
| 192 | e | 0.21 | 56.81 | 149.33 | 0.12 | 61.06 | 168.29 |
| 193 | mas | 0.28 | 57.58 | 143.91 | 0.42 | 63.54 | 152.75 |

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|---|---|---|---|---|---|---|---|
| 194 | si | 0.46 | 58.93 | 187.73 | 0.30 | 60.97 | 199.53 |
| 195 | pe | 0.20 | 58.20 | 168.50 | 0.18 | 63.07 | 213.50 |
| 196 | ta | 0.14 | 64.35 | 167.79 | 0.12 | 72.45 | 209.38 |
| 197 | ni | 0.38 | 64.51 | 209.12 | 0.24 | 75.61 | 212.48 |
| 198 | mu | 0.25 | 61.92 | 174.34 | 0.21 | 78.86 | 252.65 |
| 199 | la | 0.34 | 60.48 | 174.28 | 0.14 | 76.57 | 273.29 |
| 200 | men | 0.18 | 61.96 | 161.31 | 0.25 | 76.27 | 245.18 |
| 201 | ja | 0.21 | 61.01 | 156.93 | 0.16 | 68.56 | 185.21 |
| 202 | di | 0.30 | 60.60 | 81.04 | 0.17 | 63.80 | 170.48 |
| 203 | ta | 0.13 | 60.96 | 151.80 | 0.18 | 66.30 | 174.26 |
| 204 | mak | 0.45 | 60.24 | 131.03 | 0.25 | 69.51 | 207.59 |
| 205 | si | 0.32 | 56.28 | 159.86 | 0.27 | 61.72 | 253.97 |
| 206 | pe | 0.21 | 58.72 | 159.28 | 0.17 | 70.86 | 242.10 |
| 207 | ta | 0.16 | 64.99 | 167.43 | 0.11 | 71.05 | 234.58 |
| 208 | ni | 0.37 | 64.12 | 188.47 | 0.16 | 72.91 | 237.53 |
| 209 | me | 0.25 | 60.86 | 184.07 | 0.12 | 74.65 | 215.20 |
| 210 | ngam | 0.24 | 63.10 | 169.83 | 0.29 | 76.02 | 254.53 |
| 211 | bil | 0.25 | 63.57 | 166.08 | 0.19 | 75.43 | 319.31 |
| 212 | pi | 0.23 | 55.09 | 169.82 | 0.29 | 65.39 | 262.18 |
| 213 | sau | 0.50 | 59.82 | 171.10 | 0.28 | 67.06 | 158.04 |
| 214 | dan | 0.45 | 58.75 | 138.28 | 0.24 | 67.19 | 162.21 |
| 215 | me | 0.15 | 61.85 | 171.08 | 0.12 | 65.91 | 183.08 |
| 216 | nyem | 0.28 | 65.10 | 172.28 | 0.31 | 64.63 | 186.63 |
| 217 | be | 0.12 | 68.59 | 193.86 | 0.09 | 74.95 | 274.71 |
| 218 | lih | 0.18 | 61.51 | 188.18 | 0.26 | 73.95 | 233.43 |
| 219 | ang | 0.22 | 57.44 | 167.95 | 0.26 | 71.76 | 186.03 |
| 220 | sa | 0.36 | 58.84 | 164.51 | 0.33 | 69.52 | 185.83 |
| 221 | ber | 0.15 | 55.06 | 161.77 | 0.09 | 61.85 | 174.48 |
| 222 | tu | 0.24 | 49.49 | 160.66 | 0.11 | 50.70 | 185.00 |
| 223 | ah | 0.10 | 61.63 | 162.57 | 0.26 | 64.31 | 180.50 |
| 224 | nya | 0.37 | 59.24 | 156.05 | 0.34 | 66.96 | 155.94 |
| 225 | a | 0.19 | 57.09 | 119.43 | 0.17 | 66.78 | 196.30 |
| 226 | pa | 0.14 | 65.41 | 165.98 | 0.11 | 71.42 | 216.43 |
| 227 | bi | 0.18 | 62.38 | 161.53 | 0.11 | 70.43 | 210.65 |
| 228 | la | 0.30 | 65.43 | 167.46 | 0.19 | 74.52 | 296.02 |
| 229 | men | 0.20 | 63.31 | 167.13 | 0.14 | 72.33 | 365.78 |
| 230 | da | 0.25 | 66.69 | 155.98 | 0.20 | 71.47 | 316.38 |
| 231 | pa | 0.29 | 59.55 | 161.35 | 0.24 | 66.86 | 270.73 |
| 232 | ti | 0.35 | 58.75 | 183.98 | 0.22 | 65.21 | 202.98 |
| 233 | ti | 0.13 | 62.26 | 159.98 | 0.08 | 66.99 | 209.72 |
| 234 | a | 0.23 | 63.31 | 161.46 | 0.10 | 73.75 | 218.85 |
| 235 | da | 0.26 | 61.73 | 159.33 | 0.13 | 73.13 | 232.00 |
| 236 | se | 0.23 | 58.24 | 87.54 | 0.30 | 67.43 | 238.74 |
| 237 | bi | 0.21 | 47.07 | 330.60 | 0.16 | 67.43 | 255.78 |
| 238 | ji | 0.30 | 55.94 | 211.48 | 0.26 | 62.80 | 363.44 |
| 239 | pun | 0.31 | 65.67 | 197.40 | 0.33 | 66.98 | 256.56 |
| 240 | te | 0.12 | 62.47 | 180.79 | 0.13 | 68.97 | 212.87 |
| 241 | lur | 0.29 | 62.37 | 169.35 | 0.18 | 71.89 | 158.71 |
| 242 | e | 0.15 | 52.08 | 177.42 | 0.09 | 71.75 | 204.80 |
| 243 | mas | 0.50 | 59.36 | 168.69 | 0.33 | 69.61 | 202.49 |
| 244 | di | 0.14 | 56.91 | 158.43 | 0.06 | 65.53 | 196.81 |
| 245 | da | 0.13 | 58.73 | 159.77 | 0.14 | 71.43 | 194.75 |
| 246 | lam | 0.35 | 60.10 | 123.30 | 0.28 | 70.02 | 189.67 |
| 247 | pe | 0.10 | 61.30 | 164.90 | 0.08 | 71.85 | 198.74 |
| 248 | rut | 0.19 | 60.30 | 160.57 | 0.21 | 64.55 | 151.72 |
| 249 | ang | 0.22 | 59.15 | 167.00 | 0.17 | 70.20 | 190.29 |
| 250 | sa | 0.35 | 59.12 | 166.43 | 0.16 | 68.66 | 192.43 |
| 251 | i | 0.22 | 53.67 | 166.89 | 0.29 | 60.99 | 217.69 |
| 252 | tu | 0.25 | 57.39 | 163.14 | 0.22 | 65.84 | 170.88 |
| 253 | si | 0.32 | 58.23 | 167.43 | 0.25 | 63.58 | 229.30 |
| 254 | pe | 0.17 | 58.64 | 80.19 | 0.15 | 65.20 | 213.90 |
| 255 | ta | 0.15 | 59.44 | 175.31 | 0.11 | 72.55 | 210.03 |
| 256 | ni | 0.25 | 62.86 | 184.07 | 0.40 | 73.76 | 197.08 |
| 257 | mu | 0.25 | 63.90 | 173.65 | 0.19 | 73.96 | 218.23 |
| 258 | la | 0.26 | 66.55 | 169.55 | 0.18 | 72.51 | 210.48 |
| 259 | me | 0.24 | 63.18 | 179.78 | 0.11 | 74.59 | 191.45 |
| 260 | nye | 0.31 | 69.68 | 204.48 | 0.19 | 71.09 | 184.10 |
| 261 | da | 0.18 | 66.93 | 171.49 | 0.17 | 68.85 | 183.79 |

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|---|---|---|---|---|---|---|---|
| 262 | ri | 0.19 | 59.91 | 131.28 | 0.10 | 64.04 | 181.28 |
| 263 | ke | 0.09 | 63.75 | 169.74 | 0.05 | 68.94 | 185.68 |
| 264 | si | 0.16 | 59.03 | 169.48 | 0.11 | 64.34 | 188.50 |
| 265 | la | 0.43 | 55.82 | 154.28 | 0.26 | 63.24 | 213.24 |
| 266 | pan | 0.17 | 59.15 | 102.19 | 0.17 | 71.54 | 197.77 |
| 267 | nya | 0.36 | 62.84 | 132.48 | 0.21 | 65.77 | 169.42 |
| 268 | dan | 0.31 | 59.01 | 169.08 | 0.22 | 69.23 | 219.38 |
| 269 | be | 0.13 | 62.40 | 164.36 | 0.07 | 69.82 | 208.41 |
| 270 | ra | 0.17 | 60.45 | 161.99 | 0.15 | 69.44 | 209.97 |
| 271 | sa | 0.37 | 58.72 | 158.42 | 0.25 | 64.27 | 234.45 |
| 272 | sa | 0.33 | 54.11 | 178.32 | 0.42 | 65.75 | 232.30 |
| 273 | ngat | 0.27 | 64.16 | 191.08 | 0.30 | 66.28 | 208.88 |
| 274 | me | 0.18 | 61.89 | 161.18 | 0.19 | 65.05 | 186.49 |
| 275 | nye | 0.25 | 63.66 | 157.97 | 0.12 | 72.71 | 168.57 |
| 276 | sal | 0.49 | 54.67 | 147.08 | 0.58 | 62.38 | 151.99 |
| 277 | su | 0.15 | 55.56 | 192.80 | 0.12 | 60.81 | x |
| 278 | a | 0.32 | 64.58 | 191.58 | 0.28 | 63.82 | 143.39 |
| 279 | tu | 0.23 | 63.06 | 229.53 | 0.21 | 66.84 | 271.87 |
| 280 | ha | 0.35 | 61.11 | 215.75 | 0.15 | 73.69 | 300.68 |
| 281 | ri | 0.18 | 60.78 | 160.61 | 0.45 | 68.39 | 252.97 |
| 282 | se | 0.30 | 59.09 | 134.44 | 0.20 | 60.59 | 181.10 |
| 283 | e | 0.26 | 58.38 | 184.63 | 0.28 | 61.25 | 165.14 |
| 284 | kor | 0.27 | 62.35 | 189.35 | 0.20 | 68.20 | 128.81 |
| 285 | an | 0.20 | 66.12 | 224.14 | 0.26 | 69.03 | 218.91 |
| 286 | jing | 0.36 | 61.90 | 178.85 | 0.39 | 65.23 | 228.43 |
| 287 | ter | 0.23 | 60.47 | 162.15 | 0.21 | 65.62 | 228.27 |
| 288 | jum | 0.39 | 62.68 | 185.33 | 0.39 | 60.14 | 214.12 |
| 289 | pa | 0.22 | 60.45 | 177.73 | 0.14 | 68.30 | 223.83 |
| 290 | se | 0.30 | 52.80 | 177.10 | 0.22 | 64.58 | 419.35 |
| 291 | ke | 0.21 | 51.80 | 139.10 | 0.31 | 59.37 | 367.74 |
| 292 | tul | 0.33 | 62.35 | 188.75 | 0.25 | 71.64 | 251.73 |
| 293 | da | 0.23 | 61.12 | 143.70 | 0.20 | 68.61 | 175.33 |
| 294 | ging | 0.29 | 59.41 | 248.40 | 0.28 | 65.21 | 149.57 |
| 295 | di | 0.23 | 59.48 | 178.89 | 0.27 | 65.74 | 187.88 |
| 296 | a | 0.39 | 63.96 | 206.81 | 0.43 | 68.77 | 188.59 |
| 297 | meng | 0.36 | 67.27 | 171.47 | 0.32 | 69.96 | 199.68 |
| 298 | gong | 0.30 | 65.67 | 224.32 | 0.29 | 70.76 | 194.94 |
| 299 | gong | 0.46 | 63.87 | 209.59 | 0.23 | 69.55 | 175.86 |
| 300 | da | 0.29 | 60.53 | 184.18 | 0.25 | 69.05 | 210.33 |
| 301 | ging | 0.47 | 58.72 | 173.44 | 0.21 | 64.17 | 222.26 |
| 302 | i | 0.25 | 41.04 | x | 0.14 | 60.68 | 146.89 |
| 303 | tu | 0.33 | 57.32 | 199.01 | 0.13 | 66.90 | 202.42 |
| 304 | di | 0.31 | 57.62 | 195.18 | 0.17 | 67.24 | 215.64 |
| 305 | mu | 0.14 | 59.87 | 167.59 | 0.23 | 75.48 | 308.09 |
| 306 | lut | 0.30 | 61.37 | 166.97 | 0.21 | 71.25 | 148.85 |
| 307 | un | 0.30 | 66.19 | 193.34 | 0.23 | 72.57 | 286.35 |
| 308 | tuk | 0.26 | 58.75 | 188.23 | 0.24 | 64.74 | 347.84 |
| 309 | me | 0.24 | 62.35 | 164.91 | 0.17 | 70.77 | 232.75 |
| 310 | ma | 0.29 | 61.24 | 157.21 | 0.24 | 67.44 | 203.95 |
| 311 | kan | 0.32 | 65.31 | 207.15 | 0.18 | 68.25 | 175.72 |
| 312 | nya | 0.38 | 65.16 | 190.39 | 0.28 | 71.97 | 172.78 |
| 313 | di | 0.36 | 55.92 | 174.63 | 0.23 | 67.52 | 261.40 |
| 314 | tem | 0.26 | 55.75 | 200.55 | 0.32 | 62.87 | 177.56 |
| 315 | pat | 0.18 | 57.08 | 129.22 | 0.20 | 63.13 | 217.12 |
| 316 | yang | 0.38 | 58.01 | 204.60 | 0.27 | 64.09 | 181.95 |
| 317 | se | 0.33 | 55.61 | 250.60 | 0.25 | 65.73 | 246.92 |
| 318 | la | 0.20 | 60.75 | 157.46 | 0.20 | 70.56 | 208.82 |
| 319 | mat | 0.19 | 56.36 | 241.62 | 0.16 | 66.05 | 138.34 |
| 320 | da | 0.29 | 56.13 | 173.27 | 0.11 | 71.31 | 281.17 |
| 321 | lam | 0.42 | 60.98 | 179.22 | 0.23 | 66.67 | 268.33 |
| 322 | per | 0.18 | 60.17 | 156.36 | 0.13 | 72.47 | 328.83 |
| 323 | ja | 0.17 | 58.78 | 161.45 | 0.17 | 72.28 | 235.81 |
| 324 | la | 0.18 | 63.16 | 159.31 | 0.19 | 71.04 | 174.56 |
| 325 | nan | 0.41 | 63.68 | 191.73 | 0.47 | 68.00 | 201.32 |
| 326 | di | 0.21 | 57.52 | 182.79 | 0.14 | 57.41 | 189.14 |
| 327 | a | 0.27 | 62.33 | 153.55 | 0.16 | 69.56 | 165.68 |
| 328 | la | 0.39 | 64.48 | 143.63 | 0.27 | 69.23 | 154.09 |
| 329 | lu | 0.32 | 62.91 | 164.10 | 0.27 | 64.34 | 172.37 |

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|---|---|---|---|---|---|---|---|
| 330 | di | 0.19 | 58.02 | 152.15 | 0.11 | 58.85 | 234.31 |
| 331 | te | 0.29 | 54.08 | 263.21 | 0.17 | 64.31 | 267.14 |
| 332 | pi | 0.29 | 57.34 | 268.40 | 0.22 | 63.04 | 257.05 |
| 333 | a | 0.14 | 58.32 | 179.44 | 0.13 | 67.85 | 179.97 |
| 334 | nak | 0.32 | 58.53 | 164.84 | 0.17 | 64.15 | 177.10 |
| 335 | su | 0.33 | 58.25 | 165.13 | 0.15 | 62.56 | 165.68 |
| 336 | ngai | 0.38 | 60.84 | 176.22 | 0.30 | 68.06 | 148.97 |
| 337 | se | 0.14 | 58.43 | 179.60 | 0.17 | 64.66 | 252.22 |
| 338 | ma | 0.24 | 61.72 | 173.79 | 0.23 | 72.92 | 301.04 |
| 339 | sa | 0.40 | 63.66 | 185.52 | 0.10 | 67.89 | 470.01 |
| 340 | ber | 0.22 | 63.41 | 165.62 | 0.13 | 70.73 | 354.27 |
| 341 | ja | 0.28 | 63.77 | 155.35 | 0.16 | 73.93 | 319.53 |
| 342 | lan | 0.33 | 63.84 | 217.98 | 0.48 | 73.81 | 306.24 |
| 343 | an | 0.28 | 66.84 | 189.92 | 0.20 | 70.02 | 252.15 |
| 344 | jing | 0.33 | 64.56 | 168.75 | 0.16 | 66.10 | 248.42 |
| 345 | i | 0.23 | 53.61 | 198.64 | 0.15 | 65.57 | 234.39 |
| 346 | tu | 0.32 | 53.06 | 188.69 | 0.35 | 68.02 | 248.95 |
| 347 | me | 0.22 | 61.19 | 170.04 | 0.14 | 66.65 | 232.24 |
| 348 | li | 0.14 | 61.05 | 171.93 | 0.13 | 71.45 | 260.08 |
| 349 | hat | 0.21 | 59.33 | 193.66 | 0.29 | 66.46 | 291.15 |
| 350 | ke | 0.21 | 56.61 | 158.64 | 0.08 | 68.36 | 274.73 |
| 351 | da | 0.16 | 65.71 | 156.44 | 0.14 | 69.30 | 228.10 |
| 352 | lam | 0.33 | 64.78 | 214.08 | 0.24 | 67.78 | 197.26 |
| 353 | a | 0.23 | 62.53 | 174.28 | 0.13 | 64.77 | 169.92 |
| 354 | ir | 0.26 | 58.97 | 141.95 | 0.30 | 64.78 | 142.12 |
| 355 | a | 0.17 | 66.46 | 197.44 | 0.24 | 70.58 | 248.30 |
| 356 | da | 0.17 | 65.88 | 235.27 | 0.13 | 72.50 | 258.29 |
| 357 | se | 0.26 | 60.39 | 208.57 | 0.12 | 65.98 | 291.41 |
| 358 | e | 0.26 | 60.37 | 186.48 | 0.20 | 67.39 | 279.83 |
| 359 | kor | 0.24 | 64.07 | 165.55 | 0.07 | 73.09 | 291.75 |
| 360 | an | 0.26 | 67.29 | 209.96 | 0.22 | 71.11 | 283.86 |
| 361 | jing | 0.24 | 66.23 | 195.58 | 0.18 | 69.95 | 288.24 |
| 362 | la | 0.26 | 66.25 | 159.77 | 0.29 | 75.25 | 272.30 |
| 363 | in | 0.37 | 60.67 | 163.23 | 0.39 | 71.52 | 225.16 |
| 364 | de | 0.26 | 61.39 | 203.30 | 0.17 | 65.75 | 212.38 |
| 365 | ngan | 0.31 | 69.68 | 156.33 | 0.24 | 73.29 | 272.95 |
| 366 | da | 0.21 | 68.18 | 196.40 | 0.23 | 71.32 | 267.22 |
| 367 | ging | 0.30 | 68.53 | 150.13 | 0.19 | 70.86 | 279.78 |
| 368 | di | 0.20 | 64.02 | 157.63 | 0.14 | 75.00 | 301.17 |
| 369 | mu | 0.24 | 64.32 | 162.68 | 0.20 | 71.38 | 239.94 |
| 370 | lut | 0.23 | 63.21 | 205.85 | 0.18 | 70.38 | 225.94 |
| 371 | nya | 0.39 | 62.72 | 155.77 | 0.32 | 68.28 | 166.02 |
| 372 | di | 0.26 | 56.66 | 161.48 | 0.12 | 65.46 | 192.83 |
| 373 | da | 0.20 | 65.24 | 157.80 | 0.18 | 73.74 | 278.12 |
| 374 | lam | 0.39 | 61.16 | 204.25 | 0.11 | 73.30 | 342.16 |
| 375 | a | 0.12 | 61.95 | 196.38 | 0.16 | 70.78 | 282.53 |
| 376 | ir | 0.32 | 60.89 | 184.20 | 0.17 | 71.14 | 184.18 |
| 377 | i | 0.20 | 52.59 | 179.50 | 0.22 | 56.42 | 145.10 |
| 378 | tu | 0.18 | 53.55 | 285.55 | 0.80 | 43.47 | 154.80 |
| 379 | di | 0.16 | 62.06 | 195.75 | 0.14 | 66.26 | 155.36 |
| 380 | a | 0.35 | 67.13 | 206.04 | 0.28 | 70.44 | 197.54 |
| 381 | ti | 0.15 | 57.32 | 126.12 | 0.10 | 66.39 | 236.10 |
| 382 | dak | 0.21 | 63.66 | 166.95 | 0.16 | 67.55 | 187.00 |
| 383 | ta | 0.23 | 60.32 | 191.72 | 0.26 | 63.89 | 336.74 |
| 384 | hu | 0.32 | 60.24 | 226.43 | 0.33 | 69.91 | 335.21 |
| 385 | i | 0.27 | 57.73 | 229.02 | 0.40 | 59.58 | 277.78 |
| 386 | tu | 0.24 | 60.79 | 251.97 | 0.28 | 63.90 | 224.55 |
| 387 | i | 0.17 | 64.78 | 193.31 | 0.21 | 67.06 | 178.66 |
| 388 | a | 0.17 | 64.78 | 193.31 | 0.21 | 67.06 | 178.66 |
| 389 | lah | 0.30 | 60.97 | 191.13 | 0.32 | 64.56 | 230.56 |
| 390 | ba | 0.24 | 62.36 | 169.76 | 0.15 | 66.28 | 225.06 |
| 391 | yang | 0.39 | 64.21 | 169.30 | 0.19 | 70.62 | 220.42 |
| 392 | ba | 0.16 | 63.45 | 163.67 | 0.16 | 72.37 | 260.88 |
| 393 | yang | 0.30 | 68.07 | 198.51 | 0.15 | 72.50 | 293.83 |
| 394 | nya | 0.28 | 64.69 | 163.93 | 0.29 | 74.70 | 297.70 |
| 395 | sen | 0.37 | 57.83 | 201.60 | 0.19 | 67.33 | 345.44 |
| 396 | di | 0.15 | 59.73 | 162.52 | 0.11 | 69.69 | 374.32 |
| 397 | ri | 0.22 | 58.41 | 142.17 | 0.31 | 67.58 | 302.19 |

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|---|---|---|---|---|---|---|---|
| 398 | di | 0.20 | 55.65 | 176.16 | 0.09 | 66.37 | 262.10 |
| 399 | a | 0.26 | 69.14 | 140.24 | 0.09 | 74.33 | 285.00 |
| 400 | ma | 0.37 | 67.51 | 182.56 | 0.26 | 74.44 | 315.65 |
| 401 | hu | 0.20 | 63.16 | 172.10 | 0.24 | 65.90 | 393.08 |
| 402 | men | 0.29 | 63.83 | 159.23 | 0.10 | 77.65 | 334.61 |
| 403 | da | 0.19 | 58.84 | 148.47 | 0.20 | 73.94 | 236.21 |
| 404 | pat | 0.27 | 53.26 | 153.99 | 0.16 | 69.96 | 120.70 |
| 405 | kan | 0.42 | 57.36 | 169.12 | 0.11 | 72.71 | 208.19 |
| 406 | da | 0.20 | 66.32 | 156.29 | 0.17 | 73.01 | 193.21 |
| 407 | ging | 0.37 | 60.40 | 160.04 | 0.14 | 68.50 | 182.90 |
| 408 | i | 0.25 | 50.97 | 85.08 | 0.24 | 64.14 | 207.25 |
| 409 | tu | 0.21 | 53.40 | 188.36 | 0.17 | 65.79 | 177.16 |
| 410 | di | 0.17 | 59.30 | 159.41 | 0.14 | 69.30 | 125.50 |
| 411 | a | 0.28 | 64.66 | 171.75 | 0.23 | 69.99 | 232.13 |
| 412 | pun | 0.41 | 61.14 | 182.09 | 0.46 | 66.88 | 271.20 |
| 413 | me | 0.23 | 66.71 | 160.99 | 0.16 | 75.31 | 275.41 |
| 414 | nya | 0.21 | 67.42 | 189.73 | 0.22 | 78.25 | 336.17 |
| 415 | lak | 0.32 | 63.90 | 194.19 | 0.25 | 69.92 | 377.19 |
| 416 | ke | 0.20 | 55.78 | 161.97 | 0.15 | 61.47 | 344.13 |
| 417 | pa | 0.17 | 63.57 | 154.60 | 0.09 | 72.60 | 347.19 |
| 418 | da | 0.22 | 58.44 | 170.04 | 0.07 | 73.64 | 345.83 |
| 419 | an | 0.26 | 61.70 | 169.12 | 0.17 | 70.54 | 339.38 |
| 420 | jing | 0.35 | 60.28 | 162.21 | 0.17 | 70.83 | 345.64 |
| 421 | di | 0.23 | 56.75 | 159.36 | 0.16 | 73.52 | 340.17 |
| 422 | da | 0.18 | 62.41 | 149.99 | 0.09 | 69.61 | 349.82 |
| 423 | lam | 0.31 | 57.84 | 135.67 | 0.21 | 66.65 | 350.33 |
| 424 | a | 0.12 | 53.41 | 164.87 | 0.14 | 69.22 | 377.83 |
| 425 | ir | 0.30 | 60.57 | 171.65 | 0.32 | 70.76 | 327.97 |
| 426 | se | 0.27 | 56.50 | 163.46 | 0.19 | 60.42 | 235.73 |
| 427 | ba | 0.15 | 62.70 | 161.63 | 0.20 | 70.31 | 232.32 |
| 428 | ik | 0.32 | 60.12 | 143.90 | 0.17 | 72.23 | 200.79 |
| 429 | sa | 0.29 | 58.69 | 186.38 | 0.27 | 70.58 | 210.05 |
| 430 | ja | 0.38 | 60.47 | 151.18 | 0.15 | 70.03 | 200.73 |
| 431 | di | 0.11 | 54.46 | 168.50 | 0.07 | 70.45 | 199.03 |
| 432 | a | 0.25 | 61.81 | 163.46 | 0.12 | 72.08 | 203.63 |
| 433 | mem | 0.25 | 64.40 | 159.54 | 0.19 | 71.79 | 205.05 |
| 434 | bu | 0.22 | 54.74 | 163.62 | 0.12 | 62.19 | 217.25 |
| 435 | ka | 0.18 | 61.09 | 162.15 | 0.12 | 69.23 | 225.62 |
| 436 | mu | 0.28 | 66.28 | 156.20 | 0.17 | 72.66 | 230.35 |
| 437 | lut | 0.30 | 57.02 | 175.28 | 0.32 | 71.55 | 205.66 |
| 438 | da | 0.34 | 62.36 | 181.58 | 0.31 | 69.65 | 219.20 |
| 439 | ging | 0.24 | 64.99 | 169.28 | 0.23 | 68.80 | 202.85 |
| 440 | di | 0.25 | 61.29 | 181.40 | 0.16 | 73.27 | 221.22 |
| 441 | mu | 0.15 | 66.82 | 158.21 | 0.11 | 70.51 | 233.40 |
| 442 | lut | 0.31 | 65.63 | 190.17 | 0.20 | 72.51 | 239.02 |
| 443 | nya | 0.40 | 61.63 | 176.26 | 0.22 | 70.46 | 176.93 |
| 444 | ter | 0.23 | 58.24 | 166.42 | 0.15 | 65.74 | 246.83 |
| 445 | ja | 0.30 | 56.28 | 162.17 | 0.38 | 64.61 | 274.55 |
| 446 | tuh | 0.31 | 51.79 | 299.37 | 0.21 | 67.72 | 326.48 |
| 447 | ke | 0.16 | 58.56 | 158.71 | 0.11 | 67.06 | 235.76 |
| 448 | da | 0.13 | 61.82 | 154.26 | 0.14 | 73.30 | 193.43 |
| 449 | lam | 0.36 | 60.15 | 151.35 | 0.20 | 70.19 | 173.08 |
| 450 | a | 0.20 | 55.65 | 159.39 | 0.18 | 66.28 | 160.65 |
| 451 | ir | 0.24 | 61.28 | 147.75 | 0.19 | 67.35 | 145.50 |
| 452 | se | 0.30 | 57.73 | 177.48 | 0.19 | 66.89 | 254.83 |
| 453 | e | 0.26 | 55.69 | 178.76 | 0.19 | 62.84 | 164.94 |
| 454 | kor | 0.27 | 67.97 | 197.65 | 0.18 | 71.58 | 316.52 |
| 455 | se | 0.27 | 59.42 | 195.33 | 0.21 | 66.74 | 290.39 |
| 456 | mut | 0.33 | 59.42 | 228.71 | 0.32 | 70.30 | 174.83 |
| 457 | yang | 0.37 | 58.12 | 175.75 | 0.36 | 69.30 | 273.32 |
| 458 | ke | 0.15 | 59.24 | 184.55 | 0.15 | 69.66 | 271.83 |
| 459 | hau | 0.31 | 60.47 | 167.53 | 0.23 | 69.87 | 194.26 |
| 460 | san | 0.59 | 61.29 | 174.75 | 0.50 | 66.22 | 173.22 |
| 461 | i | 0.22 | 57.45 | 182.94 | 0.14 | 69.61 | 171.21 |
| 462 | ngin | 0.32 | 62.98 | 166.88 | 0.36 | 74.51 | 146.55 |
| 463 | me | 0.25 | 64.28 | 164.12 | 0.13 | 72.39 | 199.37 |
| 464 | mi | 0.15 | 67.61 | 164.52 | 0.20 | 73.89 | 164.32 |
| 465 | num | 0.40 | 67.44 | 210.13 | 0.17 | 70.63 | 200.53 |

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|---|---|---|---|---|---|---|---|
| 466 | a | 0.19 | 61.30 | 185.64 | 0.33 | 58.66 | 168.13 |
| 467 | ir | 0.28 | 62.19 | 169.89 | 0.34 | 67.00 | 210.39 |
| 468 | da | 0.19 | 60.93 | 164.98 | 0.19 | 65.47 | 238.73 |
| 469 | ri | 0.31 | 52.92 | 234.56 | 0.13 | 64.95 | 288.43 |
| 470 | a | 0.19 | 61.14 | 172.96 | 0.11 | 65.33 | 270.93 |
| 471 | ir | 0.27 | 60.43 | 166.96 | 0.16 | 67.27 | 262.68 |
| 472 | ter | 0.19 | 56.25 | 160.72 | 0.16 | 65.15 | 198.22 |
| 473 | jun | 0.42 | 57.31 | 160.17 | 0.31 | 62.22 | 173.87 |
| 474 | yang | 0.43 | 61.92 | 144.48 | 0.25 | 69.92 | 215.33 |
| 475 | ber | 0.30 | 61.09 | 161.93 | 0.08 | 65.28 | 208.91 |
| 476 | ham | 0.47 | 53.64 | 165.54 | 0.31 | 62.64 | 230.43 |
| 477 | pi | 0.13 | 63.41 | 208.87 | 0.15 | 69.48 | 317.21 |
| 478 | ran | 0.34 | 59.46 | 195.43 | 0.35 | 69.15 | 213.18 |
| 479 | na | 0.25 | 62.35 | 175.25 | 0.27 | 70.63 | 200.67 |
| 480 | mun | 0.36 | 58.02 | 180.82 | 0.47 | 70.41 | 177.44 |
| 481 | na | 0.19 | 58.56 | 169.34 | 0.11 | 65.52 | 227.59 |
| 482 | sib | 0.32 | 58.36 | 157.70 | 0.25 | 65.83 | 216.24 |
| 483 | nya | 0.34 | 68.56 | 194.82 | 0.25 | 74.68 | 263.18 |
| 484 | ma | 0.15 | 66.66 | 169.63 | 0.34 | 73.14 | 243.78 |
| 485 | lang | 0.33 | 60.26 | 164.65 | 0.60 | 68.03 | 180.67 |
| 486 | a | 0.26 | 51.28 | 192.11 | 0.19 | 64.65 | 263.66 |
| 487 | pa | 0.19 | 60.19 | 168.86 | 0.16 | 68.76 | 282.65 |
| 488 | bi | 0.19 | 56.78 | 167.96 | 0.13 | 71.30 | 266.90 |
| 489 | la | 0.27 | 60.44 | 169.22 | 0.43 | 66.79 | 199.05 |
| 490 | ka | 0.29 | 53.55 | 97.00 | 0.22 | 66.25 | 239.50 |
| 491 | ki | 0.24 | 50.61 | 184.78 | 0.30 | 62.98 | 213.16 |
| 492 | nya | 0.34 | 56.89 | 144.45 | 0.26 | 68.76 | 162.95 |
| 493 | ter | 0.27 | 58.39 | 180.23 | 0.18 | 69.79 | 266.38 |
| 494 | ge | 0.14 | 66.39 | 167.08 | 0.14 | 69.56 | 278.97 |
| 495 | lin | 0.17 | 66.57 | 186.21 | 0.22 | 71.83 | 271.98 |
| 496 | cir | 0.52 | 61.94 | 222.25 | 0.42 | 67.34 | 221.97 |
| 497 | dan | 0.42 | 62.39 | 190.05 | 0.18 | 71.55 | 279.25 |
| 498 | ter | 0.19 | 59.17 | 161.89 | 0.10 | 70.19 | 327.08 |
| 499 | ja | 0.33 | 58.68 | 187.11 | 0.31 | 70.38 | 330.69 |
| 500 | tuh | 0.17 | 54.89 | 247.09 | 0.24 | 68.53 | 350.38 |
| 501 | di | 0.21 | 55.17 | 157.79 | 0.14 | 68.75 | 224.51 |
| 502 | da | 0.14 | 63.32 | 169.18 | 0.14 | 71.94 | 200.93 |
| 503 | lam | 0.24 | 62.60 | 147.48 | 0.20 | 72.50 | 190.77 |
| 504 | a | 0.21 | 59.83 | 143.44 | 0.16 | 65.78 | 196.51 |
| 505 | ir | 0.27 | 59.81 | 134.88 | 0.21 | 69.15 | 198.81 |
| 506 | ter | 0.21 | 55.50 | 161.11 | 0.18 | 67.32 | 198.16 |
| 507 | jun | 0.37 | 56.14 | 166.66 | 0.15 | 70.14 | 191.22 |
| 508 | yang | 0.34 | 58.77 | 162.37 | 0.20 | 70.44 | 167.59 |
| 509 | de | 0.14 | 61.53 | 162.03 | 0.11 | 69.89 | 160.80 |
| 510 | ras | 0.43 | 53.81 | 148.50 | 0.19 | 66.15 | 144.26 |
| 511 | a | 0.22 | 54.40 | 140.51 | 0.19 | 62.78 | 199.67 |
| 512 | pa | 0.12 | 60.43 | 176.06 | 0.11 | 70.00 | 196.28 |
| 513 | bi | 0.22 | 57.96 | 176.81 | 0.13 | 72.45 | 174.63 |
| 514 | la | 0.28 | 64.04 | 174.36 | 0.14 | 74.38 | 354.10 |
| 515 | di | 0.18 | 51.96 | 175.66 | 0.15 | 72.50 | 317.15 |
| 516 | a | 0.36 | 66.60 | 192.38 | 0.11 | 75.05 | 291.91 |
| 517 | ham | 0.32 | 59.81 | 171.51 | 0.14 | 74.04 | 273.66 |
| 518 | pir | 0.23 | 62.79 | 167.25 | 0.10 | 70.56 | 276.96 |
| 519 | ham | 0.31 | 57.02 | 169.76 | 0.24 | 71.44 | 256.48 |
| 520 | pir | 0.21 | 62.70 | 164.54 | 0.10 | 70.64 | 262.03 |
| 521 | le | 0.14 | 64.21 | 163.68 | 0.15 | 72.59 | 247.75 |
| 522 | mas | 0.44 | 59.13 | 170.33 | 0.43 | 70.11 | 222.78 |
| 523 | se | 0.27 | 61.23 | 85.17 | 0.22 | 68.50 | 194.80 |
| 524 | e | 0.21 | 61.01 | 169.72 | 0.25 | 67.12 | 172.79 |
| 525 | kor | 0.23 | 62.82 | 193.66 | 0.22 | 65.11 | 114.96 |
| 526 | mer | 0.41 | 59.72 | 177.17 | 0.25 | 71.09 | 201.12 |
| 527 | pa | 0.23 | 56.29 | 149.33 | 0.30 | 63.67 | 167.87 |
| 528 | ti | 0.34 | 58.50 | 162.40 | 0.34 | 64.30 | 207.96 |
| 529 | yang | 0.38 | 62.55 | 173.72 | 0.22 | 71.43 | 222.63 |
| 530 | ber | 0.32 | 59.35 | 160.83 | 0.21 | 64.57 | 197.38 |
| 531 | teng | 0.19 | 67.63 | 200.57 | 0.25 | 73.77 | 247.32 |
| 532 | gek | 0.36 | 62.94 | 185.75 | 0.22 | 70.40 | 212.43 |
| 533 | ti | 0.17 | 54.99 | 177.09 | 0.07 | 65.87 | 262.30 |

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|---|---|---|---|---|---|---|---|
| 534 | dak | 0.28 | 57.89 | 140.65 | 0.15 | 68.10 | 268.70 |
| 535 | ja | 0.25 | 61.38 | 169.21 | 0.21 | 69.35 | 294.72 |
| 536 | uh | 0.26 | 58.69 | 170.20 | 0.21 | 72.78 | 332.79 |
| 537 | da | 0.29 | 58.50 | 146.57 | 0.10 | 71.50 | 308.99 |
| 538 | ri | 0.19 | 56.02 | 163.43 | 0.19 | 67.42 | 306.50 |
| 539 | po | 0.19 | 56.42 | 140.21 | 0.10 | 69.70 | 290.11 |
| 540 | kok | 0.32 | 55.03 | 113.07 | 0.18 | 64.91 | 293.47 |
| 541 | i | 0.23 | 50.77 | 172.51 | 0.16 | 64.92 | 296.63 |
| 542 | tu | 0.41 | 54.29 | 202.81 | 0.23 | 70.07 | 286.83 |
| 543 | men | 0.25 | 62.40 | 161.01 | 0.17 | 72.99 | 271.87 |
| 544 | ja | 0.29 | 55.23 | 151.97 | 0.27 | 67.83 | 274.17 |
| 545 | tuh | 0.22 | 57.11 | 215.69 | 0.18 | 65.38 | 305.85 |
| 546 | kan | 0.28 | 58.24 | 178.97 | 0.29 | 70.81 | 300.71 |
| 547 | se | 0.28 | 54.46 | 175.62 | 0.13 | 64.90 | 188.16 |
| 548 | he | 0.14 | 60.06 | 167.29 | 0.11 | 72.06 | 205.17 |
| 549 | lai | 0.41 | 56.76 | 161.39 | 0.26 | 70.05 | 179.33 |
| 550 | da | 0.18 | 59.83 | 117.96 | 0.16 | 68.84 | 165.07 |
| 551 | un | 0.28 | 60.30 | 149.09 | 0.28 | 69.05 | 147.18 |
| 552 | se | 0.19 | 58.77 | 197.90 | 0.14 | 61.62 | 292.54 |
| 553 | mut | 0.40 | 62.39 | 230.37 | 0.21 | 78.74 | 308.70 |
| 554 | i | 0.24 | 54.24 | 234.53 | 0.20 | 69.69 | 303.31 |
| 555 | tu | 0.29 | 58.96 | 191.89 | 0.26 | 66.48 | 312.01 |
| 556 | pun | 0.24 | 66.01 | 173.74 | 0.37 | 70.53 | 293.58 |
| 557 | me | 0.12 | 64.49 | 166.98 | 0.21 | 74.48 | 271.89 |
| 558 | man | 0.44 | 63.26 | 159.78 | 0.20 | 78.74 | 308.28 |
| 559 | jat | 0.24 | 59.15 | 138.45 | 0.31 | 72.86 | 312.93 |
| 560 | ke | 0.27 | 55.52 | 162.23 | 0.09 | 67.48 | x |
| 561 | a | 0.23 | 57.23 | 184.90 | 0.19 | 64.46 | 131.14 |
| 562 | tas | 0.32 | 61.89 | 217.81 | 0.19 | 66.29 | 210.00 |
| 563 | da | 0.22 | 63.79 | 167.26 | 0.23 | 67.46 | 208.54 |
| 564 | un | 0.40 | 58.67 | 165.62 | 0.21 | 70.60 | 207.35 |
| 565 | ter | 0.19 | 57.87 | 156.13 | 0.09 | 70.01 | 198.43 |
| 566 | se | 0.18 | 56.54 | 170.63 | 0.21 | 65.15 | 192.42 |
| 567 | but | 0.25 | 59.58 | 155.71 | 0.22 | 64.44 | 168.12 |
| 568 | dan | 0.45 | 58.02 | 145.52 | 0.64 | 70.20 | 196.06 |
| 569 | ak | 0.29 | 56.16 | 166.36 | 0.30 | 67.05 | 246.83 |
| 570 | hir | 0.13 | 61.69 | 175.92 | 0.20 | 68.95 | 259.23 |
| 571 | nya | 0.42 | 60.24 | 166.93 | 0.46 | 71.02 | 162.03 |
| 572 | ti | 0.22 | 53.47 | 170.53 | 0.27 | 63.00 | 231.49 |
| 573 | ba | 0.24 | 65.85 | 200.40 | 0.23 | 71.88 | 233.92 |
| 574 | de | 0.16 | 63.03 | 187.07 | 0.16 | 72.11 | 209.64 |
| 575 | ngan | 0.36 | 63.60 | 181.66 | 0.11 | 74.18 | 191.21 |
| 576 | se | 0.29 | 60.67 | 180.87 | 0.11 | 68.48 | 191.62 |
| 577 | la | 0.14 | 62.09 | 162.56 | 0.28 | 68.64 | 185.64 |
| 578 | mat | 0.21 | 58.71 | 164.40 | 0.32 | 67.93 | 199.93 |
| 579 | di | 0.31 | 56.23 | 167.50 | 0.19 | 62.41 | 171.22 |
| 580 | te | 0.16 | 57.43 | 163.63 | 0.14 | 65.66 | 163.69 |
| 581 | bing | 0.21 | 55.17 | 162.17 | 0.11 | 65.95 | 161.25 |
| 582 | su | 0.30 | 55.49 | 172.88 | 0.25 | 61.36 | 156.66 |
| 583 | ngai | 0.38 | 59.92 | 156.83 | 0.37 | 68.19 | 147.48 |
| 584 | be | 0.24 | 60.72 | 175.02 | 0.14 | 69.49 | 158.35 |
| 585 | be | 0.08 | 63.72 | 179.28 | 0.09 | 68.92 | 156.06 |
| 586 | ra | 0.26 | 61.14 | 186.22 | 0.24 | 66.77 | 183.25 |
| 587 | pa | 0.28 | 61.55 | 216.82 | 0.14 | 71.01 | 346.95 |
| 588 | ha | 0.17 | 61.17 | 190.83 | 0.15 | 73.03 | 335.26 |
| 589 | ri | 0.27 | 57.56 | 180.82 | 0.17 | 69.83 | 309.96 |
| 590 | ke | 0.14 | 58.92 | 181.39 | 0.11 | 74.20 | 288.95 |
| 591 | mu | 0.22 | 65.12 | 170.42 | 0.11 | 72.42 | 279.85 |
| 592 | di | 0.09 | 56.07 | 170.00 | 0.09 | 71.20 | 271.32 |
| 593 | an | 0.37 | 63.41 | 206.65 | 0.45 | 72.42 | 256.86 |
| 594 | se | 0.32 | 57.64 | 161.95 | 0.26 | 60.96 | x |
| 595 | o | 0.16 | 65.38 | 172.69 | 0.23 | 70.08 | 192.07 |
| 596 | rang | 0.37 | 63.46 | 187.38 | 0.28 | 70.07 | 229.21 |
| 597 | pem | 0.17 | 64.04 | 181.69 | 0.23 | 70.50 | 217.73 |
| 598 | bu | 0.30 | 64.64 | 170.27 | 0.22 | 66.66 | 204.47 |
| 599 | ru | 0.27 | 60.10 | 175.55 | 0.30 | 66.20 | 210.05 |
| 600 | me | 0.22 | 59.15 | 171.56 | 0.09 | 66.43 | 152.40 |
| 601 | li | 0.14 | 63.32 | 167.20 | 0.15 | 67.94 | 135.10 |

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|---|---|---|---|---|---|---|---|
| 602 | hat | 0.30 | 58.04 | 152.13 | 0.25 | 68.44 | 304.55 |
| 603 | se | 0.28 | 57.33 | 244.68 | 0.16 | 60.55 | 305.60 |
| 604 | e | 0.20 | 60.72 | 203.38 | 0.15 | 69.57 | 196.01 |
| 605 | kor | 0.36 | 59.52 | 216.39 | 0.20 | 64.00 | 189.71 |
| 606 | mer | 0.34 | 54.32 | 183.39 | 0.28 | 65.91 | 212.46 |
| 607 | pa | 0.19 | 56.76 | 147.09 | 0.18 | 63.69 | 202.31 |
| 608 | ti | 0.40 | 49.52 | 163.59 | 0.36 | 59.50 | 168.76 |
| 609 | dan | 0.32 | 60.02 | 136.19 | 0.22 | 64.35 | 152.49 |
| 610 | i | 0.17 | 60.89 | 159.98 | 0.28 | 66.83 | 196.97 |
| 611 | ngin | 0.32 | 65.17 | 170.00 | 0.24 | 76.61 | 264.76 |
| 612 | me | 0.24 | 63.31 | 135.97 | 0.07 | 75.47 | 221.18 |
| 613 | nem | 0.22 | 62.49 | 126.49 | 0.24 | 73.00 | 210.95 |
| 614 | bak | 0.25 | 61.23 | 188.23 | 0.15 | 69.80 | 244.82 |
| 615 | nya | 0.29 | 62.09 | 155.63 | 0.36 | 70.76 | 289.20 |
| 616 | na | 0.23 | 63.20 | 146.67 | 0.26 | 71.60 | 214.59 |
| 617 | mun | 0.38 | 63.88 | 218.83 | 0.54 | 74.21 | 254.93 |
| 618 | se | 0.25 | 57.88 | 183.64 | 0.28 | 63.66 | 239.10 |
| 619 | mut | 0.41 | 59.50 | 196.30 | 0.44 | 65.85 | 208.76 |
| 620 | ter | 0.13 | 64.06 | 176.33 | 0.11 | 67.94 | 219.36 |
| 621 | li | 0.21 | 61.65 | 173.35 | 0.19 | 69.25 | 184.97 |
| 622 | hat | 0.26 | 60.22 | 182.59 | 0.38 | 65.13 | 218.86 |
| 623 | a | 0.20 | 56.76 | 171.88 | 0.12 | 64.86 | 239.44 |
| 624 | kan | 0.44 | 55.14 | 167.81 | 0.32 | 63.72 | 247.25 |
| 625 | per | 0.16 | 63.05 | 169.36 | 0.05 | 68.54 | 256.08 |
| 626 | la | 0.33 | 57.17 | 163.47 | 0.21 | 70.07 | 250.48 |
| 627 | ku | 0.09 | 60.04 | 174.89 | 0.19 | 59.37 | 255.40 |
| 628 | an | 0.25 | 60.20 | 165.57 | 0.26 | 68.15 | 249.95 |
| 629 | pem | 0.24 | 61.16 | 163.02 | 0.14 | 71.06 | 246.63 |
| 630 | bu | 0.18 | 63.09 | 157.64 | 0.11 | 69.86 | 257.03 |
| 631 | ru | 0.20 | 58.56 | 154.33 | 0.09 | 67.40 | 267.81 |
| 632 | i | 0.18 | 48.89 | 84.81 | 0.22 | 63.52 | 335.15 |
| 633 | tu | 0.18 | 52.44 | 142.23 | 0.25 | 68.65 | 315.31 |
| 634 | se | 0.28 | 60.47 | 180.60 | 0.17 | 66.72 | 293.98 |
| 635 | mut | 0.33 | 64.15 | 191.12 | 0.34 | 74.51 | 307.68 |
| 636 | pun | 0.28 | 61.55 | 182.00 | 0.32 | 72.70 | 304.17 |
| 637 | lan | 0.23 | 64.82 | 166.97 | 0.36 | 66.80 | 317.23 |
| 638 | tas | 0.53 | 59.35 | 170.63 | 0.24 | 65.27 | 360.92 |
| 639 | meng | 0.40 | 64.28 | 171.43 | 0.28 | 74.12 | 299.12 |
| 640 | gi | 0.25 | 54.95 | 160.50 | 0.22 | 69.12 | 334.11 |
| 641 | git | 0.27 | 55.68 | 157.14 | 0.32 | 66.08 | 273.28 |
| 642 | ka | 0.25 | 54.72 | 148.29 | 0.17 | 68.03 | 230.41 |
| 643 | ki | 0.26 | 50.05 | 199.86 | 0.23 | 64.31 | 223.28 |
| 644 | pem | 0.15 | 59.74 | 163.98 | 0.20 | 73.10 | 201.27 |
| 645 | bu | 0.21 | 61.33 | 177.48 | 0.10 | 72.96 | 194.66 |
| 646 | ru | 0.20 | 60.27 | 224.28 | 0.10 | 73.24 | 193.28 |
| 647 | i | 0.24 | 54.32 | 189.77 | 0.23 | 64.43 | 199.93 |
| 648 | tu | 0.30 | 60.02 | 170.23 | 0.14 | 65.25 | 169.98 |
| 649 | dan | 0.32 | 59.47 | 163.97 | 0.23 | 68.74 | 189.11 |
| 650 | tem | 0.20 | 62.07 | 163.04 | 0.12 | 72.76 | 193.03 |
| 651 | ba | 0.23 | 54.39 | 163.73 | 0.32 | 69.01 | 223.58 |
| 652 | kan | 0.25 | 62.38 | 187.83 | 0.14 | 71.62 | 223.33 |
| 653 | nya | 0.29 | 64.76 | 176.37 | 0.28 | 67.15 | 212.97 |
| 654 | ter | 0.15 | 61.65 | 168.83 | 0.17 | 69.75 | 301.73 |
| 655 | sa | 0.38 | 54.43 | 167.47 | 0.26 | 63.27 | 380.25 |
| 656 | sar | 0.35 | 57.84 | 138.50 | 0.37 | 63.44 | 221.12 |
| 657 | mer | 0.30 | 57.60 | 162.87 | 0.23 | 63.44 | 176.31 |
| 658 | pa | 0.18 | 58.24 | 166.12 | 0.26 | 63.77 | 208.25 |
| 659 | ti | 0.27 | 53.69 | 204.82 | 0.16 | 63.34 | 239.16 |
| 660 | yang | 0.41 | 60.12 | 162.39 | 0.27 | 67.61 | 234.78 |
| 661 | ter | 0.17 | 65.12 | 151.94 | 0.27 | 70.74 | 231.33 |
| 662 | de | 0.25 | 59.48 | 173.48 | 0.12 | 70.91 | 233.48 |
| 663 | ngar | 0.47 | 65.97 | 193.38 | 0.41 | 74.47 | 218.08 |
| 664 | je | 0.20 | 62.54 | 171.47 | 0.15 | 69.76 | 205.77 |
| 665 | ri | 0.21 | 58.22 | 171.67 | 0.18 | 62.71 | 219.64 |
| 666 | tan | 0.36 | 60.09 | 164.08 | 0.21 | 69.21 | 221.32 |
| 667 | pem | 0.17 | 63.36 | 169.22 | 0.16 | 71.87 | 214.28 |
| 668 | bu | 0.16 | 60.71 | 160.75 | 0.13 | 67.10 | 211.32 |
| 669 | ru | 0.35 | 57.79 | 220.31 | 0.16 | 65.81 | 217.66 |

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|---|---|---|---|---|---|---|---|
| 670 | i | 0.21 | 50.59 | 169.43 | 0.22 | 56.45 | 197.64 |
| 671 | tu | 0.18 | 54.00 | 232.84 | 0.21 | 63.19 | 198.81 |
| 672 | se | 0.26 | 54.01 | 124.70 | 0.25 | 62.06 | 259.54 |
| 673 | ge | 0.19 | 59.19 | 149.35 | 0.20 | 70.58 | 239.20 |
| 674 | ra | 0.23 | 62.56 | 193.94 | 0.30 | 66.05 | 236.27 |
| 675 | ter | 0.16 | 60.13 | 178.62 | 0.18 | 71.16 | 293.87 |
| 676 | bang | 0.39 | 61.00 | 169.38 | 0.31 | 72.01 | 245.73 |
| 677 | ber | 0.28 | 56.69 | 174.37 | 0.19 | 67.25 | 176.13 |
| 678 | e | 0.21 | 54.77 | 168.06 | 0.15 | 71.62 | 190.69 |
| 679 | dar | 0.31 | 58.87 | 162.33 | 0.32 | 66.56 | 170.30 |
| 680 | da | 0.19 | 60.74 | 157.15 | 0.17 | 69.16 | 205.52 |
| 681 | ri | 0.28 | 53.99 | 155.31 | 0.08 | 70.57 | 212.61 |
| 682 | si | 0.27 | 51.36 | 340.05 | 0.33 | 58.57 | 180.29 |
| 683 | tu | 0.23 | 52.10 | 190.73 | 0.24 | 54.92 | 154.48 |

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data
## Female Storyteller 4 (Fst4)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.17 | 54.43 | 261.90 | 0.18 | 54.75 | x |
| 2 | a | 0.16 | 72.49 | 225.97 | 0.38 | 63.37 | 213.92 |
| 3 | tu | 0.19 | 66.94 | 262.83 | 0.16 | 67.99 | 329.85 |
| 4 | ma | 0.21 | 68.45 | 264.73 | 0.15 | 72.15 | 344.22 |
| 5 | sa | 0.20 | 63.18 | 251.70 | 0.22 | 68.34 | 327.99 |
| 6 | da | 0.19 | 71.24 | 229.23 | 0.14 | 74.30 | 311.52 |
| 7 | hu | 0.22 | 69.96 | 226.32 | 0.14 | 72.99 | 308.67 |
| 8 | lu | 0.29 | 66.70 | 280.98 | 0.40 | 69.22 | 296.13 |
| 9 | ting | 0.23 | 63.60 | 236.73 | 0.38 | 70.57 | 209.88 |
| 10 | gal | 0.18 | 73.61 | 288.10 | 0.23 | 73.32 | 330.80 |
| 11 | se | 0.14 | 63.66 | 303.95 | 0.13 | 65.43 | 371.29 |
| 12 | o | 0.11 | 72.04 | x | 0.17 | 74.96 | 230.93 |
| 13 | rang | 0.27 | 69.34 | 226.55 | 0.17 | 64.99 | 281.05 |
| 14 | pe | 0.15 | 65.97 | 235.53 | 0.13 | 65.45 | 270.47 |
| 15 | ta | 0.22 | 71.84 | 227.52 | 0.20 | 70.31 | 274.14 |
| 16 | ni | 0.16 | 69.92 | 267.03 | 0.36 | 67.39 | 284.27 |
| 17 | yang | 0.23 | 70.58 | 235.95 | 0.21 | 67.72 | 239.77 |
| 18 | me | 0.19 | 68.67 | 226.77 | 0.09 | 69.10 | 251.14 |
| 19 | me | 0.10 | 69.36 | 226.84 | 0.07 | 67.08 | 242.49 |
| 20 | li | 0.22 | 71.20 | 221.72 | 0.15 | 68.31 | 242.77 |
| 21 | ha | 0.20 | 69.44 | 228.94 | 0.15 | 69.45 | 240.02 |
| 22 | ra | 0.19 | 66.27 | 240.69 | 0.13 | 69.04 | 243.88 |
| 23 | se | 0.16 | 61.49 | 250.30 | 0.26 | 63.24 | 327.35 |
| 24 | e | 0.15 | 67.57 | 284.04 | 0.36 | 71.79 | 310.74 |
| 25 | kor | 0.19 | 63.96 | 226.21 | 0.23 | 66.76 | 317.80 |
| 26 | ang | 0.27 | 69.96 | 212.54 | 0.22 | 71.94 | 215.82 |
| 27 | sa | 0.32 | 62.38 | 207.24 | 0.32 | 62.58 | 191.14 |
| 28 | pa | 0.22 | 72.20 | 218.53 | 0.33 | 72.42 | 198.07 |
| 29 | da | 0.15 | 74.07 | 272.12 | 0.22 | 69.52 | 308.12 |
| 30 | su | 0.15 | 63.03 | 303.12 | 0.10 | 66.60 | 343.41 |
| 31 | a | 0.21 | 65.59 | 250.30 | 0.14 | 68.42 | 322.73 |
| 32 | tu | 0.11 | 67.90 | 237.18 | 0.11 | 68.82 | 322.37 |
| 33 | ha | 0.27 | 72.97 | 218.88 | 0.24 | 72.23 | 300.56 |
| 34 | ri | 0.49 | 58.36 | 275.71 | 0.42 | 65.73 | 298.26 |
| 35 | ke | 0.09 | 60.91 | 253.89 | 0.20 | 62.12 | 234.32 |
| 36 | ti | 0.24 | 63.98 | 245.98 | 0.18 | 66.99 | 272.18 |
| 37 | ka | 0.17 | 70.20 | 308.33 | 0.14 | 69.67 | 355.71 |
| 38 | i | 0.23 | 61.92 | 237.77 | 0.19 | 59.35 | 124.60 |
| 39 | tu | 0.23 | 66.21 | 273.08 | 0.28 | 66.15 | 280.06 |
| 40 | di | 0.08 | 70.30 | 226.10 | 0.16 | 69.57 | 238.75 |
| 41 | a | 0.22 | 70.59 | 269.08 | 0.20 | 70.42 | 333.08 |
| 42 | i | 0.18 | 64.83 | 234.10 | 0.16 | 69.76 | 243.44 |
| 43 | ngin | 0.14 | 68.10 | 251.68 | 0.20 | 70.91 | 254.30 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 44 | me | 0.24 | 67.08 | 241.84 | 0.12 | 64.68 | 242.53 |
| 45 | ngam | 0.21 | 71.34 | 226.25 | 0.28 | 66.37 | 240.62 |
| 46 | bil | 0.23 | 67.28 | 245.03 | 0.27 | 64.67 | 258.65 |
| 47 | te | 0.11 | 65.89 | 243.64 | 0.11 | 71.27 | 295.78 |
| 48 | lur | 0.21 | 70.80 | 232.02 | 0.37 | 72.27 | 324.08 |
| 49 | ang | 0.25 | 71.56 | 220.32 | 0.16 | 68.34 | 223.81 |
| 50 | sa | 0.27 | 65.86 | 238.41 | 0.27 | 66.07 | 233.95 |
| 51 | nya | 0.39 | 63.49 | 222.89 | 0.36 | 65.58 | 171.17 |
| 52 | si | 0.39 | 65.51 | 357.08 | 0.36 | 64.01 | 366.71 |
| 53 | pe | 0.15 | 68.61 | 251.69 | 0.15 | 68.99 | 301.21 |
| 54 | ta | 0.22 | 71.27 | 234.80 | 0.20 | 73.99 | 259.08 |
| 55 | ni | 0.20 | 67.75 | 279.24 | 0.28 | 65.14 | 324.25 |
| 56 | men | 0.16 | 67.27 | 258.29 | 0.26 | 68.89 | 281.57 |
| 57 | da | 0.22 | 72.74 | 221.82 | 0.10 | 73.96 | 240.14 |
| 58 | pa | 0.21 | 69.19 | 217.78 | 0.31 | 65.50 | 239.03 |
| 59 | ti | 0.21 | 61.10 | 256.41 | 0.30 | 62.78 | 308.09 |
| 60 | te | 0.17 | 66.81 | 238.57 | 0.17 | 70.31 | 287.78 |
| 61 | lur | 0.16 | 68.18 | 251.31 | 0.14 | 74.85 | 373.39 |
| 62 | i | 0.18 | 64.39 | 222.27 | 0.21 | 64.58 | 267.52 |
| 63 | tu | 0.19 | 59.35 | 246.93 | 0.35 | 64.05 | 275.85 |
| 64 | ke | 0.12 | 69.17 | 224.67 | 0.10 | 70.00 | 261.38 |
| 65 | li | 0.13 | 72.21 | 221.91 | 0.09 | 72.02 | 279.41 |
| 66 | ha | 0.23 | 68.69 | 215.64 | 0.19 | 69.54 | 285.03 |
| 67 | tan | 0.36 | 63.51 | 228.36 | 0.25 | 67.84 | 291.72 |
| 68 | a | 0.21 | 62.21 | 233.87 | 0.20 | 71.47 | 284.96 |
| 69 | neh | 0.30 | 60.27 | 219.00 | 0.45 | 67.13 | 288.83 |
| 70 | war | 0.21 | 69.36 | 238.12 | 0.17 | 70.77 | 201.03 |
| 71 | na | 0.19 | 71.15 | 259.63 | 0.16 | 72.31 | 206.58 |
| 72 | nya | 0.24 | 63.00 | 313.97 | 0.32 | 68.80 | 228.48 |
| 73 | ku | 0.18 | 69.41 | 262.73 | 0.12 | 63.80 | 250.30 |
| 74 | ning | 0.33 | 64.64 | 243.72 | 0.44 | 70.63 | 281.43 |
| 75 | ke | 0.11 | 69.05 | 215.13 | 0.13 | 65.07 | 289.38 |
| 76 | e | 0.14 | 71.20 | 219.31 | 0.13 | 69.43 | 199.20 |
| 77 | ma | 0.15 | 72.33 | 220.51 | 0.11 | 69.19 | 196.80 |
| 78 | san | 0.40 | 66.77 | 251.13 | 0.48 | 63.18 | 279.21 |
| 79 | dan | 0.29 | 72.48 | 228.48 | 0.42 | 72.19 | 308.77 |
| 80 | be | 0.22 | 71.56 | 233.98 | 0.15 | 69.26 | 283.94 |
| 81 | rat | 0.38 | 61.37 | 228.75 | 0.36 | 65.43 | 221.77 |
| 82 | di | 0.15 | 68.96 | 214.49 | 0.07 | 71.66 | 208.11 |
| 83 | a | 0.26 | 72.40 | 265.88 | 0.32 | 73.41 | 205.63 |
| 84 | me | 0.12 | 67.99 | 259.77 | 0.13 | 66.14 | 328.97 |
| 85 | nyang | 0.27 | 70.32 | 230.81 | 0.33 | 66.71 | 245.89 |
| 86 | ka | 0.19 | 70.56 | 268.48 | 0.27 | 70.43 | 315.33 |
| 87 | ji | 0.16 | 66.44 | 241.62 | 0.24 | 69.15 | 245.57 |
| 88 | ran | 0.19 | 73.86 | 226.52 | 0.19 | 72.94 | 229.21 |
| 89 | nya | 0.25 | 68.32 | 249.66 | 0.45 | 63.54 | 283.37 |
| 90 | cu | 0.18 | 60.05 | 251.13 | 0.24 | 63.55 | 253.06 |
| 91 | ba | 0.22 | 69.37 | 240.44 | 0.14 | 73.04 | 305.89 |
| 92 | ber | 0.18 | 71.23 | 229.19 | 0.18 | 71.19 | 239.33 |
| 93 | gu | 0.21 | 72.79 | 219.08 | 0.10 | 73.52 | 219.28 |
| 94 | rau | 0.39 | 69.27 | 221.48 | 0.59 | 67.06 | 232.18 |
| 95 | la | 0.27 | 71.21 | 210.30 | 0.20 | 71.63 | 220.66 |
| 96 | lu | 0.18 | 67.05 | 281.40 | 0.27 | 69.41 | 297.01 |
| 97 | ber | 0.34 | 69.48 | 233.05 | 0.15 | 71.52 | 297.62 |
| 98 | ca | 0.25 | 66.68 | 220.05 | 0.31 | 66.03 | 235.70 |
| 99 | dang | 0.35 | 70.26 | 240.16 | 0.43 | 66.21 | 256.78 |
| 100 | un | 0.24 | 69.91 | 224.68 | 0.23 | 65.38 | 241.09 |
| 101 | tuk | 0.26 | 65.96 | 329.86 | 0.18 | 68.82 | 282.65 |
| 102 | mem | 0.28 | 70.86 | 230.65 | 0.23 | 66.95 | 236.67 |
| 103 | bu | 0.13 | 71.32 | 218.82 | 0.10 | 72.10 | 245.64 |
| 104 | ang | 0.30 | 65.42 | 231.03 | 0.27 | 72.52 | 318.95 |
| 105 | te | 0.13 | 71.89 | 217.78 | 0.23 | 65.90 | 238.93 |
| 106 | lur | 0.27 | 70.66 | 218.53 | 0.27 | 69.51 | 220.55 |
| 107 | i | 0.18 | 64.49 | 222.80 | 0.21 | 60.36 | 217.46 |
| 108 | tu | 0.41 | 63.10 | 199.29 | 0.41 | 60.62 | 195.23 |
| 109 | na | 0.19 | 72.20 | 219.23 | 0.21 | 70.50 | 195.45 |
| 110 | mun | 0.14 | 66.63 | 256.17 | 0.47 | 66.67 | 244.99 |
| 111 | se | 0.25 | 64.34 | 271.13 | 0.18 | 58.30 | 254.20 |

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|---|---|---|---|---|---|---|---|
| 112 | le | 0.21 | 65.08 | 229.84 | 0.19 | 69.02 | 314.49 |
| 113 | pas | 0.33 | 60.45 | 240.07 | 0.23 | 68.87 | 345.93 |
| 114 | ber | 0.35 | 62.55 | 222.80 | 0.25 | 67.22 | 273.43 |
| 115 | fi | 0.14 | 68.81 | 222.65 | 0.18 | 65.83 | 227.72 |
| 116 | kir | 0.48 | 65.72 | 226.98 | 0.55 | 65.37 | 220.25 |
| 117 | di | 0.13 | 64.83 | 205.89 | 0.12 | 67.72 | 209.60 |
| 118 | a | 0.25 | 74.07 | 268.18 | 0.25 | 73.01 | 300.13 |
| 119 | mem | 0.21 | 69.76 | 245.77 | 0.16 | 72.35 | 272.92 |
| 120 | ba | 0.16 | 76.00 | 216.33 | 0.17 | 76.79 | 227.93 |
| 121 | wa | 0.21 | 69.43 | 232.57 | 0.34 | 69.76 | 291.74 |
| 122 | te | 0.16 | 68.76 | 228.18 | 0.19 | 69.73 | 251.68 |
| 123 | lur | 0.23 | 68.26 | 233.94 | 0.23 | 69.49 | 285.90 |
| 124 | i | 0.15 | 65.21 | 216.58 | 0.21 | 61.85 | 226.13 |
| 125 | tu | 0.22 | 63.08 | 239.39 | 0.23 | 61.75 | 275.19 |
| 126 | pu | 0.12 | 71.61 | 221.08 | 0.20 | 66.07 | 230.25 |
| 127 | lang | 0.37 | 66.73 | 254.53 | 0.43 | 67.45 | 243.16 |
| 128 | ke | 0.20 | 70.31 | 217.85 | 0.14 | 73.00 | 271.40 |
| 129 | ru | 0.10 | 72.66 | 211.11 | 0.12 | 70.33 | 247.83 |
| 130 | mah | 0.49 | 60.77 | 235.00 | 0.41 | 66.10 | 262.95 |
| 131 | un | 0.23 | 70.38 | 215.50 | 0.21 | 65.20 | 222.87 |
| 132 | tuk | 0.19 | 68.14 | 237.04 | 0.15 | 70.81 | 265.49 |
| 133 | di | 0.26 | 68.53 | 217.11 | 0.12 | 68.02 | 235.08 |
| 134 | pe | 0.07 | 69.52 | 214.70 | 0.10 | 65.14 | 238.55 |
| 135 | rik | 0.17 | 70.26 | 202.77 | 0.17 | 73.75 | 214.91 |
| 136 | sa | 0.46 | 60.34 | 313.71 | 0.46 | 62.73 | 195.31 |
| 137 | si | 0.39 | 59.16 | 287.11 | 0.40 | 60.35 | 350.73 |
| 138 | pe | 0.14 | 67.98 | 248.81 | 0.16 | 67.70 | 293.32 |
| 139 | ta | 0.25 | 72.01 | 221.78 | 0.13 | 73.45 | 253.71 |
| 140 | ni | 0.27 | 65.51 | 271.74 | 0.22 | 69.78 | 283.04 |
| 141 | be | 0.15 | 70.98 | 229.58 | 0.09 | 74.90 | 273.33 |
| 142 | ra | 0.17 | 73.33 | 218.08 | 0.14 | 74.91 | 278.77 |
| 143 | sa | 0.30 | 63.76 | 263.54 | 0.24 | 66.08 | 347.98 |
| 144 | ter | 0.16 | 67.51 | 235.34 | 0.13 | 66.96 | 322.13 |
| 145 | ke | 0.18 | 70.02 | 216.75 | 0.15 | 70.23 | 283.48 |
| 146 | jut | 0.36 | 60.36 | 308.02 | 0.41 | 63.67 | 288.12 |
| 147 | a | 0.19 | 64.34 | 199.79 | 0.16 | 69.99 | 215.82 |
| 148 | pa | 0.15 | 71.62 | 216.05 | 0.15 | 71.53 | 242.01 |
| 149 | bi | 0.13 | 74.11 | 219.48 | 0.16 | 70.56 | 259.75 |
| 150 | la | 0.19 | 69.33 | 253.98 | 0.17 | 70.78 | 352.13 |
| 151 | men | 0.22 | 74.60 | 221.63 | 0.16 | 71.08 | 296.78 |
| 152 | da | 0.19 | 69.39 | 207.87 | 0.21 | 72.55 | 231.81 |
| 153 | pa | 0.26 | 64.13 | 209.90 | 0.26 | 67.07 | 225.08 |
| 154 | ti | 0.31 | 60.00 | 268.69 | 0.28 | 64.70 | 341.68 |
| 155 | i | 0.14 | 64.99 | 222.99 | 0.18 | 61.33 | 251.93 |
| 156 | tu | 0.25 | 65.53 | 263.66 | 0.12 | 70.85 | 368.97 |
| 157 | a | 0.17 | 70.96 | 212.86 | 0.09 | 71.19 | 219.93 |
| 158 | da | 0.13 | 70.67 | 214.94 | 0.14 | 69.34 | 239.01 |
| 159 | lah | 0.28 | 67.28 | 227.53 | 0.30 | 61.04 | 266.77 |
| 160 | te | 0.15 | 67.96 | 231.53 | 0.15 | 70.59 | 244.90 |
| 161 | lur | 0.26 | 72.45 | 219.03 | 0.15 | 76.71 | 266.83 |
| 162 | e | 0.17 | 64.47 | 222.21 | 0.11 | 68.80 | 338.95 |
| 163 | mas | 0.59 | 60.57 | 298.73 | 0.51 | 65.11 | 351.06 |
| 164 | si | 0.20 | 63.87 | 277.20 | 0.39 | 60.20 | 315.12 |
| 165 | pe | 0.16 | 66.48 | 240.39 | 0.17 | 68.28 | 284.68 |
| 166 | ta | 0.21 | 73.56 | 218.15 | 0.19 | 73.88 | 218.60 |
| 167 | ni | 0.13 | 66.32 | 257.61 | 0.25 | 63.62 | 256.68 |
| 168 | sung | 0.31 | 62.46 | 244.44 | 0.59 | 64.41 | 334.49 |
| 169 | guh | 0.31 | 64.48 | 241.47 | 0.23 | 73.24 | 331.91 |
| 170 | gem | 0.38 | 70.64 | 214.11 | 0.17 | 71.35 | 237.09 |
| 171 | bi | 0.17 | 71.96 | 212.41 | 0.17 | 72.53 | 231.17 |
| 172 | ra | 0.40 | 63.28 | 206.95 | 0.47 | 63.01 | 180.19 |
| 173 | ha | 0.21 | 72.02 | 213.78 | 0.12 | 70.05 | 251.33 |
| 174 | ri | 0.14 | 68.75 | 254.37 | 0.25 | 72.79 | 352.63 |
| 175 | de | 0.13 | 67.11 | 244.24 | 0.08 | 74.25 | 301.99 |
| 176 | mi | 0.21 | 71.06 | 232.67 | 0.19 | 73.65 | 264.05 |
| 177 | ha | 0.21 | 69.06 | 236.06 | 0.15 | 70.09 | 244.13 |
| 178 | ri | 0.22 | 71.58 | 225.50 | 0.19 | 70.85 | 276.36 |
| 179 | se | 0.20 | 66.36 | 298.96 | 0.23 | 65.67 | 320.62 |

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|---|---|---|---|---|---|---|---|
| 180 | le | 0.24 | 65.07 | 215.88 | 0.14 | 65.80 | 253.80 |
| 181 | pas | 0.31 | 64.09 | 234.16 | 0.22 | 66.89 | 246.22 |
| 182 | i | 0.25 | 66.82 | 246.54 | 0.21 | 63.93 | 213.23 |
| 183 | tu | 0.60 | 63.60 | 307.68 | 0.31 | 65.73 | 263.20 |
| 184 | si | 0.37 | 64.78 | 342.76 | 0.38 | 63.77 | 312.07 |
| 185 | ang | 0.26 | 71.86 | 238.62 | 0.21 | 70.37 | 233.56 |
| 186 | sa | 0.57 | 67.82 | 297.26 | 0.41 | 66.15 | 323.71 |
| 187 | te | 0.18 | 73.20 | 232.80 | 0.38 | 71.98 | 327.61 |
| 188 | rus | 0.38 | 61.34 | 301.73 | 0.24 | 65.08 | 322.38 |
| 189 | ber | 0.24 | 70.39 | 222.92 | 0.19 | 62.60 | 250.26 |
| 190 | te | 0.14 | 70.43 | 267.19 | 0.12 | 71.29 | 257.34 |
| 191 | lur | 0.33 | 70.84 | 224.47 | 0.15 | 72.42 | 237.70 |
| 192 | e | 0.17 | 67.78 | 212.61 | 0.12 | 70.20 | 219.72 |
| 193 | mas | 0.46 | 64.26 | 258.05 | 0.35 | 64.45 | 207.41 |
| 194 | si | 0.37 | 60.50 | 253.99 | 0.21 | 61.26 | 237.33 |
| 195 | pe | 0.16 | 63.10 | 245.72 | 0.13 | 71.11 | 250.15 |
| 196 | ta | 0.25 | 71.45 | 224.34 | 0.22 | 72.34 | 255.81 |
| 197 | ni | 0.32 | 64.70 | 246.60 | 0.07 | 71.87 | 299.48 |
| 198 | mu | 0.34 | 72.46 | 222.18 | 0.26 | 71.98 | 289.73 |
| 199 | la | 0.30 | 69.61 | 249.85 | 0.18 | 72.02 | 366.18 |
| 200 | men | 0.20 | 73.55 | 215.54 | 0.18 | 72.45 | 276.88 |
| 201 | ja | 0.21 | 69.99 | 215.83 | 0.11 | 72.13 | 238.95 |
| 202 | di | 0.25 | 64.38 | 226.10 | 0.17 | 67.73 | 240.67 |
| 203 | ta | 0.20 | 71.39 | 218.03 | 0.18 | 71.98 | 229.48 |
| 204 | mak | 0.24 | 65.17 | 171.00 | 0.30 | 65.24 | 218.18 |
| 205 | si | 0.53 | 61.57 | 315.06 | 0.35 | 58.91 | 316.53 |
| 206 | pe | 0.11 | 64.97 | 235.95 | 0.13 | 69.81 | 291.68 |
| 207 | ta | 0.23 | 72.46 | 221.58 | 0.14 | 71.61 | 250.97 |
| 208 | ni | 0.14 | 65.87 | 250.73 | 0.29 | 68.64 | 319.51 |
| 209 | me | 0.18 | 69.81 | 221.58 | 0.22 | 66.07 | 272.63 |
| 210 | ngam | 0.25 | 73.18 | 215.93 | 0.26 | 71.25 | 274.20 |
| 211 | bil | 0.37 | 67.64 | 252.19 | 0.24 | 67.43 | 304.25 |
| 212 | pi | 0.31 | 59.94 | 239.73 | 0.09 | 67.33 | 236.80 |
| 213 | sau | 0.37 | 69.99 | 251.31 | 0.50 | 67.64 | 281.17 |
| 214 | dan | 0.19 | 73.11 | 221.57 | 0.52 | 71.21 | 218.32 |
| 215 | me | 0.14 | 76.34 | 216.14 | 0.15 | 65.53 | 240.36 |
| 216 | nyem | 0.23 | 76.81 | 216.71 | 0.20 | 74.25 | 258.58 |
| 217 | be | 0.20 | 74.22 | 220.93 | 0.10 | 70.93 | 329.42 |
| 218 | lih | 0.23 | 65.22 | 230.81 | 0.29 | 68.65 | 322.74 |
| 219 | ang | 0.27 | 64.83 | 224.17 | 0.20 | 69.31 | 254.39 |
| 220 | sa | 0.42 | 68.69 | 225.58 | 0.28 | 64.70 | 273.28 |
| 221 | ber | 0.22 | 66.48 | 213.96 | 0.15 | 68.18 | 230.04 |
| 222 | tu | 0.13 | 63.35 | 219.44 | 0.12 | 67.23 | 223.90 |
| 223 | ah | 0.19 | 68.36 | 216.42 | 0.11 | 72.95 | 222.17 |
| 224 | nya | 0.48 | 62.03 | 226.12 | 0.52 | 62.79 | 205.10 |
| 225 | a | 0.20 | 62.95 | 213.59 | 0.18 | 66.90 | 217.16 |
| 226 | pa | 0.10 | 72.35 | 224.31 | 0.12 | 69.60 | 242.06 |
| 227 | bi | 0.18 | 68.49 | 235.32 | 0.11 | 72.24 | 259.74 |
| 228 | la | 0.22 | 70.95 | 282.63 | 0.18 | 69.12 | 363.31 |
| 229 | men | 0.20 | 69.00 | 246.44 | 0.25 | 71.74 | 291.71 |
| 230 | da | 0.21 | 73.99 | 216.83 | 0.14 | 70.17 | 241.82 |
| 231 | pa | 0.24 | 68.77 | 222.52 | 0.25 | 68.91 | 237.04 |
| 232 | ti | 0.35 | 62.33 | 258.56 | 0.22 | 64.87 | 302.06 |
| 233 | ti | 0.06 | 62.27 | 243.78 | 0.05 | 63.63 | 265.30 |
| 234 | a | 0.23 | 71.54 | 228.68 | 0.09 | 69.68 | 252.63 |
| 235 | da | 0.18 | 72.00 | 269.13 | 0.14 | 68.55 | 259.88 |
| 236 | se | 0.18 | 64.14 | 253.59 | 0.17 | 65.14 | 270.96 |
| 237 | bi | 0.26 | 69.73 | 226.25 | 0.14 | 67.18 | 280.48 |
| 238 | ji | 0.28 | 58.64 | 245.84 | 0.33 | 69.57 | 351.58 |
| 239 | pun | 0.35 | 64.22 | 220.18 | 0.26 | 70.99 | 238.53 |
| 240 | te | 0.12 | 70.47 | 219.42 | 0.07 | 69.83 | 238.01 |
| 241 | lur | 0.35 | 65.66 | 227.45 | 0.20 | 71.63 | 204.51 |
| 242 | e | 0.21 | 64.15 | 141.91 | 0.15 | 70.70 | 227.70 |
| 243 | mas | 0.31 | 66.61 | 223.36 | 0.31 | 67.67 | 251.93 |
| 244 | di | 0.20 | 67.62 | 216.22 | 0.16 | 63.96 | 221.86 |
| 245 | da | 0.13 | 71.35 | 213.84 | 0.13 | 71.71 | 232.00 |
| 246 | lam | 0.24 | 70.73 | 219.27 | 0.22 | 70.39 | 288.27 |
| 247 | pe | 0.12 | 68.61 | 224.48 | 0.09 | 69.64 | 285.69 |

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|---|---|---|---|---|---|---|---|
| 248 | rut | 0.23 | 60.55 | 217.90 | 0.11 | 70.86 | 239.20 |
| 249 | ang | 0.20 | 66.25 | 183.71 | 0.19 | 69.95 | 220.43 |
| 250 | sa | 0.39 | 63.56 | 222.17 | 0.22 | 66.43 | 227.92 |
| 251 | i | 0.22 | 61.36 | 143.04 | 0.18 | 61.89 | 194.11 |
| 252 | tu | 0.27 | 61.60 | 242.60 | 0.35 | 62.52 | 235.56 |
| 253 | si | 0.42 | 57.85 | 253.48 | 0.31 | 61.27 | 369.99 |
| 254 | pe | 0.15 | 65.83 | 243.13 | 0.13 | 69.17 | 268.72 |
| 255 | ta | 0.20 | 73.02 | 212.97 | 0.19 | 73.43 | 228.07 |
| 256 | ni | 0.29 | 69.11 | 238.99 | 0.11 | 71.63 | 258.70 |
| 257 | mu | 0.31 | 73.44 | 223.08 | 0.35 | 70.74 | 277.78 |
| 258 | la | 0.19 | 69.41 | 252.37 | 0.19 | 72.08 | 350.18 |
| 259 | me | 0.15 | 72.99 | 223.28 | 0.09 | 71.72 | 251.94 |
| 260 | nye | 0.14 | 74.60 | 211.70 | 0.16 | 71.73 | 230.03 |
| 261 | da | 0.24 | 73.68 | 208.56 | 0.17 | 75.98 | 222.27 |
| 262 | ri | 0.18 | 63.49 | 236.33 | 0.21 | 70.64 | 260.65 |
| 263 | ke | 0.13 | 65.78 | 234.54 | 0.11 | 61.59 | 263.25 |
| 264 | si | 0.17 | 65.82 | 223.63 | 0.16 | 64.05 | 237.63 |
| 265 | la | 0.24 | 65.88 | 199.23 | 0.17 | 71.11 | 217.96 |
| 266 | pan | 0.25 | 68.80 | 207.36 | 0.13 | 70.46 | 207.56 |
| 267 | nya | 0.32 | 62.07 | 267.34 | 0.37 | 67.03 | 286.74 |
| 268 | dan | 0.46 | 68.10 | 219.06 | 0.32 | 70.24 | 298.11 |
| 269 | be | 0.28 | 68.23 | 213.41 | 0.08 | 73.01 | 264.10 |
| 270 | ra | 0.19 | 71.51 | 212.98 | 0.18 | 75.42 | 218.48 |
| 271 | sa | 0.32 | 64.30 | 230.62 | 0.43 | 66.02 | 264.08 |
| 272 | sa | 0.24 | 64.03 | 219.22 | 0.75 | 64.83 | 306.37 |
| 273 | ngat | 0.27 | 64.20 | 204.56 | 0.17 | 67.34 | 286.42 |
| 274 | me | 0.18 | 66.54 | 203.37 | 0.13 | 71.99 | 222.08 |
| 275 | nye | 0.18 | 71.20 | 208.21 | 0.13 | 72.69 | 218.73 |
| 276 | sal | 0.49 | 58.69 | 204.45 | 0.64 | 59.80 | 209.84 |
| 277 | su | 0.18 | 59.61 | 238.15 | 0.17 | 57.46 | 239.85 |
| 278 | a | 0.25 | 62.84 | 238.83 | 0.29 | 67.65 | 202.98 |
| 279 | tu | 0.19 | 69.25 | 305.50 | 0.15 | 68.20 | 301.30 |
| 280 | ha | 0.26 | 69.46 | 247.81 | 0.19 | 74.42 | 309.28 |
| 281 | ri | 0.34 | 65.85 | 283.21 | 0.45 | 72.25 | 293.84 |
| 282 | se | 0.19 | 51.91 | 242.25 | 0.20 | 60.24 | 226.12 |
| 283 | e | 0.31 | 68.43 | 301.95 | 0.21 | 69.13 | 231.81 |
| 284 | kor | 0.19 | 70.03 | 320.70 | 0.21 | 69.05 | 350.23 |
| 285 | an | 0.27 | 70.50 | 247.76 | 0.23 | 68.32 | 278.56 |
| 286 | jing | 0.47 | 71.01 | 264.65 | 0.39 | 69.51 | 288.71 |
| 287 | ter | 0.22 | 71.62 | 241.66 | 0.17 | 65.61 | 280.45 |
| 288 | jum | 0.24 | 68.86 | 234.64 | 0.38 | 65.09 | 312.35 |
| 289 | pa | 0.34 | 73.99 | 260.45 | 0.16 | 73.00 | 367.57 |
| 290 | se | 0.29 | 67.01 | 323.33 | 0.21 | 66.32 | 292.21 |
| 291 | ke | 0.22 | 63.20 | 224.53 | 0.14 | 65.97 | 243.77 |
| 292 | tul | 0.35 | 66.50 | 234.56 | 0.12 | 70.04 | 240.73 |
| 293 | da | 0.18 | 69.04 | 238.15 | 0.22 | 73.87 | 224.44 |
| 294 | ging | 0.43 | 64.99 | 209.77 | 0.54 | 63.89 | 203.50 |
| 295 | di | 0.17 | 69.05 | 222.20 | 0.13 | 67.15 | 201.13 |
| 296 | a | 0.30 | 73.34 | 290.28 | 0.24 | 73.17 | 290.01 |
| 297 | meng | 0.24 | 65.89 | 254.80 | 0.20 | 69.08 | 336.88 |
| 298 | gong | 0.37 | 65.48 | 239.63 | 0.29 | 75.50 | 293.30 |
| 299 | gong | 0.34 | 70.36 | 283.05 | 0.45 | 65.99 | 288.81 |
| 300 | da | 0.19 | 74.97 | 231.22 | 0.24 | 71.53 | 213.53 |
| 301 | ging | 0.23 | 65.66 | 230.50 | 0.27 | 66.42 | 311.37 |
| 302 | i | 0.27 | 61.14 | 220.43 | 0.16 | 57.81 | 246.76 |
| 303 | tu | 0.23 | 68.14 | 269.77 | 0.42 | 63.26 | 287.51 |
| 304 | di | 0.16 | 65.97 | 233.47 | 0.25 | 70.49 | 308.71 |
| 305 | mu | 0.26 | 70.45 | 230.72 | 0.16 | 69.71 | 301.41 |
| 306 | lut | 0.42 | 58.02 | 251.83 | 0.41 | 61.99 | 286.54 |
| 307 | un | 0.26 | 60.56 | 236.98 | 0.24 | 62.64 | 210.77 |
| 308 | tuk | 0.22 | 65.00 | 260.08 | 0.18 | 68.97 | 274.27 |
| 309 | me | 0.14 | 69.46 | 221.70 | 0.09 | 67.35 | 216.12 |
| 310 | ma | 0.27 | 69.67 | 219.29 | 0.23 | 68.53 | 225.48 |
| 311 | kan | 0.16 | 68.16 | 252.07 | 0.19 | 71.77 | 223.93 |
| 312 | nya | 0.52 | 65.06 | 238.23 | 0.38 | 64.68 | 242.57 |
| 313 | di | 0.32 | 68.75 | 212.18 | 0.18 | 65.40 | 104.30 |
| 314 | tem | 0.26 | 65.68 | 224.58 | 0.25 | 70.11 | 100.54 |
| 315 | pat | 0.22 | 69.78 | 228.90 | 0.16 | 71.83 | 378.69 |

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|---|---|---|---|---|---|---|---|
| 316 | yang | 0.29 | 71.23 | 212.90 | 0.15 | 70.87 | 228.13 |
| 317 | se | 0.30 | 68.65 | 212.83 | 0.14 | 66.54 | 176.73 |
| 318 | la | 0.17 | 71.06 | 208.06 | 0.13 | 74.07 | 175.16 |
| 319 | mat | 0.32 | 65.01 | 214.33 | 0.32 | 66.86 | 98.02 |
| 320 | da | 0.20 | 75.93 | 222.25 | 0.26 | 68.98 | 189.64 |
| 321 | lam | 0.29 | 66.00 | 265.49 | 0.20 | 68.16 | 218.91 |
| 322 | per | 0.13 | 68.22 | 250.01 | 0.13 | 69.49 | 339.51 |
| 323 | ja | 0.28 | 71.24 | 230.22 | 0.17 | 74.41 | 318.10 |
| 324 | la | 0.19 | 76.00 | 224.30 | 0.13 | 71.58 | 304.43 |
| 325 | nan | 0.48 | 62.41 | 275.17 | 0.45 | 64.79 | 303.87 |
| 326 | di | 0.15 | 67.28 | 214.29 | 0.12 | 68.86 | 208.23 |
| 327 | a | 0.24 | 74.72 | 279.60 | 0.20 | 73.65 | 230.05 |
| 328 | la | 0.22 | 73.15 | 231.68 | 0.14 | 75.64 | 246.79 |
| 329 | lu | 0.20 | 67.50 | 256.18 | 0.16 | 71.11 | 326.30 |
| 330 | di | 0.23 | 66.66 | 235.94 | 0.25 | 69.30 | 280.77 |
| 331 | te | 0.23 | 63.58 | 231.01 | 0.19 | 64.57 | 244.56 |
| 332 | pi | 0.31 | 63.20 | 250.67 | 0.07 | 69.37 | 205.24 |
| 333 | a | 0.11 | 69.79 | 217.09 | 0.12 | 70.44 | 209.63 |
| 334 | nak | 0.28 | 69.86 | 220.38 | 0.14 | 72.70 | 215.61 |
| 335 | su | 0.28 | 61.74 | 277.72 | 0.24 | 64.27 | 210.78 |
| 336 | ngai | 0.48 | 64.26 | 186.43 | 0.47 | 63.55 | 177.23 |
| 337 | se | 0.27 | 58.93 | 247.86 | 0.20 | 63.66 | 213.93 |
| 338 | ma | 0.16 | 69.13 | 248.60 | 0.19 | 72.93 | 201.49 |
| 339 | sa | 0.30 | 67.42 | 286.76 | 0.32 | 65.88 | 306.91 |
| 340 | ber | 0.23 | 72.45 | 255.88 | 0.17 | 70.40 | 305.16 |
| 341 | ja | 0.22 | 71.32 | 232.91 | 0.22 | 71.07 | 289.68 |
| 342 | lan | 0.45 | 66.05 | 264.97 | 0.74 | 62.97 | 281.51 |
| 343 | an | 0.23 | 67.54 | 222.40 | 0.27 | 68.55 | 213.24 |
| 344 | jing | 0.33 | 65.43 | 275.48 | 0.22 | 69.98 | 351.63 |
| 345 | i | 0.19 | 63.67 | 231.54 | 0.14 | 63.79 | 298.68 |
| 346 | tu | 0.26 | 65.28 | 251.01 | 0.52 | 66.35 | 191.38 |
| 347 | me | 0.19 | 68.97 | 232.37 | 0.19 | 68.44 | 225.16 |
| 348 | li | 0.18 | 67.39 | 239.38 | 0.06 | 71.49 | 258.64 |
| 349 | hat | 0.29 | 66.05 | 242.83 | 0.33 | 67.56 | 340.22 |
| 350 | ke | 0.20 | 67.23 | 231.51 | 0.11 | 67.87 | 221.13 |
| 351 | da | 0.19 | 73.34 | 227.93 | 0.12 | 74.22 | 213.46 |
| 352 | lam | 0.35 | 70.91 | 221.88 | 0.18 | 69.53 | 207.78 |
| 353 | a | 0.22 | 70.19 | 218.96 | 0.19 | 69.31 | 201.98 |
| 354 | ir | 0.46 | 63.76 | 188.51 | 0.44 | 63.49 | 189.44 |
| 355 | a | 0.31 | 63.22 | 219.85 | 0.18 | 70.40 | 195.03 |
| 356 | da | 0.16 | 74.04 | 307.82 | 0.08 | 70.51 | 256.49 |
| 357 | se | 0.19 | 65.35 | 283.67 | 0.16 | 66.73 | 344.00 |
| 358 | e | 0.21 | 67.73 | 198.59 | 0.13 | 69.10 | 261.13 |
| 359 | kor | 0.39 | 65.25 | 252.22 | 0.11 | 68.00 | 266.38 |
| 360 | an | 0.27 | 73.48 | 214.52 | 0.16 | 72.57 | 242.20 |
| 361 | jing | 0.26 | 66.88 | 192.64 | 0.11 | 69.31 | 257.15 |
| 362 | la | 0.31 | 71.04 | 219.65 | 0.23 | 72.17 | 252.02 |
| 363 | in | 0.36 | 65.99 | 254.29 | 0.55 | 67.35 | 255.38 |
| 364 | de | 0.23 | 70.47 | 210.63 | 0.12 | 64.99 | 213.27 |
| 365 | ngan | 0.46 | 70.18 | 226.07 | 0.29 | 73.98 | 219.21 |
| 366 | da | 0.25 | 72.61 | 217.82 | 0.18 | 72.72 | 226.41 |
| 367 | ging | 0.42 | 62.12 | 256.91 | 0.24 | 67.30 | 316.91 |
| 368 | di | 0.29 | 65.41 | 212.95 | 0.17 | 71.15 | 244.55 |
| 369 | mu | 0.15 | 75.35 | 220.31 | 0.17 | 74.40 | 225.46 |
| 370 | lut | 0.20 | 67.56 | 320.09 | 0.18 | 69.37 | 203.89 |
| 371 | nya | 0.39 | 65.44 | 261.58 | 0.48 | 64.02 | 271.46 |
| 372 | di | 0.21 | 70.63 | 216.30 | 0.17 | 65.61 | 231.65 |
| 373 | da | 0.17 | 71.95 | 216.04 | 0.20 | 71.66 | 288.82 |
| 374 | lam | 0.28 | 71.77 | 222.15 | 0.16 | 67.69 | 333.37 |
| 375 | a | 0.17 | 68.35 | 211.68 | 0.16 | 71.45 | 210.30 |
| 376 | ir | 0.24 | 70.26 | 214.58 | 0.22 | 66.40 | 204.38 |
| 377 | i | 0.13 | 64.63 | 216.03 | 0.16 | 59.77 | 205.70 |
| 378 | tu | 0.40 | 62.22 | 163.20 | 0.36 | 58.76 | 197.10 |
| 379 | di | 0.14 | 66.78 | 206.43 | 0.08 | 67.20 | 198.23 |
| 380 | a | 0.28 | 72.31 | 295.21 | 0.17 | 73.39 | 216.89 |
| 381 | ti | 0.20 | 62.21 | 256.98 | 0.11 | 71.35 | 221.22 |
| 382 | dak | 0.38 | 66.50 | 263.04 | 0.18 | 69.02 | 212.33 |
| 383 | ta | 0.14 | 67.85 | 231.02 | 0.17 | 73.14 | 216.80 |

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|---|---|---|---|---|---|---|---|
| 384 | hu | 0.33 | 65.57 | 268.49 | 0.68 | 61.69 | 266.57 |
| 385 | i | 0.29 | 60.66 | 277.82 | 0.31 | 61.26 | 217.56 |
| 386 | tu | 0.25 | 65.33 | 285.63 | 0.18 | 67.99 | 316.11 |
| 387 | i | 0.08 | 63.16 | 216.66 | 0.14 | 66.80 | 320.09 |
| 388 | a | 0.13 | 71.50 | 221.97 | 0.12 | 72.95 | 212.85 |
| 389 | lah | 0.21 | 71.48 | 225.64 | 0.29 | 65.27 | 186.16 |
| 390 | ba | 0.26 | 73.28 | 219.81 | 0.22 | 65.65 | 230.97 |
| 391 | yang | 0.37 | 71.31 | 227.48 | 0.26 | 69.55 | 228.33 |
| 392 | ba | 0.12 | 72.18 | 213.78 | 0.13 | 71.33 | 237.35 |
| 393 | yang | 0.27 | 71.67 | 223.78 | 0.23 | 68.81 | 241.98 |
| 394 | nya | 0.29 | 67.16 | 226.83 | 0.10 | 68.86 | 257.27 |
| 395 | sen | 0.21 | 63.91 | 222.19 | 0.21 | 66.40 | 274.02 |
| 396 | di | 0.32 | 67.69 | 217.87 | 0.18 | 70.33 | 290.99 |
| 397 | ri | 0.37 | 62.65 | 193.68 | 0.46 | 66.27 | 317.62 |
| 398 | di | 0.18 | 71.48 | 210.78 | 0.13 | 69.30 | 211.14 |
| 399 | a | 0.21 | 73.19 | 255.97 | 0.14 | 71.88 | 235.89 |
| 400 | ma | 0.30 | 70.61 | 239.94 | 0.21 | 69.25 | 251.89 |
| 401 | hu | 0.34 | 68.75 | 249.48 | 0.22 | 71.14 | 362.62 |
| 402 | men | 0.39 | 71.84 | 222.19 | 0.24 | 75.47 | 224.93 |
| 403 | da | 0.24 | 69.35 | 213.22 | 0.17 | 72.34 | 218.09 |
| 404 | pat | 0.31 | 61.39 | 227.05 | 0.25 | 64.82 | 228.98 |
| 405 | kan | 0.42 | 70.64 | 223.79 | 0.30 | 68.33 | 230.69 |
| 406 | da | 0.22 | 69.72 | 207.45 | 0.19 | 71.38 | 198.99 |
| 407 | ging | 0.29 | 70.47 | 212.15 | 0.29 | 68.76 | 200.84 |
| 408 | i | 0.24 | 64.37 | 246.86 | 0.20 | 64.02 | 201.78 |
| 409 | tu | 0.32 | 60.19 | 249.49 | 0.43 | 59.26 | 234.55 |
| 410 | di | 0.20 | 67.65 | 211.95 | 0.10 | 67.19 | 202.39 |
| 411 | a | 0.22 | 68.44 | 237.58 | 0.25 | 70.44 | 219.62 |
| 412 | pun | 0.54 | 64.65 | 294.81 | 0.48 | 65.76 | 342.39 |
| 413 | me | 0.28 | 71.24 | 215.63 | 0.18 | 71.44 | 213.33 |
| 414 | nya | 0.26 | 74.47 | 223.25 | 0.26 | 76.89 | 224.14 |
| 415 | lak | 0.29 | 66.06 | 248.91 | 0.39 | 65.49 | 320.58 |
| 416 | ke | 0.22 | 63.01 | 228.37 | 0.17 | 64.57 | 210.44 |
| 417 | pa | 0.25 | 72.65 | 218.78 | 0.19 | 70.90 | 242.95 |
| 418 | da | 0.51 | 65.73 | 222.51 | 0.12 | 71.64 | 336.76 |
| 419 | an | 0.28 | 70.63 | 212.61 | 0.26 | 73.41 | 211.44 |
| 420 | jing | 0.37 | 73.60 | 219.16 | 0.39 | 68.42 | 247.74 |
| 421 | di | 0.16 | 69.56 | 203.60 | 0.25 | 66.00 | 207.93 |
| 422 | da | 0.28 | 70.67 | 205.17 | 0.15 | 72.29 | 245.59 |
| 423 | lam | 0.24 | 69.67 | 207.66 | 0.24 | 67.40 | 277.48 |
| 424 | a | 0.22 | 69.79 | 210.66 | 0.22 | 62.84 | 216.46 |
| 425 | ir | 0.52 | 60.59 | 185.34 | 0.31 | 63.67 | 153.07 |
| 426 | se | 0.24 | 62.01 | 220.12 | 0.20 | 59.78 | 203.53 |
| 427 | ba | 0.21 | 74.21 | 221.42 | 0.19 | 71.72 | 208.62 |
| 428 | ik | 0.13 | 70.62 | 268.68 | 0.09 | 70.12 | x |
| 429 | sa | 0.48 | 66.31 | 229.77 | 0.23 | 66.05 | 270.52 |
| 430 | ja | 0.21 | 69.38 | 254.14 | 0.19 | 70.16 | 248.51 |
| 431 | di | 0.27 | 70.46 | 226.06 | 0.08 | 69.48 | 237.91 |
| 432 | a | 0.27 | 68.70 | 244.82 | 0.20 | 72.28 | 238.14 |
| 433 | mem | 0.22 | 72.68 | 217.83 | 0.18 | 74.76 | 223.23 |
| 434 | bu | 0.25 | 68.03 | 215.83 | 0.28 | 69.79 | 219.18 |
| 435 | ka | 0.18 | 68.62 | 211.76 | 0.15 | 67.84 | 225.03 |
| 436 | mu | 0.19 | 69.85 | 206.24 | 0.21 | 70.85 | 192.33 |
| 437 | lut | 0.42 | 68.13 | 236.28 | 0.39 | 66.15 | 209.01 |
| 438 | da | 0.27 | 74.07 | 222.12 | 0.34 | 71.88 | 217.89 |
| 439 | ging | 0.26 | 70.14 | 245.18 | 0.15 | 68.76 | 337.87 |
| 440 | di | 0.23 | 67.67 | 239.04 | 0.20 | 70.76 | 274.85 |
| 441 | mu | 0.22 | 75.88 | 220.76 | 0.13 | 71.86 | 232.78 |
| 442 | lut | 0.22 | 70.42 | 224.27 | 0.25 | 72.55 | 218.56 |
| 443 | nya | 0.43 | 64.74 | 229.50 | 0.42 | 65.03 | 265.13 |
| 444 | ter | 0.19 | 66.64 | 211.90 | 0.21 | 70.28 | 237.89 |
| 445 | ja | 0.31 | 68.61 | 211.06 | 0.21 | 70.31 | 309.86 |
| 446 | tuh | 0.39 | 58.34 | 222.90 | 0.22 | 66.51 | 321.70 |
| 447 | ke | 0.16 | 66.67 | 239.30 | 0.10 | 67.02 | 230.34 |
| 448 | da | 0.20 | 71.32 | 208.57 | 0.15 | 73.19 | 205.84 |
| 449 | lam | 0.26 | 69.36 | 208.41 | 0.15 | 71.72 | 196.30 |
| 450 | a | 0.22 | 64.70 | 176.73 | 0.28 | 68.86 | 192.51 |
| 451 | ir | 0.31 | 64.64 | 102.77 | 0.40 | 60.93 | 199.11 |

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|---|---|---|---|---|---|---|---|
| 452 | se | 0.31 | 66.28 | 309.39 | 0.16 | 63.94 | 222.85 |
| 453 | e | 0.21 | 60.86 | 233.97 | 0.15 | 68.58 | 228.40 |
| 454 | kor | 0.30 | 68.03 | 317.75 | 0.12 | 72.89 | 402.73 |
| 455 | se | 0.36 | 63.89 | 270.16 | 0.21 | 68.90 | 320.85 |
| 456 | mut | 0.29 | 65.03 | 273.68 | 0.38 | 68.15 | 242.92 |
| 457 | yang | 0.58 | 67.68 | 264.73 | 0.36 | 67.43 | 310.79 |
| 458 | ke | 0.21 | 62.23 | 252.32 | 0.10 | 69.27 | 281.76 |
| 459 | hau | 0.22 | 71.31 | 221.62 | 0.21 | 69.94 | 222.90 |
| 460 | san | 0.43 | 64.78 | 269.35 | 0.55 | 62.28 | 191.31 |
| 461 | i | 0.23 | 60.92 | 239.28 | 0.16 | 67.04 | 243.32 |
| 462 | ngin | 0.31 | 65.25 | 287.82 | 0.21 | 72.38 | 367.72 |
| 463 | me | 0.18 | 67.00 | 255.23 | 0.13 | 71.87 | 282.73 |
| 464 | mi | 0.16 | 69.93 | 229.18 | 0.12 | 70.18 | 244.48 |
| 465 | num | 0.19 | 65.73 | 254.77 | 0.14 | 70.18 | 229.12 |
| 466 | a | 0.34 | 64.60 | 240.94 | 0.17 | 71.62 | 223.00 |
| 467 | ir | 0.37 | 66.97 | 278.93 | 0.36 | 65.84 | 285.56 |
| 468 | da | 0.31 | 69.91 | 223.73 | 0.37 | 68.98 | 221.88 |
| 469 | ri | 0.27 | 67.94 | 257.73 | 0.31 | 64.44 | 247.54 |
| 470 | a | 0.23 | 69.66 | 232.79 | 0.12 | 63.61 | 214.07 |
| 471 | ir | 0.25 | 64.69 | 258.90 | 0.21 | 71.23 | 225.73 |
| 472 | ter | 0.22 | 66.93 | 228.65 | 0.16 | 70.33 | 318.60 |
| 473 | jun | 0.30 | 65.92 | 253.32 | 0.15 | 73.30 | 372.63 |
| 474 | yang | 0.32 | 67.80 | 235.63 | 0.20 | 70.51 | 283.88 |
| 475 | ber | 0.29 | 69.22 | 229.55 | 0.07 | 72.61 | 228.00 |
| 476 | ham | 0.33 | 67.31 | 216.84 | 0.22 | 69.38 | 225.28 |
| 477 | pi | 0.16 | 61.62 | 228.37 | 0.13 | 69.87 | 212.91 |
| 478 | ran | 0.30 | 60.50 | 216.18 | 0.31 | 66.05 | 203.17 |
| 479 | na | 0.30 | 73.86 | 216.15 | 0.14 | 71.78 | 194.13 |
| 480 | mun | 0.32 | 63.18 | 269.40 | 0.49 | 67.02 | 249.42 |
| 481 | na | 0.35 | 65.64 | 216.57 | 0.15 | 69.48 | 216.51 |
| 482 | sib | 0.28 | 62.57 | 262.94 | 0.24 | 65.87 | 268.47 |
| 483 | nya | 0.42 | 66.44 | 303.46 | 0.17 | 67.30 | 348.13 |
| 484 | ma | 0.36 | 70.19 | 226.98 | 0.19 | 73.76 | 240.10 |
| 485 | lang | 0.34 | 66.85 | 280.29 | 0.54 | 68.08 | 226.15 |
| 486 | a | 0.16 | 65.06 | 211.58 | 0.17 | 64.82 | 202.97 |
| 487 | pa | 0.17 | 69.26 | 215.15 | 0.12 | 71.70 | 213.91 |
| 488 | bi | 0.19 | 72.86 | 220.66 | 0.16 | 71.04 | 198.57 |
| 489 | la | 0.24 | 65.57 | 264.01 | 0.41 | 66.74 | 212.76 |
| 490 | ka | 0.21 | 69.28 | 226.75 | 0.22 | 64.02 | 248.88 |
| 491 | ki | 0.24 | 62.62 | 243.42 | 0.12 | 67.41 | 296.71 |
| 492 | nya | 0.32 | 64.60 | 271.13 | 0.18 | 68.71 | 375.85 |
| 493 | ter | 0.18 | 67.40 | 238.75 | 0.18 | 70.68 | 289.55 |
| 494 | ge | 0.24 | 74.08 | 214.76 | 0.14 | 75.36 | 229.31 |
| 495 | lin | 0.23 | 74.54 | 216.43 | 0.21 | 73.92 | 227.08 |
| 496 | cir | 0.41 | 66.25 | 243.28 | 0.50 | 65.84 | 300.06 |
| 497 | dan | 0.50 | 66.57 | 217.75 | 0.26 | 70.05 | 294.81 |
| 498 | ter | 0.22 | 69.64 | 213.40 | 0.18 | 73.16 | 260.56 |
| 499 | ja | 0.33 | 68.76 | 216.86 | 0.28 | 70.50 | 256.72 |
| 500 | tuh | 0.36 | 62.67 | 247.82 | 0.14 | 73.72 | 417.93 |
| 501 | di | 0.20 | 67.17 | 207.25 | 0.16 | 70.40 | 263.80 |
| 502 | da | 0.14 | 73.13 | 212.08 | 0.14 | 71.15 | 227.78 |
| 503 | lam | 0.38 | 65.42 | 231.33 | 0.17 | 73.01 | 219.23 |
| 504 | a | 0.18 | 70.08 | 208.37 | 0.09 | 69.98 | 201.13 |
| 505 | ir | 0.28 | 59.85 | 237.37 | 0.17 | 68.04 | 203.50 |
| 506 | ter | 0.21 | 69.43 | 224.90 | 0.20 | 65.39 | 252.88 |
| 507 | jun | 0.48 | 64.27 | 225.27 | 0.15 | 63.00 | 324.43 |
| 508 | yang | 0.44 | 67.24 | 207.07 | 0.23 | 69.85 | 263.60 |
| 509 | de | 0.14 | 68.45 | 217.01 | 0.10 | 70.32 | 197.49 |
| 510 | ras | 0.53 | 55.06 | 233.75 | 0.36 | 60.79 | 195.82 |
| 511 | a | 0.30 | 66.23 | 214.03 | 0.15 | 66.98 | 208.28 |
| 512 | pa | 0.20 | 68.43 | 233.76 | 0.13 | 72.09 | 244.88 |
| 513 | bi | 0.12 | 65.87 | 240.79 | 0.13 | 71.03 | 280.53 |
| 514 | la | 0.36 | 70.57 | 296.54 | 0.17 | 73.80 | 409.68 |
| 515 | di | 0.18 | 70.53 | 223.91 | 0.09 | 71.36 | 379.06 |
| 516 | a | 0.34 | 69.59 | 270.18 | 0.11 | 77.07 | 291.25 |
| 517 | ham | 0.28 | 64.48 | 239.46 | 0.20 | 69.96 | 261.83 |
| 518 | pir | 0.26 | 68.19 | 243.76 | 0.08 | 68.51 | 265.26 |
| 519 | ham | 0.28 | 63.16 | 232.08 | 0.23 | 66.91 | 243.42 |

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|---|---|---|---|---|---|---|---|
| 520 | pir | 0.26 | 69.15 | 224.90 | 0.14 | 70.59 | 227.83 |
| 521 | le | 0.18 | 69.38 | 195.50 | 0.12 | 70.33 | 198.30 |
| 522 | mas | 0.47 | 62.97 | 208.10 | 0.51 | 63.89 | 229.70 |
| 523 | se | 0.38 | 54.22 | 292.86 | 0.18 | 60.57 | 254.55 |
| 524 | e | 0.22 | 66.49 | 224.42 | 0.16 | 71.55 | 258.28 |
| 525 | kor | 0.40 | 68.70 | 310.49 | 0.20 | 69.29 | 421.90 |
| 526 | mer | 0.38 | 66.61 | 236.97 | 0.25 | 67.33 | 296.58 |
| 527 | pa | 0.29 | 66.28 | 214.22 | 0.27 | 66.25 | 228.64 |
| 528 | ti | 0.21 | 66.07 | 266.94 | 0.16 | 70.20 | 317.64 |
| 529 | yang | 0.52 | 67.88 | 246.94 | 0.20 | 72.68 | 268.28 |
| 530 | ber | 0.34 | 65.33 | 224.53 | 0.21 | 66.42 | 213.48 |
| 531 | teng | 0.33 | 70.79 | 196.56 | 0.29 | 64.79 | 190.43 |
| 532 | gek | 0.32 | 65.53 | 232.22 | 0.34 | 63.67 | 197.40 |
| 533 | ti | 0.12 | 70.38 | 216.76 | 0.13 | 65.12 | 225.62 |
| 534 | dak | 0.20 | 70.29 | 180.55 | 0.14 | 73.20 | 239.33 |
| 535 | ja | 0.15 | 70.90 | 181.51 | 0.13 | 73.93 | 300.49 |
| 536 | uh | 0.18 | 70.90 | 246.96 | 0.18 | 74.66 | 365.57 |
| 537 | da | 0.22 | 72.07 | 214.95 | 0.07 | 72.89 | 252.69 |
| 538 | ri | 0.29 | 67.99 | 215.31 | 0.17 | 70.30 | 226.36 |
| 539 | po | 0.19 | 65.51 | 210.21 | 0.15 | 66.48 | 212.31 |
| 540 | kok | 0.20 | 62.55 | 199.41 | 0.10 | 65.83 | 100.21 |
| 541 | i | 0.23 | 60.52 | 168.92 | 0.19 | 63.84 | 120.43 |
| 542 | tu | 0.32 | 59.99 | 257.25 | 0.28 | 64.27 | 215.82 |
| 543 | men | 0.32 | 72.99 | 216.50 | 0.09 | 70.29 | 255.13 |
| 544 | ja | 0.29 | 67.39 | 212.66 | 0.31 | 69.69 | 265.58 |
| 545 | tuh | 0.27 | 59.49 | 250.08 | 0.22 | 64.97 | 381.13 |
| 546 | kan | 0.26 | 68.46 | 243.45 | 0.18 | 70.45 | 306.14 |
| 547 | se | 0.34 | 63.77 | 234.23 | 0.12 | 61.47 | 227.41 |
| 548 | he | 0.19 | 72.40 | 217.71 | 0.20 | 67.20 | 234.94 |
| 549 | lai | 0.35 | 72.46 | 211.89 | 0.22 | 72.69 | 212.98 |
| 550 | da | 0.24 | 69.80 | 212.33 | 0.20 | 71.73 | 194.73 |
| 551 | un | 0.36 | 60.93 | 209.15 | 0.29 | 62.74 | 191.89 |
| 552 | se | 0.20 | 59.25 | 261.78 | 0.21 | 63.59 | 311.48 |
| 553 | mut | 0.36 | 66.96 | 277.23 | 0.17 | 71.04 | 384.68 |
| 554 | i | 0.25 | 61.43 | 233.49 | 0.19 | 61.96 | 275.47 |
| 555 | tu | 0.28 | 64.74 | 277.26 | 0.15 | 65.95 | 337.66 |
| 556 | pun | 0.43 | 64.76 | 302.25 | 0.36 | 64.62 | 435.95 |
| 557 | me | 0.19 | 69.53 | 224.84 | 0.14 | 67.65 | 255.86 |
| 558 | man | 0.32 | 74.06 | 225.96 | 0.21 | 69.95 | 307.76 |
| 559 | jat | 0.35 | 66.53 | 251.15 | 0.25 | 64.91 | 389.80 |
| 560 | ke | 0.15 | 64.09 | 209.90 | 0.11 | 65.49 | 231.12 |
| 561 | a | 0.24 | 68.13 | 214.11 | 0.21 | 67.07 | 213.07 |
| 562 | tas | 0.35 | 63.54 | 239.28 | 0.20 | 66.47 | 213.58 |
| 563 | da | 0.25 | 68.65 | 214.48 | 0.18 | 70.78 | 200.73 |
| 564 | un | 0.37 | 64.32 | 238.65 | 0.29 | 73.73 | 193.53 |
| 565 | ter | 0.11 | 67.01 | 211.00 | 0.10 | 68.93 | 193.10 |
| 566 | se | 0.25 | 63.07 | 208.81 | 0.23 | 64.88 | 194.28 |
| 567 | but | 0.41 | 64.57 | 227.64 | 0.38 | 64.91 | 305.82 |
| 568 | dan | 0.52 | 65.81 | 246.77 | 0.29 | 68.13 | 315.61 |
| 569 | ak | 0.21 | 67.86 | 221.53 | 0.23 | 65.94 | 279.23 |
| 570 | hir | 0.34 | 64.19 | 240.73 | 0.21 | 71.55 | 226.78 |
| 571 | nya | 0.33 | 66.60 | 197.25 | 0.37 | 66.38 | 321.89 |
| 572 | ti | 0.21 | 62.83 | 233.90 | 0.22 | 64.74 | 293.25 |
| 573 | ba | 0.38 | 69.89 | 246.87 | 0.18 | 74.46 | 356.40 |
| 574 | de | 0.25 | 69.80 | 232.06 | 0.12 | 73.04 | 252.81 |
| 575 | ngan | 0.23 | 67.90 | 236.66 | 0.13 | 72.16 | 227.63 |
| 576 | se | 0.30 | 62.87 | 228.11 | 0.19 | 64.96 | 225.32 |
| 577 | la | 0.23 | 70.39 | 199.11 | 0.13 | 72.94 | 206.04 |
| 578 | mat | 0.29 | 64.40 | 231.97 | 0.37 | 66.64 | 261.10 |
| 579 | di | 0.29 | 67.77 | 217.14 | 0.21 | 66.58 | 214.56 |
| 580 | te | 0.18 | 67.94 | 218.84 | 0.19 | 68.50 | 216.42 |
| 581 | bing | 0.35 | 74.01 | 216.88 | 0.29 | 72.62 | 209.74 |
| 582 | su | 0.19 | 61.50 | 218.54 | 0.26 | 65.11 | 206.53 |
| 583 | ngai | 0.44 | 64.88 | 214.18 | 0.42 | 61.49 | 206.89 |
| 584 | be | 0.20 | 70.95 | 223.36 | 0.08 | 72.81 | 224.51 |
| 585 | be | 0.10 | 68.27 | 238.45 | 0.08 | 75.18 | 218.00 |
| 586 | ra | 0.22 | 70.79 | 234.27 | 0.25 | 71.78 | 213.50 |
| 587 | pa | 0.28 | 68.89 | 305.40 | 0.09 | 73.77 | 362.41 |

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|---|---|---|---|---|---|---|---|
| 588 | ha | 0.24 | 64.61 | 276.23 | 0.13 | 75.54 | 368.58 |
| 589 | ri | 0.32 | 63.58 | 236.58 | 0.19 | 68.15 | 356.54 |
| 590 | ke | 0.15 | 65.24 | 233.81 | 0.12 | 68.07 | 313.06 |
| 591 | mu | 0.16 | 71.04 | 207.43 | 0.12 | 70.23 | 279.33 |
| 592 | di | 0.11 | 67.43 | 198.87 | 0.09 | 68.50 | 234.11 |
| 593 | an | 0.37 | 66.16 | 213.05 | 0.40 | 68.21 | 281.57 |
| 594 | se | 0.28 | 60.86 | 211.22 | 0.18 | 62.32 | 214.67 |
| 595 | o | 0.16 | 71.49 | 244.03 | 0.13 | 76.44 | 192.24 |
| 596 | rang | 0.49 | 66.11 | 241.07 | 0.23 | 69.03 | 378.70 |
| 597 | pem | 0.25 | 73.29 | 214.49 | 0.17 | 71.53 | 291.63 |
| 598 | bu | 0.27 | 73.86 | 217.83 | 0.20 | 71.22 | 233.68 |
| 599 | ru | 0.36 | 65.93 | 282.94 | 0.33 | 67.17 | 325.28 |
| 600 | me | 0.29 | 73.34 | 217.48 | 0.24 | 64.64 | 248.95 |
| 601 | li | 0.21 | 69.11 | 207.15 | 0.17 | 72.17 | 253.11 |
| 602 | hat | 0.35 | 64.30 | 247.20 | 0.34 | 66.84 | 347.54 |
| 603 | se | 0.27 | 61.08 | 203.93 | 0.25 | 58.52 | 235.83 |
| 604 | e | 0.22 | 66.79 | 228.79 | 0.17 | 66.51 | 272.35 |
| 605 | kor | 0.24 | 69.30 | 288.47 | 0.23 | 68.96 | 327.71 |
| 606 | mer | 0.49 | 64.46 | 228.96 | 0.15 | 69.61 | 223.78 |
| 607 | pa | 0.32 | 62.79 | 198.17 | 0.30 | 60.79 | 195.36 |
| 608 | ti | 0.34 | 64.15 | 277.19 | 0.38 | 60.59 | 305.79 |
| 609 | dan | 0.64 | 67.88 | 249.05 | 0.27 | 67.08 | 242.68 |
| 610 | i | 0.21 | 67.10 | 285.81 | 0.20 | 70.99 | 348.75 |
| 611 | ngin | 0.40 | 67.04 | 254.94 | 0.19 | 75.80 | 428.53 |
| 612 | me | 0.19 | 73.42 | 222.45 | 0.18 | 71.53 | 260.22 |
| 613 | nem | 0.27 | 77.07 | 218.13 | 0.17 | 74.62 | 224.05 |
| 614 | bak | 0.23 | 68.89 | 215.81 | 0.25 | 73.77 | 212.38 |
| 615 | nya | 0.48 | 64.88 | 212.05 | 0.57 | 62.13 | 201.41 |
| 616 | na | 0.37 | 66.79 | 219.33 | 0.18 | 70.13 | 192.88 |
| 617 | mun | 0.42 | 65.29 | 249.71 | 0.53 | 67.32 | 214.92 |
| 618 | se | 0.22 | 58.04 | 243.96 | 0.32 | 60.07 | 292.00 |
| 619 | mut | 0.37 | 66.43 | 271.97 | 0.30 | 67.20 | 402.73 |
| 620 | ter | 0.22 | 68.61 | 215.68 | 0.15 | 69.30 | 255.90 |
| 621 | li | 0.20 | 68.98 | 205.18 | 0.22 | 72.16 | 213.69 |
| 622 | hat | 0.46 | 65.12 | 250.01 | 0.40 | 66.58 | 264.48 |
| 623 | a | 0.27 | 62.35 | 207.42 | 0.20 | 64.56 | 236.94 |
| 624 | kan | 0.41 | 62.37 | 270.71 | 0.27 | 63.46 | 350.32 |
| 625 | per | 0.20 | 68.08 | 226.76 | 0.15 | 71.58 | 265.80 |
| 626 | la | 0.31 | 67.31 | 211.24 | 0.18 | 72.46 | 235.85 |
| 627 | ku | 0.11 | 62.31 | 239.93 | 0.13 | 64.78 | 300.21 |
| 628 | an | 0.31 | 66.21 | 240.14 | 0.22 | 71.37 | 299.25 |
| 629 | pem | 0.27 | 68.92 | 219.20 | 0.12 | 70.82 | 224.99 |
| 630 | bu | 0.19 | 72.32 | 214.58 | 0.23 | 74.13 | 220.03 |
| 631 | ru | 0.23 | 73.28 | 198.63 | 0.11 | 70.61 | 210.96 |
| 632 | i | 0.31 | 62.74 | 118.08 | 0.17 | 63.88 | 202.49 |
| 633 | tu | 0.38 | 60.83 | 171.55 | 0.30 | 64.77 | 201.43 |
| 634 | se | 0.28 | 57.11 | 226.03 | 0.18 | 62.95 | 279.67 |
| 635 | mut | 0.39 | 67.21 | 267.48 | 0.31 | 65.06 | 260.55 |
| 636 | pun | 0.33 | 67.45 | 293.49 | 0.39 | 67.55 | 397.88 |
| 637 | lan | 0.52 | 68.18 | 229.93 | 0.37 | 64.49 | 310.72 |
| 638 | tas | 0.52 | 62.57 | 284.43 | 0.29 | 68.24 | 373.64 |
| 639 | meng | 0.35 | 74.17 | 215.54 | 0.22 | 67.96 | 214.35 |
| 640 | gi | 0.29 | 68.07 | 199.56 | 0.28 | 69.95 | 228.44 |
| 641 | git | 0.28 | 62.09 | 250.70 | 0.38 | 61.08 | 342.36 |
| 642 | ka | 0.29 | 64.32 | 207.07 | 0.25 | 64.06 | 270.96 |
| 643 | ki | 0.31 | 60.93 | 265.19 | 0.21 | 65.35 | 321.60 |
| 644 | pem | 0.29 | 69.02 | 223.47 | 0.14 | 69.80 | 246.15 |
| 645 | bu | 0.16 | 71.53 | 204.39 | 0.14 | 75.38 | 221.11 |
| 646 | ru | 0.35 | 67.14 | 226.56 | 0.07 | 75.18 | 209.84 |
| 647 | i | 0.21 | 64.08 | 165.81 | 0.21 | 66.16 | 194.58 |
| 648 | tu | 0.40 | 58.03 | 206.31 | 0.33 | 62.56 | 354.82 |
| 649 | dan | 0.62 | 62.79 | 248.42 | 0.69 | 68.52 | 229.30 |
| 650 | tem | 0.33 | 71.29 | 240.79 | 0.19 | 70.13 | 276.67 |
| 651 | ba | 0.21 | 71.11 | 210.84 | 0.20 | 73.03 | 290.53 |
| 652 | kan | 0.33 | 67.03 | 233.35 | 0.21 | 70.95 | 354.69 |
| 653 | nya | 0.32 | 64.96 | 251.25 | 0.16 | 68.60 | 404.96 |
| 654 | ter | 0.18 | 68.53 | 215.67 | 0.28 | 64.85 | 320.76 |
| 655 | sa | 0.34 | 62.53 | 221.76 | 0.18 | 68.71 | 235.84 |

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|---|---|---|---|---|---|---|---|
| 656 | sar | 0.49 | 60.90 | 164.65 | 0.49 | 62.07 | 233.25 |
| 657 | mer | 0.26 | 68.46 | 216.65 | 0.20 | 66.89 | 266.19 |
| 658 | pa | 0.31 | 66.57 | 227.41 | 0.23 | 69.27 | 317.85 |
| 659 | ti | 0.37 | 67.09 | 300.75 | 0.13 | 76.50 | 439.95 |
| 660 | yang | 0.55 | 67.82 | 209.85 | 0.33 | 68.52 | 278.01 |
| 661 | ter | 0.29 | 65.73 | 206.35 | 0.16 | 67.04 | 252.80 |
| 662 | de | 0.13 | 72.57 | 234.21 | 0.27 | 71.00 | 226.74 |
| 663 | ngar | 0.42 | 68.67 | 239.13 | 0.47 | 66.10 | 244.32 |
| 664 | je | 0.27 | 69.06 | 218.43 | 0.22 | 67.13 | 217.79 |
| 665 | ri | 0.23 | 66.79 | 210.12 | 0.21 | 67.01 | 248.66 |
| 666 | tan | 0.73 | 64.90 | 283.91 | 0.28 | 69.72 | 263.08 |
| 667 | pem | 0.16 | 71.89 | 202.57 | 0.13 | 65.52 | 229.02 |
| 668 | bu | 0.32 | 70.96 | 212.33 | 0.10 | 74.63 | 218.80 |
| 669 | ru | 0.22 | 66.31 | 314.62 | 0.14 | 74.09 | 218.65 |
| 670 | i | 0.27 | 58.65 | 234.84 | 0.19 | 63.57 | 115.83 |
| 671 | tu | 0.36 | 59.57 | 219.83 | 0.32 | 59.26 | 308.47 |
| 672 | se | 0.31 | 61.69 | 209.82 | 0.25 | 64.99 | 272.06 |
| 673 | ge | 0.22 | 74.18 | 219.93 | 0.12 | 68.21 | 330.87 |
| 674 | ra | 0.29 | 66.72 | 252.69 | 0.23 | 70.74 | 383.11 |
| 675 | ter | 0.31 | 67.81 | 217.74 | 0.19 | 71.13 | 247.35 |
| 676 | bang | 0.54 | 66.20 | 236.71 | 0.45 | 66.09 | 310.27 |
| 677 | ber | 0.32 | 66.97 | 205.29 | 0.20 | 64.88 | 189.39 |
| 678 | e | 0.24 | 70.08 | 248.10 | 0.21 | 71.41 | 280.89 |
| 679 | dar | 0.48 | 70.08 | 187.93 | 0.25 | 73.32 | 276.29 |
| 680 | da | 0.23 | 71.73 | 202.46 | 0.16 | 72.78 | 221.04 |
| 681 | ri | 0.17 | 68.14 | 205.83 | 0.10 | 71.66 | 220.94 |
| 682 | si | 0.35 | 63.02 | 207.78 | 0.20 | 63.92 | 212.71 |
| 683 | tu | 0.42 | 55.61 | 385.00 | 0.52 | 57.08 | 204.79 |

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data
## Female Storyteller 5 (Fst5)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.18 | 59.49 | 388.11 | 0.21 | 62.02 | 219.30 |
| 2 | a | 0.18 | 55.44 | 188.02 | 0.23 | 55.21 | 177.29 |
| 3 | tu | 0.23 | 50.88 | 235.82 | 0.12 | 58.93 | 182.84 |
| 4 | ma | 0.18 | 58.94 | 209.56 | 0.19 | 65.64 | 269.69 |
| 5 | sa | 0.19 | 50.42 | 181.47 | 0.11 | 58.38 | 255.21 |
| 6 | da | 0.19 | 52.04 | 190.33 | 0.22 | 60.48 | 220.58 |
| 7 | hu | 0.18 | 50.33 | 168.75 | 0.14 | 65.98 | 216.45 |
| 8 | lu | 0.30 | 59.72 | 223.94 | 0.52 | 65.15 | 219.08 |
| 9 | ting | 0.34 | 51.31 | 180.57 | 0.27 | 56.16 | 185.59 |
| 10 | gal | 0.23 | 60.23 | 217.26 | 0.36 | 55.68 | 212.59 |
| 11 | se | 0.18 | 52.84 | 279.73 | 0.19 | 53.80 | 89.17 |
| 12 | o | 0.24 | 58.14 | 219.41 | 0.14 | 59.24 | 164.13 |
| 13 | rang | 0.32 | 50.83 | 186.18 | 0.30 | 59.96 | 219.56 |
| 14 | pe | 0.19 | 50.62 | 224.85 | 0.15 | 54.35 | 259.72 |
| 15 | ta | 0.22 | 56.34 | 178.63 | 0.17 | 60.61 | 211.06 |
| 16 | ni | 0.26 | 58.17 | 196.37 | 0.42 | 60.11 | 208.20 |
| 17 | yang | 0.25 | 49.66 | 173.36 | 0.12 | 59.55 | 205.40 |
| 18 | me | 0.16 | 43.81 | x | 0.23 | 63.77 | 197.22 |
| 19 | me | 0.13 | 40.80 | x | 0.12 | 64.72 | 195.04 |
| 20 | li | 0.18 | 44.38 | 171.90 | 0.18 | 62.80 | 192.09 |
| 21 | ha | 0.16 | 55.03 | 199.93 | 0.30 | 56.32 | 168.89 |
| 22 | ra | 0.26 | 56.16 | 195.31 | 0.23 | 59.51 | 223.57 |
| 23 | se | 0.32 | 47.96 | 242.80 | 0.15 | 52.80 | 271.10 |
| 24 | e | 0.23 | 48.28 | 209.89 | 0.18 | 56.07 | 96.94 |
| 25 | kor | 0.24 | 51.76 | 209.13 | 0.18 | 54.12 | 173.26 |
| 26 | ang | 0.24 | 60.94 | 201.81 | 0.32 | 52.04 | 229.95 |
| 27 | sa | 0.32 | 50.88 | 180.21 | 0.31 | 55.17 | 173.66 |
| 28 | pa | 0.13 | 55.39 | 174.90 | 0.21 | 51.81 | 175.56 |
| 29 | da | 0.17 | 58.74 | 210.32 | 0.15 | 59.43 | 214.34 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 30 | su | 0.14 | 48.88 | 214.82 | 0.10 | 52.21 | 224.06 |
| 31 | a | 0.16 | 55.90 | 185.97 | 0.20 | 57.95 | 249.75 |
| 32 | tu | 0.15 | 57.18 | 171.44 | 0.13 | 57.86 | 238.25 |
| 33 | ha | 0.19 | 57.50 | 181.98 | 0.20 | 58.40 | 227.54 |
| 34 | ri | 0.32 | 57.55 | 218.92 | 0.46 | 61.67 | 219.05 |
| 35 | ke | 0.14 | 51.78 | x | 0.12 | 50.72 | 200.10 |
| 36 | ti | 0.18 | 51.48 | 186.93 | 0.23 | 45.87 | 180.90 |
| 37 | ka | 0.22 | 62.89 | 325.71 | 0.23 | 53.81 | 236.00 |
| 38 | i | 0.17 | 59.28 | 248.34 | 0.22 | 55.06 | 232.91 |
| 39 | tu | 0.37 | 53.31 | 192.30 | 0.35 | 61.45 | 217.72 |
| 40 | di | 0.16 | 56.96 | 194.14 | 0.08 | 54.69 | 200.78 |
| 41 | a | 0.15 | 61.02 | 232.06 | 0.23 | 57.03 | 220.46 |
| 42 | i | 0.11 | 63.87 | 212.58 | 0.20 | 57.72 | 214.55 |
| 43 | ngin | 0.15 | 65.30 | 196.96 | 0.13 | 66.22 | 195.00 |
| 44 | me | 0.15 | 59.25 | 182.15 | 0.20 | 63.60 | 189.23 |
| 45 | ngam | 0.21 | 57.47 | 174.63 | 0.36 | 55.87 | 172.59 |
| 46 | bil | 0.27 | 55.30 | 217.07 | 0.27 | 50.20 | 181.10 |
| 47 | te | 0.12 | 53.33 | 179.26 | 0.17 | 55.76 | 188.83 |
| 48 | lur | 0.24 | 59.83 | 177.97 | 0.17 | 64.91 | 182.42 |
| 49 | ang | 0.24 | 57.90 | 168.64 | 0.37 | 58.95 | 159.94 |
| 50 | sa | 0.31 | 57.39 | 210.25 | 0.38 | 57.18 | 219.70 |
| 51 | nya | 0.31 | 61.67 | 184.67 | 0.36 | 63.11 | 183.87 |
| 52 | si | 0.21 | 53.39 | 233.19 | 0.22 | 61.57 | 271.10 |
| 53 | pe | 0.18 | 54.33 | 226.18 | 0.05 | 60.88 | 148.35 |
| 54 | ta | 0.16 | 59.53 | 184.96 | 0.24 | 58.75 | 159.10 |
| 55 | ni | 0.69 | 49.02 | 188.30 | 0.38 | 60.29 | 200.93 |
| 56 | men | 0.20 | 60.48 | 237.31 | 0.32 | 63.37 | 253.58 |
| 57 | da | 0.16 | 63.51 | 205.68 | 0.16 | 63.12 | 207.79 |
| 58 | pa | 0.27 | 55.27 | 182.99 | 0.22 | 56.05 | 182.90 |
| 59 | ti | 0.22 | 53.83 | 185.99 | 0.25 | 58.49 | 217.04 |
| 60 | te | 0.22 | 50.74 | 199.11 | 0.23 | 56.59 | 192.09 |
| 61 | lur | 0.29 | 49.82 | 174.04 | 0.25 | 59.37 | 187.72 |
| 62 | i | 0.20 | 51.72 | 198.75 | 0.24 | 52.23 | 258.46 |
| 63 | tu | 0.26 | 58.93 | 217.51 | 0.31 | 60.38 | 256.32 |
| 64 | ke | 0.11 | 56.14 | 213.62 | 0.08 | 59.02 | 323.36 |
| 65 | li | 0.10 | 63.57 | 190.57 | 0.18 | 58.05 | 182.63 |
| 66 | ha | 0.26 | 60.28 | 189.98 | 0.25 | 53.43 | 291.97 |
| 67 | tan | 0.26 | 53.76 | 175.95 | 0.32 | 51.99 | 137.61 |
| 68 | a | 0.26 | 62.12 | 220.28 | 0.15 | 62.02 | 235.40 |
| 69 | neh | 0.30 | 55.81 | 186.55 | 0.31 | 64.44 | 226.03 |
| 70 | war | 0.28 | 57.25 | 252.10 | 0.20 | 67.31 | 195.53 |
| 71 | na | 0.14 | 62.66 | 196.89 | 0.18 | 63.39 | 205.22 |
| 72 | nya | 0.34 | 57.48 | 237.14 | 0.29 | 60.93 | 292.11 |
| 73 | ku | 0.14 | 64.02 | 187.35 | 0.14 | 62.50 | 199.60 |
| 74 | ning | 0.23 | 61.97 | 206.87 | 0.31 | 61.26 | 201.62 |
| 75 | ke | 0.15 | 53.50 | 185.73 | 0.10 | 58.95 | 192.23 |
| 76 | e | 0.14 | 56.70 | 184.66 | 0.13 | 62.98 | 207.15 |
| 77 | ma | 0.12 | 57.22 | 174.13 | 0.19 | 59.03 | 170.54 |
| 78 | san | 0.75 | 54.39 | 198.13 | 0.35 | 57.03 | 159.38 |
| 79 | dan | 0.36 | 60.02 | 215.38 | 0.26 | 69.34 | 282.77 |
| 80 | be | 0.15 | 62.34 | 185.32 | 0.23 | 66.14 | 230.40 |
| 81 | rat | 0.28 | 53.94 | 174.21 | 0.21 | 60.83 | 172.67 |
| 82 | di | 0.08 | 61.70 | 190.30 | 0.09 | 68.30 | 280.91 |
| 83 | a | 0.12 | 68.28 | 209.78 | 0.06 | 69.85 | 298.11 |
| 84 | me | 0.10 | 67.16 | 215.20 | 0.09 | 70.35 | 272.49 |
| 85 | nyang | 0.34 | 58.57 | 183.53 | 0.44 | 59.94 | 207.09 |
| 86 | ka | 0.50 | 50.60 | 213.89 | 0.37 | 59.44 | 217.43 |
| 87 | ji | 0.26 | 59.89 | 191.20 | 0.24 | 62.74 | 168.67 |
| 88 | ran | 0.24 | 64.33 | 202.67 | 0.26 | 71.19 | 202.80 |
| 89 | nya | 0.20 | 64.20 | 233.77 | 0.29 | 69.75 | 107.30 |
| 90 | cu | 0.25 | 52.75 | 215.50 | 0.31 | 67.47 | x |
| 91 | ba | 0.16 | 56.08 | 187.45 | 0.22 | 62.47 | 226.80 |
| 92 | ber | 0.21 | 52.58 | 367.67 | 0.18 | 58.68 | 204.73 |
| 93 | gu | 0.14 | 54.13 | 188.19 | 0.21 | 55.31 | 282.63 |
| 94 | rau | 0.29 | 58.24 | 187.98 | 0.33 | 61.44 | 186.09 |
| 95 | la | 0.18 | 66.47 | 197.74 | 0.20 | 59.27 | 243.69 |
| 96 | lu | 0.13 | 63.67 | 222.36 | 0.15 | 62.51 | 238.22 |
| 97 | ber | 0.21 | 62.06 | 215.13 | 0.15 | 62.20 | 286.69 |

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|---|---|---|---|---|---|---|---|
| 98 | ca | 0.24 | 58.02 | 184.40 | 0.35 | 61.49 | 285.73 |
| 99 | dang | 0.35 | 56.38 | 157.66 | 0.20 | 62.20 | 264.25 |
| 100 | un | 0.14 | 56.14 | 195.55 | 0.14 | 61.41 | 279.52 |
| 101 | tuk | 0.19 | 55.72 | 223.08 | 0.28 | 63.21 | 283.72 |
| 102 | mem | 0.17 | 52.25 | 281.71 | 0.18 | 62.65 | 204.03 |
| 103 | bu | 0.15 | 48.01 | 180.08 | 0.11 | 58.98 | 194.15 |
| 104 | ang | 0.42 | 55.44 | 198.44 | 0.39 | 58.38 | 223.55 |
| 105 | te | 0.17 | 54.22 | 220.95 | 0.19 | 55.56 | 191.60 |
| 106 | lur | 0.23 | 58.76 | 204.18 | 0.17 | 55.56 | 185.26 |
| 107 | i | 0.22 | 50.86 | 194.47 | 0.20 | 43.45 | x |
| 108 | tu | 0.47 | 45.24 | 341.43 | 0.24 | 50.60 | 145.82 |
| 109 | na | 0.19 | 58.21 | 185.98 | 0.30 | 58.94 | 209.10 |
| 110 | mun | 0.62 | 52.68 | 207.17 | 0.62 | 53.90 | 236.88 |
| 111 | se | 0.17 | 55.26 | 222.24 | 0.15 | 51.39 | 267.13 |
| 112 | le | 0.20 | 56.40 | 204.98 | 0.24 | 58.49 | 232.33 |
| 113 | pas | 0.24 | 62.81 | 241.09 | 0.23 | 59.81 | 245.07 |
| 114 | ber | 0.19 | 60.90 | 130.65 | 0.20 | 65.81 | 261.39 |
| 115 | fi | 0.23 | 48.23 | 165.41 | 0.29 | 55.56 | 241.59 |
| 116 | kir | 0.68 | 52.32 | 244.86 | 0.42 | 59.11 | 219.94 |
| 117 | di | 0.11 | 57.30 | 199.26 | 0.07 | 56.85 | 273.63 |
| 118 | a | 0.23 | 61.96 | 227.16 | 0.11 | 69.68 | 298.76 |
| 119 | mem | 0.18 | 64.58 | 203.50 | 0.18 | 68.25 | 249.53 |
| 120 | ba | 0.13 | 61.39 | 182.47 | 0.15 | 65.44 | 200.28 |
| 121 | wa | 0.15 | 63.15 | 185.98 | 0.25 | 58.85 | 236.77 |
| 122 | te | 0.20 | 56.99 | 184.79 | 0.11 | 56.84 | 200.41 |
| 123 | lur | 0.27 | 56.68 | 178.91 | 0.21 | 61.87 | 194.33 |
| 124 | i | 0.29 | 50.69 | 197.09 | 0.23 | 55.80 | 194.68 |
| 125 | tu | 0.30 | 57.53 | 218.12 | 0.27 | 56.37 | 247.73 |
| 126 | pu | 0.14 | 65.58 | 216.19 | 0.10 | 54.19 | 197.14 |
| 127 | lang | 0.21 | 65.58 | 248.07 | 0.20 | 57.59 | 187.34 |
| 128 | ke | 0.21 | 55.21 | 224.85 | 0.26 | 62.63 | 214.30 |
| 129 | ru | 0.22 | 60.46 | 199.04 | 0.17 | 62.69 | 218.90 |
| 130 | mah | 0.38 | 60.56 | 193.99 | 0.34 | 63.69 | 195.86 |
| 131 | un | 0.19 | 56.55 | 205.80 | 0.37 | 67.36 | 269.08 |
| 132 | tuk | 0.19 | 58.65 | 209.62 | 0.19 | 64.43 | 291.13 |
| 133 | di | 0.28 | 46.32 | 190.66 | 0.17 | 67.23 | 266.86 |
| 134 | pe | 0.09 | 49.76 | 186.04 | 0.16 | 66.78 | 198.06 |
| 135 | rik | 0.19 | 57.89 | 231.65 | 0.22 | 67.21 | 321.16 |
| 136 | sa | 0.34 | 50.57 | 289.36 | 0.38 | 55.79 | 239.23 |
| 137 | si | 0.17 | 57.44 | 249.27 | 0.31 | 52.60 | 198.34 |
| 138 | pe | 0.14 | 54.90 | 241.31 | 0.09 | 59.04 | 202.23 |
| 139 | ta | 0.18 | 60.98 | 194.81 | 0.25 | 60.02 | 193.82 |
| 140 | ni | 0.30 | 58.75 | 189.41 | 0.23 | 62.67 | 211.45 |
| 141 | be | 0.11 | 55.91 | 179.45 | 0.22 | 60.37 | 222.94 |
| 142 | ra | 0.15 | 59.70 | 173.66 | 0.25 | 62.55 | 211.40 |
| 143 | sa | 0.35 | 46.14 | 176.28 | 0.47 | 55.10 | 222.89 |
| 144 | ter | 0.19 | 51.29 | 193.13 | 0.21 | 59.69 | 270.28 |
| 145 | ke | 0.16 | 55.53 | 188.10 | 0.15 | 65.76 | 263.36 |
| 146 | jut | 0.70 | 47.61 | 263.82 | 0.38 | 62.21 | 208.54 |
| 147 | a | 0.19 | 57.29 | 223.64 | 0.18 | 58.17 | 235.86 |
| 148 | pa | 0.15 | 49.04 | 188.28 | 0.08 | 62.94 | 230.81 |
| 149 | bi | 0.10 | 61.24 | 183.76 | 0.22 | 63.93 | 197.99 |
| 150 | la | 0.21 | 61.12 | 189.32 | 0.13 | 64.00 | 199.36 |
| 151 | men | 0.24 | 61.01 | 196.13 | 0.30 | 66.05 | 237.37 |
| 152 | da | 0.18 | 52.72 | 185.08 | 0.23 | 56.32 | 126.09 |
| 153 | pa | 0.25 | 48.64 | 247.45 | 0.25 | 53.61 | 180.17 |
| 154 | ti | 0.30 | 55.73 | 203.47 | 0.26 | 57.26 | 222.52 |
| 155 | i | 0.23 | 52.91 | 166.40 | 0.23 | 47.55 | 222.35 |
| 156 | tu | 0.45 | 51.43 | 234.81 | 0.25 | 57.52 | 219.69 |
| 157 | a | 0.15 | 59.23 | 192.18 | 0.15 | 61.26 | 176.41 |
| 158 | da | 0.12 | 61.26 | 187.38 | 0.17 | 60.68 | 167.77 |
| 159 | lah | 0.32 | 53.22 | 92.28 | 0.21 | 54.85 | 188.58 |
| 160 | te | 0.13 | 60.29 | 223.36 | 0.15 | 56.68 | 179.46 |
| 161 | lur | 0.26 | 58.81 | 189.65 | 0.19 | 58.37 | 95.65 |
| 162 | e | 0.19 | 59.75 | 198.07 | 0.12 | 59.69 | 224.06 |
| 163 | mas | 0.25 | 61.56 | 202.40 | 0.42 | 60.16 | 201.58 |
| 164 | si | 0.52 | 54.58 | 326.38 | 0.23 | 51.42 | 301.09 |
| 165 | pe | 0.08 | 60.05 | 229.49 | 0.10 | 54.87 | 243.66 |

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|---|---|---|---|---|---|---|---|
| 166 | ta | 0.22 | 61.00 | 199.99 | 0.14 | 59.71 | 206.38 |
| 167 | ni | 0.12 | 57.16 | 184.44 | 0.16 | 65.03 | 196.21 |
| 168 | sung | 0.38 | 56.78 | 194.63 | 0.69 | 65.45 | 244.22 |
| 169 | guh | 0.23 | 60.67 | 236.46 | 0.21 | 64.25 | 296.85 |
| 170 | gem | 0.22 | 59.25 | 185.59 | 0.15 | 58.20 | 255.75 |
| 171 | bi | 0.24 | 55.42 | 153.37 | 0.26 | 67.91 | 194.53 |
| 172 | ra | 0.37 | 55.84 | 122.02 | 0.30 | 59.58 | 181.94 |
| 173 | ha | 0.29 | 57.56 | 223.49 | 0.44 | 60.81 | 248.35 |
| 174 | ri | 0.26 | 65.31 | 227.77 | 0.21 | 63.71 | 233.24 |
| 175 | de | 0.13 | 59.94 | 215.03 | 0.13 | 75.09 | 289.98 |
| 176 | mi | 0.15 | 62.53 | 189.91 | 0.15 | 71.47 | 265.50 |
| 177 | ha | 0.34 | 51.85 | 184.99 | 0.22 | 63.85 | 132.03 |
| 178 | ri | 0.21 | 60.63 | 212.62 | 0.17 | 59.71 | 225.66 |
| 179 | se | 0.21 | 53.38 | 220.13 | 0.13 | 54.44 | 244.85 |
| 180 | le | 0.18 | 50.74 | 187.02 | 0.12 | 58.65 | 138.37 |
| 181 | pas | 0.23 | 56.44 | 186.48 | 0.25 | 49.45 | x |
| 182 | i | 0.28 | 49.72 | 197.68 | 0.24 | 42.10 | x |
| 183 | tu | 0.56 | 51.55 | 272.91 | 0.36 | 61.17 | 274.75 |
| 184 | si | 0.49 | 52.55 | 240.90 | 0.31 | 55.48 | 294.98 |
| 185 | ang | 0.26 | 61.88 | 204.53 | 0.46 | 54.30 | 204.96 |
| 186 | sa | 0.33 | 55.27 | 202.33 | 0.29 | 60.32 | 227.45 |
| 187 | te | 0.18 | 57.81 | 231.75 | 0.27 | 65.47 | 251.14 |
| 188 | rus | 0.27 | 57.87 | 267.18 | 0.38 | 57.90 | 275.82 |
| 189 | ber | 0.34 | 52.95 | 197.92 | 0.20 | 58.98 | 226.27 |
| 190 | te | 0.13 | 60.46 | 250.21 | 0.26 | 58.68 | 231.86 |
| 191 | lur | 0.26 | 64.66 | 192.13 | 0.25 | 65.92 | 192.68 |
| 192 | e | 0.17 | 56.51 | 188.75 | 0.17 | 64.95 | 193.87 |
| 193 | mas | 0.41 | 51.56 | 180.78 | 0.30 | 56.21 | 174.56 |
| 194 | si | 0.25 | 53.72 | 240.56 | 0.35 | 58.87 | 462.13 |
| 195 | pe | 0.13 | 59.71 | 223.52 | 0.12 | 72.62 | 323.10 |
| 196 | ta | 0.27 | 60.93 | 195.97 | 0.18 | 61.54 | 267.82 |
| 197 | ni | 0.12 | 65.34 | 196.81 | 0.40 | 65.50 | 197.83 |
| 198 | mu | 0.12 | 64.28 | 204.84 | 0.11 | 67.18 | 211.99 |
| 199 | la | 0.24 | 67.29 | 236.08 | 0.22 | 68.15 | 238.60 |
| 200 | men | 0.18 | 66.25 | 233.59 | 0.11 | 71.35 | 291.68 |
| 201 | ja | 0.17 | 61.43 | 196.20 | 0.18 | 65.41 | 221.04 |
| 202 | di | 0.13 | 58.70 | 187.27 | 0.20 | 57.64 | 189.24 |
| 203 | ta | 0.24 | 59.25 | 164.29 | 0.18 | 58.09 | 172.01 |
| 204 | mak | 0.26 | 57.95 | 207.69 | 0.28 | 56.26 | 168.43 |
| 205 | si | 0.22 | 49.06 | 266.51 | 0.38 | 58.45 | 172.15 |
| 206 | pe | 0.14 | 55.18 | 190.65 | 0.11 | 62.72 | 213.33 |
| 207 | ta | 0.19 | 60.46 | 182.11 | 0.18 | 64.79 | 232.14 |
| 208 | ni | 0.17 | 62.47 | 215.90 | 0.13 | 61.45 | 228.70 |
| 209 | me | 0.12 | 63.15 | 222.01 | 0.15 | 64.40 | 152.29 |
| 210 | ngam | 0.19 | 60.07 | 185.89 | 0.17 | 61.82 | 229.88 |
| 211 | bil | 0.25 | 57.47 | 178.66 | 0.14 | 63.63 | 193.18 |
| 212 | pi | 0.19 | 50.91 | 88.97 | 0.26 | 59.22 | 216.63 |
| 213 | sau | 0.58 | 58.02 | 216.57 | 0.58 | 60.79 | 240.51 |
| 214 | dan | 0.23 | 58.79 | 222.44 | 0.15 | 65.63 | 324.69 |
| 215 | me | 0.08 | 65.06 | 208.96 | 0.13 | 73.94 | 285.54 |
| 216 | nyem | 0.25 | 61.33 | 183.64 | 0.24 | 67.42 | 219.69 |
| 217 | be | 0.12 | 59.78 | 178.95 | 0.14 | 69.02 | 196.77 |
| 218 | lih | 0.36 | 54.77 | 210.11 | 0.11 | 68.51 | 248.33 |
| 219 | ang | 0.23 | 59.35 | 170.48 | 0.36 | 67.98 | 212.53 |
| 220 | sa | 0.66 | 54.06 | 210.43 | 0.27 | 58.11 | 228.37 |
| 221 | ber | 0.16 | 60.38 | 199.31 | 0.14 | 63.19 | 196.33 |
| 222 | tu | 0.13 | 53.15 | 193.52 | 0.10 | 59.49 | 277.95 |
| 223 | ah | 0.34 | 57.29 | 209.22 | 0.15 | 62.63 | 240.84 |
| 224 | nya | 0.26 | 60.22 | 183.05 | 0.37 | 65.16 | 253.49 |
| 225 | a | 0.18 | 51.39 | 202.33 | 0.42 | 57.44 | 268.15 |
| 226 | pa | 0.07 | 51.44 | 192.21 | 0.20 | 64.14 | 209.76 |
| 227 | bi | 0.15 | 61.43 | 193.63 | 0.10 | 61.72 | 201.51 |
| 228 | la | 0.17 | 65.38 | 219.68 | 0.13 | 60.97 | 171.38 |
| 229 | men | 0.08 | 66.95 | 252.59 | 0.11 | 66.74 | 231.87 |
| 230 | da | 0.12 | 64.26 | 209.20 | 0.23 | 62.66 | 232.91 |
| 231 | pa | 0.31 | 54.63 | 183.18 | 0.21 | 63.15 | 131.70 |
| 232 | ti | 0.64 | 54.00 | 264.60 | 0.47 | 62.31 | 195.38 |
| 233 | ti | 0.11 | 56.17 | 196.03 | 0.04 | 59.40 | 380.98 |

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|---|---|---|---|---|---|---|---|
| 234 | a | 0.12 | 64.01 | 188.71 | 0.13 | 66.86 | 203.43 |
| 235 | da | 0.10 | 62.82 | 210.79 | 0.21 | 67.52 | 192.51 |
| 236 | se | 0.23 | 59.17 | 211.61 | 0.23 | 65.10 | 194.95 |
| 237 | bi | 0.19 | 58.91 | 195.93 | 0.23 | 66.23 | 192.93 |
| 238 | ji | 0.34 | 53.18 | 213.43 | 0.33 | 62.84 | 260.42 |
| 239 | pun | 0.37 | 59.36 | 209.52 | 0.28 | 60.03 | 244.84 |
| 240 | te | 0.13 | 62.57 | 192.17 | 0.15 | 59.24 | 206.58 |
| 241 | lur | 0.21 | 66.54 | 194.73 | 0.17 | 62.07 | 193.85 |
| 242 | e | 0.16 | 60.76 | 194.54 | 0.20 | 63.29 | 198.59 |
| 243 | mas | 0.28 | 60.80 | 191.75 | 0.22 | 61.55 | 195.07 |
| 244 | di | 0.18 | 57.32 | 189.87 | 0.23 | 59.49 | 188.04 |
| 245 | da | 0.09 | 57.72 | 181.23 | 0.16 | 65.70 | 167.53 |
| 246 | lam | 0.25 | 54.94 | 184.17 | 0.33 | 56.39 | 138.25 |
| 247 | pe | 0.14 | 56.91 | 190.12 | 0.08 | 60.40 | 200.35 |
| 248 | rut | 0.22 | 59.36 | 247.82 | 0.21 | 60.05 | 191.60 |
| 249 | ang | 0.24 | 52.17 | 205.98 | 0.27 | 58.34 | 179.88 |
| 250 | sa | 0.31 | 56.16 | 264.10 | 0.21 | 56.40 | 201.88 |
| 251 | i | 0.21 | 52.19 | 274.70 | 0.20 | 50.80 | 97.70 |
| 252 | tu | 0.37 | 60.25 | 243.63 | 0.29 | 59.85 | 250.96 |
| 253 | si | 0.40 | 56.74 | 242.23 | 0.20 | 64.39 | 281.51 |
| 254 | pe | 0.15 | 61.09 | 196.28 | 0.31 | 66.38 | 203.10 |
| 255 | ta | 0.08 | 65.48 | 190.34 | 0.19 | 57.27 | 238.33 |
| 256 | ni | 0.12 | 68.02 | 191.08 | 0.23 | 54.02 | 369.51 |
| 257 | mu | 0.10 | 67.83 | 189.30 | 0.33 | 62.49 | 226.65 |
| 258 | la | 0.20 | 64.10 | 196.23 | 0.25 | 60.95 | 230.03 |
| 259 | me | 0.19 | 63.25 | 226.13 | 0.15 | 61.65 | 220.90 |
| 260 | nye | 0.12 | 66.88 | 194.13 | 0.17 | 58.63 | 192.24 |
| 261 | da | 0.22 | 61.61 | 185.53 | 0.25 | 56.34 | 184.99 |
| 262 | ri | 0.20 | 59.03 | 187.13 | 0.26 | 56.49 | 233.08 |
| 263 | ke | 0.15 | 57.85 | 183.93 | 0.15 | 57.72 | 221.88 |
| 264 | si | 0.16 | 51.70 | 172.20 | 0.14 | 51.41 | 222.90 |
| 265 | la | 0.22 | 53.60 | 170.13 | 0.20 | 50.15 | x |
| 266 | pan | 0.11 | 60.54 | 209.56 | 0.18 | 55.38 | 180.54 |
| 267 | nya | 0.29 | 59.88 | 187.82 | 0.30 | 50.32 | 184.53 |
| 268 | dan | 0.27 | 59.31 | 221.80 | 0.29 | 56.41 | 188.71 |
| 269 | be | 0.10 | 58.59 | 196.82 | 0.12 | 57.86 | 184.96 |
| 270 | ra | 0.18 | 58.27 | 181.38 | 0.21 | 58.54 | 183.99 |
| 271 | sa | 0.23 | 53.45 | 101.87 | 0.24 | 55.40 | 242.40 |
| 272 | sa | 0.25 | 51.12 | 167.40 | 0.36 | 57.76 | 197.78 |
| 273 | ngat | 0.30 | 52.77 | 189.29 | 0.39 | 57.77 | 210.72 |
| 274 | me | 0.13 | 54.32 | 181.39 | 0.19 | 61.14 | 191.51 |
| 275 | nye | 0.14 | 59.81 | 170.25 | 0.20 | 57.74 | 179.63 |
| 276 | sal | 0.20 | 53.33 | 170.40 | 0.52 | 54.06 | 174.28 |
| 277 | su | 0.14 | 61.42 | 468.95 | 0.17 | 58.69 | 323.48 |
| 278 | a | 0.15 | 61.00 | 199.60 | 0.18 | 53.85 | 167.01 |
| 279 | tu | 0.21 | 59.25 | 265.06 | 0.12 | 63.64 | 263.55 |
| 280 | ha | 0.19 | 64.45 | 207.94 | 0.25 | 65.86 | 246.54 |
| 281 | ri | 0.28 | 59.63 | 211.00 | 0.34 | 59.78 | 222.48 |
| 282 | se | 0.16 | 49.31 | x | 0.22 | 50.98 | 201.45 |
| 283 | e | 0.23 | 62.50 | 197.82 | 0.28 | 52.54 | 181.76 |
| 284 | kor | 0.19 | 57.24 | 239.06 | 0.19 | 60.97 | 259.92 |
| 285 | an | 0.21 | 61.88 | 245.10 | 0.16 | 62.12 | 212.49 |
| 286 | jing | 0.35 | 62.36 | 199.88 | 0.47 | 57.60 | 200.50 |
| 287 | ter | 0.20 | 59.47 | 198.97 | 0.19 | 49.86 | 159.03 |
| 288 | jum | 0.23 | 62.77 | 212.51 | 0.33 | 52.17 | 187.34 |
| 289 | pa | 0.28 | 57.64 | 213.87 | 0.18 | 52.84 | 218.84 |
| 290 | se | 0.14 | 53.91 | 191.80 | 0.18 | 53.18 | 282.59 |
| 291 | ke | 0.13 | 54.58 | 203.22 | 0.19 | 58.02 | 192.54 |
| 292 | tul | 0.31 | 54.84 | 192.63 | 0.30 | 58.92 | 187.30 |
| 293 | da | 0.21 | 60.36 | 211.22 | 0.20 | 61.82 | 230.61 |
| 294 | ging | 0.32 | 61.86 | 199.99 | 0.71 | 61.32 | 216.98 |
| 295 | di | 0.13 | 57.54 | 204.21 | 0.10 | 58.56 | 258.60 |
| 296 | a | 0.13 | 64.90 | 238.97 | 0.09 | 68.81 | 286.13 |
| 297 | meng | 0.29 | 65.36 | 223.42 | 0.20 | 68.69 | 246.47 |
| 298 | gong | 0.27 | 63.01 | 194.80 | 0.31 | 58.85 | 190.39 |
| 299 | gong | 0.27 | 62.64 | 208.24 | 0.25 | 58.22 | 216.92 |
| 300 | da | 0.21 | 60.31 | 187.02 | 0.28 | 59.17 | 203.08 |
| 301 | ging | 0.18 | 54.31 | 188.36 | 0.27 | 59.15 | 322.11 |

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|---|---|---|---|---|---|---|---|
| 302 | i | 0.28 | 54.98 | 196.56 | 0.26 | 57.98 | 95.30 |
| 303 | tu | 0.42 | 57.23 | 227.08 | 0.31 | 61.18 | 249.16 |
| 304 | di | 0.18 | 59.40 | 222.35 | 0.10 | 59.03 | 216.44 |
| 305 | mu | 0.18 | 69.78 | 202.68 | 0.25 | 59.92 | 180.00 |
| 306 | lut | 0.22 | 62.54 | 204.05 | 0.31 | 60.78 | 210.24 |
| 307 | un | 0.21 | 58.52 | 201.29 | 0.16 | 60.93 | 250.12 |
| 308 | tuk | 0.24 | 61.44 | 235.13 | 0.20 | 66.93 | 262.67 |
| 309 | me | 0.20 | 64.64 | 193.75 | 0.15 | 64.63 | 220.90 |
| 310 | ma | 0.20 | 57.22 | 180.16 | 0.28 | 57.94 | 179.38 |
| 311 | kan | 0.26 | 60.56 | 219.41 | 0.30 | 57.64 | 233.29 |
| 312 | nya | 0.30 | 64.48 | 181.64 | 0.25 | 60.04 | 227.88 |
| 313 | di | 0.20 | 56.64 | 189.61 | 0.14 | 59.98 | 166.45 |
| 314 | tem | 0.18 | 57.32 | 189.83 | 0.26 | 53.25 | 113.10 |
| 315 | pat | 0.23 | 56.58 | 199.75 | 0.17 | 54.77 | x |
| 316 | yang | 0.20 | 57.75 | 192.01 | 0.24 | 50.77 | 255.65 |
| 317 | se | 0.14 | 59.36 | 187.04 | 0.16 | 58.94 | 197.83 |
| 318 | la | 0.11 | 68.21 | 198.63 | 0.19 | 62.30 | 239.51 |
| 319 | mat | 0.25 | 58.12 | 198.51 | 0.44 | 59.66 | 266.94 |
| 320 | da | 0.15 | 62.62 | 193.49 | 0.13 | 55.57 | 176.66 |
| 321 | lam | 0.24 | 61.50 | 222.17 | 0.27 | 58.31 | 201.53 |
| 322 | per | 0.13 | 63.05 | 239.40 | 0.13 | 65.00 | 255.02 |
| 323 | ja | 0.22 | 61.45 | 206.40 | 0.22 | 59.18 | 197.18 |
| 324 | la | 0.12 | 63.48 | 169.07 | 0.22 | 57.55 | 156.63 |
| 325 | nan | 0.34 | 59.08 | 185.07 | 0.48 | 55.41 | 197.21 |
| 326 | di | 0.09 | 56.14 | 200.93 | 0.13 | 49.59 | 198.97 |
| 327 | a | 0.21 | 65.08 | 246.73 | 0.11 | 64.91 | 193.56 |
| 328 | la | 0.14 | 64.57 | 211.54 | 0.35 | 62.40 | 185.79 |
| 329 | lu | 0.27 | 61.95 | 204.34 | 0.23 | 62.87 | 286.84 |
| 330 | di | 0.21 | 57.38 | 190.08 | 0.13 | 61.14 | 258.51 |
| 331 | te | 0.21 | 52.92 | 307.43 | 0.23 | 55.01 | 175.23 |
| 332 | pi | 0.22 | 60.50 | 194.98 | 0.23 | 60.44 | 97.31 |
| 333 | a | 0.19 | 60.21 | 457.43 | 0.12 | 56.48 | 140.37 |
| 334 | nak | 0.18 | 63.34 | 224.50 | 0.18 | 54.73 | 176.14 |
| 335 | su | 0.23 | 62.20 | 349.44 | 0.15 | 52.00 | x |
| 336 | ngai | 0.42 | 58.56 | 165.80 | 0.38 | 59.48 | 209.65 |
| 337 | se | 0.21 | 52.52 | 325.74 | 0.17 | 48.16 | 195.55 |
| 338 | ma | 0.11 | 64.13 | 188.61 | 0.20 | 61.52 | 178.82 |
| 339 | sa | 0.21 | 55.97 | 214.85 | 0.22 | 53.81 | 216.89 |
| 340 | ber | 0.22 | 64.08 | 281.83 | 0.17 | 66.31 | 245.04 |
| 341 | ja | 0.24 | 58.24 | 204.92 | 0.24 | 60.28 | 194.34 |
| 342 | lan | 0.49 | 57.29 | 189.96 | 0.75 | 56.55 | 186.94 |
| 343 | an | 0.26 | 59.71 | 198.88 | 0.23 | 63.77 | 199.44 |
| 344 | jing | 0.29 | 62.60 | 251.78 | 0.30 | 58.63 | 210.48 |
| 345 | i | 0.24 | 55.18 | 186.88 | 0.26 | 58.00 | 155.90 |
| 346 | tu | 0.27 | 65.49 | 237.37 | 0.21 | 60.50 | 145.98 |
| 347 | me | 0.18 | 59.56 | 182.32 | 0.15 | 60.05 | 182.34 |
| 348 | li | 0.13 | 58.26 | 186.80 | 0.15 | 61.03 | 167.84 |
| 349 | hat | 0.18 | 57.18 | 204.04 | 0.24 | 53.85 | x |
| 350 | ke | 0.17 | 56.35 | 194.77 | 0.18 | 53.64 | 135.37 |
| 351 | da | 0.18 | 56.78 | 188.48 | 0.11 | 56.22 | 183.84 |
| 352 | lam | 0.25 | 52.20 | 212.56 | 0.34 | 48.87 | 172.39 |
| 353 | a | 0.18 | 60.64 | 209.44 | 0.17 | 63.77 | 253.86 |
| 354 | ir | 0.24 | 61.70 | 204.51 | 0.47 | 64.32 | 232.70 |
| 355 | a | 0.19 | 64.49 | 220.33 | 0.15 | 59.03 | 246.64 |
| 356 | da | 0.18 | 69.80 | 274.04 | 0.17 | 65.72 | 256.28 |
| 357 | se | 0.16 | 63.03 | 398.38 | 0.26 | 62.25 | 329.06 |
| 358 | e | 0.22 | 61.51 | 208.70 | 0.36 | 60.39 | 248.43 |
| 359 | kor | 0.17 | 63.50 | 218.77 | 0.22 | 59.54 | 230.17 |
| 360 | an | 0.19 | 66.89 | 219.20 | 0.21 | 61.87 | 157.45 |
| 361 | jing | 0.25 | 59.32 | 176.87 | 0.14 | 55.71 | 197.71 |
| 362 | la | 0.21 | 64.15 | 208.56 | 0.36 | 56.82 | 164.64 |
| 363 | in | 0.37 | 63.62 | 198.33 | 0.53 | 51.78 | 223.60 |
| 364 | de | 0.13 | 60.02 | 193.43 | 0.18 | 54.41 | 199.37 |
| 365 | ngan | 0.25 | 65.80 | 190.74 | 0.29 | 65.99 | 155.09 |
| 366 | da | 0.21 | 61.90 | 195.50 | 0.33 | 57.22 | 177.29 |
| 367 | ging | 0.32 | 61.93 | 228.37 | 0.31 | 62.12 | 237.23 |
| 368 | di | 0.12 | 63.80 | 212.41 | 0.14 | 60.08 | 230.22 |
| 369 | mu | 0.19 | 65.38 | 193.72 | 0.20 | 63.67 | 197.70 |

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|---|---|---|---|---|---|---|---|
| 370 | lut | 0.21 | 64.71 | 219.70 | 0.21 | 58.81 | 136.33 |
| 371 | nya | 0.34 | 61.57 | 207.06 | 0.35 | 62.60 | 213.70 |
| 372 | di | 0.12 | 57.71 | 199.57 | 0.16 | 58.37 | 201.68 |
| 373 | da | 0.13 | 60.16 | 189.83 | 0.13 | 57.09 | 171.25 |
| 374 | lam | 0.25 | 56.95 | 261.43 | 0.25 | 53.39 | 139.33 |
| 375 | a | 0.20 | 65.37 | 207.59 | 0.13 | 50.52 | x |
| 376 | ir | 0.20 | 62.85 | 204.03 | 0.39 | 47.48 | 182.48 |
| 377 | i | 0.27 | 61.81 | 224.47 | 0.21 | 55.36 | 258.51 |
| 378 | tu | 0.29 | 56.82 | 228.94 | 0.34 | 61.75 | 287.10 |
| 379 | di | 0.15 | 61.12 | 234.16 | 0.12 | 53.06 | 107.18 |
| 380 | a | 0.17 | 64.39 | 217.82 | 0.23 | 61.53 | 318.34 |
| 381 | ti | 0.17 | 61.39 | 225.80 | 0.13 | 59.02 | 185.37 |
| 382 | dak | 0.28 | 60.71 | 192.93 | 0.25 | 60.47 | 155.73 |
| 383 | ta | 0.21 | 64.13 | 192.79 | 0.27 | 55.56 | 166.21 |
| 384 | hu | 0.68 | 60.95 | 234.74 | 0.57 | 56.73 | 198.54 |
| 385 | i | 0.20 | 59.75 | 220.87 | 0.30 | 48.65 | 364.02 |
| 386 | tu | 0.23 | 62.39 | 246.65 | 0.28 | 58.85 | 245.84 |
| 387 | i | 0.12 | 60.94 | 221.72 | 0.06 | 60.90 | 410.70 |
| 388 | a | 0.14 | 67.65 | 194.83 | 0.14 | 60.76 | 186.53 |
| 389 | lah | 0.27 | 65.17 | 195.98 | 0.26 | 60.55 | 199.76 |
| 390 | ba | 0.16 | 63.79 | 189.87 | 0.10 | 56.50 | 185.70 |
| 391 | yang | 0.19 | 62.72 | 199.60 | 0.21 | 59.05 | 162.25 |
| 392 | ba | 0.25 | 63.95 | 193.64 | 0.13 | 58.03 | 149.70 |
| 393 | yang | 0.20 | 57.29 | 187.15 | 0.30 | 60.60 | 170.86 |
| 394 | nya | 0.24 | 59.52 | 199.68 | 0.15 | 54.89 | 176.98 |
| 395 | sen | 0.25 | 56.68 | 196.18 | 0.21 | 52.70 | 216.18 |
| 396 | di | 0.24 | 64.01 | 202.27 | 0.20 | 66.89 | 257.19 |
| 397 | ri | 0.38 | 58.38 | 250.72 | 0.34 | 65.24 | 273.94 |
| 398 | di | 0.21 | 62.09 | 251.60 | 0.07 | 57.67 | 257.50 |
| 399 | a | 0.22 | 70.17 | 261.41 | 0.07 | 71.97 | 269.94 |
| 400 | ma | 0.23 | 60.84 | 221.60 | 0.26 | 67.25 | 227.33 |
| 401 | hu | 0.13 | 64.69 | 227.38 | 0.22 | 60.92 | 222.88 |
| 402 | men | 0.22 | 65.13 | 198.95 | 0.14 | 59.98 | 215.97 |
| 403 | da | 0.17 | 54.66 | 184.06 | 0.24 | 52.09 | 168.32 |
| 404 | pat | 0.31 | 56.58 | 200.29 | 0.28 | 56.22 | 396.70 |
| 405 | kan | 0.28 | 60.41 | 198.22 | 0.25 | 62.62 | 228.73 |
| 406 | da | 0.15 | 59.72 | 186.78 | 0.21 | 56.66 | 240.58 |
| 407 | ging | 0.32 | 54.55 | 254.79 | 0.39 | 52.08 | 257.79 |
| 408 | i | 0.25 | 59.94 | 396.29 | 0.20 | 51.77 | 194.81 |
| 409 | tu | 0.19 | 62.16 | 204.98 | 0.29 | 64.05 | 244.50 |
| 410 | di | 0.11 | 68.05 | 220.32 | 0.06 | 64.04 | 197.90 |
| 411 | a | 0.23 | 62.16 | 222.66 | 0.14 | 61.33 | 193.89 |
| 412 | pun | 0.18 | 63.96 | 275.01 | 0.17 | 63.97 | 280.98 |
| 413 | me | 0.20 | 67.85 | 270.86 | 0.14 | 69.61 | 311.75 |
| 414 | nya | 0.29 | 67.54 | 196.79 | 0.23 | 68.66 | 216.32 |
| 415 | lak | 0.31 | 61.75 | 204.02 | 0.54 | 61.37 | 337.43 |
| 416 | ke | 0.21 | 64.90 | 465.80 | 0.07 | 55.64 | 169.58 |
| 417 | pa | 0.14 | 60.52 | 197.45 | 0.08 | 57.51 | 170.66 |
| 418 | da | 0.18 | 58.90 | 193.66 | 0.08 | 57.58 | 177.70 |
| 419 | an | 0.28 | 62.46 | 210.16 | 0.43 | 53.19 | 240.12 |
| 420 | jing | 0.30 | 66.58 | 252.72 | 0.38 | 62.03 | 256.78 |
| 421 | di | 0.18 | 65.88 | 235.44 | 0.14 | 59.51 | 212.49 |
| 422 | da | 0.12 | 68.89 | 198.80 | 0.10 | 58.12 | 185.22 |
| 423 | lam | 0.30 | 65.60 | 194.22 | 0.30 | 52.19 | 198.35 |
| 424 | a | 0.18 | 67.49 | 220.54 | 0.19 | 57.18 | 184.58 |
| 425 | ir | 0.29 | 64.25 | 137.29 | 0.36 | 57.69 | 143.23 |
| 426 | se | 0.20 | 60.30 | 344.90 | 0.25 | 53.61 | 372.58 |
| 427 | ba | 0.14 | 63.14 | 214.15 | 0.13 | 56.84 | 173.60 |
| 428 | ik | 0.14 | 63.93 | 262.28 | 0.17 | 66.83 | 236.44 |
| 429 | sa | 0.20 | 67.16 | 324.26 | 0.23 | 63.58 | 279.13 |
| 430 | ja | 0.64 | 65.87 | 220.26 | 0.58 | 58.28 | 261.66 |
| 431 | di | 0.08 | 64.77 | 193.15 | 0.11 | 53.08 | 276.60 |
| 432 | a | 0.12 | 66.57 | 193.69 | 0.11 | 55.74 | 177.15 |
| 433 | mem | 0.27 | 64.45 | 197.84 | 0.18 | 54.22 | 174.73 |
| 434 | bu | 0.18 | 54.52 | 190.93 | 0.23 | 50.51 | 175.36 |
| 435 | ka | 0.19 | 55.60 | 184.84 | 0.07 | 54.91 | 285.23 |
| 436 | mu | 0.17 | 58.70 | 173.75 | 0.28 | 60.53 | 234.07 |
| 437 | lut | 0.38 | 62.18 | 200.68 | 0.25 | 60.58 | 207.65 |

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|---|---|---|---|---|---|---|---|
| 438 | da | 0.32 | 61.01 | 198.62 | 0.22 | 53.34 | 183.29 |
| 439 | ging | 0.30 | 64.77 | 217.06 | 0.31 | 51.91 | 185.46 |
| 440 | di | 0.18 | 65.68 | 217.87 | 0.14 | 51.68 | 185.35 |
| 441 | mu | 0.19 | 66.74 | 189.37 | 0.16 | 63.04 | 178.09 |
| 442 | lut | 0.20 | 60.85 | 214.74 | 0.22 | 61.13 | 219.50 |
| 443 | nya | 0.35 | 61.62 | 218.39 | 0.25 | 56.04 | 192.55 |
| 444 | ter | 0.18 | 58.78 | 187.05 | 0.25 | 55.15 | 97.33 |
| 445 | ja | 0.31 | 59.59 | 264.23 | 0.39 | 49.31 | 157.50 |
| 446 | tuh | 0.33 | 66.53 | 271.83 | 0.48 | 54.26 | 247.96 |
| 447 | ke | 0.16 | 62.72 | 312.88 | 0.24 | 58.48 | 239.76 |
| 448 | da | 0.13 | 64.67 | 203.37 | 0.11 | 62.16 | 203.50 |
| 449 | lam | 0.16 | 56.31 | 180.20 | 0.19 | 60.08 | 172.24 |
| 450 | a | 0.15 | 62.45 | 193.67 | 0.27 | 57.30 | 327.05 |
| 451 | ir | 0.29 | 56.99 | 178.08 | 0.50 | 59.04 | 294.94 |
| 452 | se | 0.21 | 50.48 | 166.08 | 0.20 | 55.39 | 295.02 |
| 453 | e | 0.27 | 53.41 | 267.53 | 0.24 | 59.50 | 195.91 |
| 454 | kor | 0.17 | 63.66 | 273.00 | 0.22 | 50.71 | 215.02 |
| 455 | se | 0.20 | 58.26 | 239.75 | 0.26 | 58.00 | 217.78 |
| 456 | mut | 0.34 | 61.59 | 105.76 | 0.56 | 57.22 | 204.82 |
| 457 | yang | 0.27 | 59.31 | 196.38 | 0.43 | 56.90 | 225.74 |
| 458 | ke | 0.28 | 61.17 | 200.50 | 0.18 | 51.21 | 183.55 |
| 459 | hau | 0.26 | 60.25 | 210.02 | 0.36 | 55.76 | 175.96 |
| 460 | san | 0.42 | 59.65 | 274.24 | 0.45 | 52.15 | 194.70 |
| 461 | i | 0.17 | 60.52 | 204.38 | 0.20 | 59.12 | 207.15 |
| 462 | ngin | 0.25 | 64.21 | 206.17 | 0.28 | 66.69 | 212.58 |
| 463 | me | 0.28 | 57.49 | 187.26 | 0.18 | 58.99 | 193.62 |
| 464 | mi | 0.14 | 62.54 | 206.57 | 0.18 | 46.02 | 180.90 |
| 465 | num | 0.26 | 61.23 | 216.44 | 0.25 | 41.61 | x |
| 466 | a | 0.24 | 59.31 | 208.33 | 0.25 | 49.62 | 167.83 |
| 467 | ir | 0.24 | 61.16 | 197.95 | 0.36 | 49.32 | 238.70 |
| 468 | da | 0.17 | 55.94 | 190.14 | 0.25 | 63.01 | 194.07 |
| 469 | ri | 0.25 | 46.53 | 184.58 | 0.18 | 55.19 | 209.87 |
| 470 | a | 0.16 | 54.47 | 202.16 | 0.15 | 52.14 | 188.58 |
| 471 | ir | 0.22 | 59.54 | 222.78 | 0.24 | 59.92 | 192.77 |
| 472 | ter | 0.23 | 48.41 | 203.34 | 0.34 | 54.96 | 197.28 |
| 473 | jun | 0.19 | 56.37 | 200.85 | 0.23 | 66.55 | 248.98 |
| 474 | yang | 0.39 | 60.30 | 188.47 | 0.18 | 65.80 | 199.26 |
| 475 | ber | 0.15 | 54.22 | 179.21 | 0.15 | 57.61 | 190.26 |
| 476 | ham | 0.39 | 45.40 | 181.26 | 0.20 | 55.27 | 184.61 |
| 477 | pi | 0.21 | 61.42 | 213.24 | 0.21 | 52.34 | 173.34 |
| 478 | ran | 0.22 | 53.61 | 177.95 | 0.27 | 49.35 | 170.56 |
| 479 | na | 0.22 | 58.01 | 186.71 | 0.24 | 62.21 | 196.55 |
| 480 | mun | 0.46 | 57.73 | 204.32 | 0.45 | 61.69 | 191.03 |
| 481 | na | 0.22 | 59.12 | 206.21 | 0.24 | 54.59 | 201.82 |
| 482 | sib | 0.24 | 56.08 | 238.63 | 0.25 | 51.77 | 243.40 |
| 483 | nya | 0.26 | 64.41 | 243.68 | 0.20 | 60.72 | 235.59 |
| 484 | ma | 0.19 | 64.89 | 192.43 | 0.24 | 62.22 | 203.38 |
| 485 | lang | 0.33 | 59.93 | 192.68 | 0.50 | 61.95 | 201.02 |
| 486 | a | 0.21 | 56.24 | 213.90 | 0.22 | 57.46 | 230.05 |
| 487 | pa | 0.12 | 59.40 | 212.33 | 0.12 | 60.55 | 230.55 |
| 488 | bi | 0.13 | 65.28 | 210.46 | 0.17 | 63.62 | 196.93 |
| 489 | la | 0.21 | 59.77 | 219.59 | 0.24 | 62.20 | 202.32 |
| 490 | ka | 0.18 | 59.38 | 198.35 | 0.28 | 57.15 | 232.54 |
| 491 | ki | 0.16 | 56.06 | 215.36 | 0.21 | 58.80 | 216.22 |
| 492 | nya | 0.23 | 62.03 | 231.98 | 0.25 | 57.68 | 244.63 |
| 493 | ter | 0.21 | 59.18 | 210.90 | 0.21 | 57.65 | 208.40 |
| 494 | ge | 0.19 | 56.22 | 194.18 | 0.21 | 54.84 | 190.97 |
| 495 | lin | 0.24 | 63.85 | 210.34 | 0.25 | 56.57 | 175.67 |
| 496 | cir | 0.29 | 58.80 | 195.80 | 0.40 | 58.22 | 196.92 |
| 497 | dan | 0.36 | 58.55 | 179.89 | 0.26 | 60.39 | 226.46 |
| 498 | ter | 0.17 | 61.17 | 115.74 | 0.17 | 64.82 | 213.45 |
| 499 | ja | 0.37 | 57.97 | 174.41 | 0.36 | 55.36 | 188.65 |
| 500 | tuh | 0.25 | 64.19 | 236.96 | 0.27 | 55.30 | 240.28 |
| 501 | di | 0.19 | 60.67 | 160.35 | 0.20 | 59.00 | 185.75 |
| 502 | da | 0.14 | 64.50 | 158.02 | 0.11 | 62.02 | 187.58 |
| 503 | lam | 0.18 | 61.73 | 175.58 | 0.34 | 56.63 | 193.28 |
| 504 | a | 0.21 | 58.42 | 214.88 | 0.18 | 62.72 | 190.16 |
| 505 | ir | 0.87 | 59.42 | 184.50 | 0.29 | 59.04 | 207.52 |

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|---|---|---|---|---|---|---|---|
| 506 | ter | 0.24 | 59.98 | 196.61 | 0.35 | 61.96 | 321.30 |
| 507 | jun | 0.48 | 58.29 | 200.21 | 0.28 | 61.82 | 250.80 |
| 508 | yang | 0.42 | 60.77 | 207.43 | 0.36 | 62.99 | 222.19 |
| 509 | de | 0.18 | 63.98 | 190.31 | 0.11 | 57.29 | 177.63 |
| 510 | ras | 0.41 | 54.82 | 132.24 | 0.45 | 59.63 | 276.15 |
| 511 | a | 0.11 | 58.02 | x | 0.08 | 59.64 | 201.40 |
| 512 | pa | 0.16 | 62.01 | 205.27 | 0.20 | 53.50 | 197.25 |
| 513 | bi | 0.10 | 68.12 | 214.54 | 0.15 | 61.49 | 187.09 |
| 514 | la | 0.28 | 67.13 | 249.02 | 0.23 | 63.91 | 209.32 |
| 515 | di | 0.07 | 63.44 | 219.50 | 0.08 | 60.59 | 215.83 |
| 516 | a | 0.26 | 58.20 | 211.69 | 0.13 | 61.83 | 208.63 |
| 517 | ham | 0.29 | 61.94 | 198.28 | 0.38 | 57.03 | 189.00 |
| 518 | pir | 0.23 | 64.91 | 120.66 | 0.16 | 59.01 | 190.58 |
| 519 | ham | 0.25 | 60.37 | 181.37 | 0.49 | 46.77 | 184.20 |
| 520 | pir | 0.22 | 61.15 | 194.72 | 0.51 | 56.56 | 195.01 |
| 521 | le | 0.22 | 58.66 | 181.33 | 0.17 | 61.53 | 224.36 |
| 522 | mas | 0.38 | 53.98 | 138.94 | 0.86 | 54.71 | 258.30 |
| 523 | se | 0.21 | 52.18 | 215.50 | 0.17 | 52.35 | 251.38 |
| 524 | e | 0.29 | 60.03 | 159.42 | 0.31 | 59.35 | 242.23 |
| 525 | kor | 0.27 | 64.17 | 258.01 | 0.15 | 60.90 | 224.47 |
| 526 | mer | 0.35 | 60.59 | 145.39 | 0.39 | 60.32 | 202.34 |
| 527 | pa | 0.31 | 59.16 | 116.29 | 0.32 | 49.35 | 214.91 |
| 528 | ti | 0.44 | 62.32 | 112.98 | 0.20 | 62.74 | 234.53 |
| 529 | yang | 0.34 | 62.93 | 176.32 | 0.19 | 62.63 | 200.38 |
| 530 | ber | 0.28 | 54.54 | 197.74 | 0.23 | 57.00 | 186.84 |
| 531 | teng | 0.31 | 63.30 | 208.50 | 0.29 | 56.14 | 177.54 |
| 532 | gek | 0.34 | 55.16 | 335.25 | 0.28 | 59.09 | 212.64 |
| 533 | ti | 0.14 | 56.14 | 241.18 | 0.15 | 62.97 | 222.53 |
| 534 | dak | 0.21 | 59.06 | 215.23 | 0.20 | 62.13 | 165.10 |
| 535 | ja | 0.20 | 58.46 | 212.27 | 0.19 | 64.37 | 398.12 |
| 536 | uh | 0.25 | 67.02 | 211.64 | 0.29 | 65.05 | 245.84 |
| 537 | da | 0.14 | 63.42 | 200.85 | 0.12 | 64.85 | 260.04 |
| 538 | ri | 0.24 | 58.92 | 221.36 | 0.09 | 56.96 | 227.21 |
| 539 | po | 0.15 | 48.80 | 198.48 | 0.08 | 55.20 | 219.85 |
| 540 | kok | 0.19 | 55.81 | 304.16 | 0.23 | 60.34 | 195.81 |
| 541 | i | 0.27 | 54.73 | 98.28 | 0.18 | 51.96 | 194.08 |
| 542 | tu | 0.30 | 56.29 | 253.78 | 0.17 | 64.03 | 270.16 |
| 543 | men | 0.27 | 58.27 | 240.19 | 0.25 | 65.80 | 240.23 |
| 544 | ja | 0.25 | 61.93 | 206.47 | 0.24 | 54.99 | 171.99 |
| 545 | tuh | 0.21 | 56.86 | 210.10 | 0.25 | 45.56 | 184.50 |
| 546 | kan | 0.36 | 60.24 | 205.09 | 0.37 | 56.56 | 223.24 |
| 547 | se | 0.24 | 56.30 | 205.73 | 0.07 | 62.17 | 198.77 |
| 548 | he | 0.18 | 61.31 | 196.90 | 0.15 | 57.83 | 186.55 |
| 549 | lai | 0.26 | 66.23 | 191.50 | 0.24 | 56.39 | 184.21 |
| 550 | da | 0.12 | 63.00 | 202.31 | 0.20 | 56.60 | 229.07 |
| 551 | un | 0.34 | 61.50 | 192.83 | 0.47 | 61.83 | 235.47 |
| 552 | se | 0.34 | 54.94 | 308.31 | 0.11 | 60.22 | 245.80 |
| 553 | mut | 0.27 | 62.41 | 267.83 | 0.23 | 60.23 | 247.47 |
| 554 | i | 0.16 | 57.15 | 242.23 | 0.16 | 59.64 | 270.03 |
| 555 | tu | 0.21 | 56.64 | 228.04 | 0.21 | 62.38 | 262.21 |
| 556 | pun | 0.20 | 64.01 | 241.01 | 0.16 | 66.84 | 310.07 |
| 557 | me | 0.18 | 65.28 | 220.45 | 0.26 | 65.89 | 271.27 |
| 558 | man | 0.36 | 65.36 | 192.68 | 0.28 | 66.38 | 197.13 |
| 559 | jat | 0.27 | 55.16 | 218.23 | 0.35 | 54.09 | 208.74 |
| 560 | ke | 0.18 | 52.39 | 198.50 | 0.10 | 56.53 | 194.83 |
| 561 | a | 0.18 | 59.37 | 193.68 | 0.19 | 57.91 | 247.95 |
| 562 | tas | 0.38 | 57.08 | 211.75 | 0.27 | 48.01 | 269.48 |
| 563 | da | 0.12 | 63.89 | 194.84 | 0.14 | 58.63 | 214.50 |
| 564 | un | 0.27 | 64.68 | 161.19 | 0.17 | 61.04 | 234.83 |
| 565 | ter | 0.11 | 59.11 | 178.65 | 0.17 | 55.23 | 209.32 |
| 566 | se | 0.25 | 56.91 | 233.99 | 0.21 | 55.88 | 160.96 |
| 567 | but | 0.23 | 60.78 | 230.50 | 0.62 | 51.92 | 183.87 |
| 568 | dan | 0.27 | 62.28 | 215.80 | 0.27 | 60.69 | 174.53 |
| 569 | ak | 0.17 | 59.21 | 200.75 | 0.26 | 51.72 | 248.63 |
| 570 | hir | 0.31 | 57.84 | 223.16 | 0.23 | 62.39 | 237.71 |
| 571 | nya | 0.47 | 60.80 | 194.95 | 0.39 | 59.43 | 196.40 |
| 572 | ti | 0.17 | 60.06 | 236.67 | 0.29 | 55.60 | 182.64 |
| 573 | ba | 0.25 | 65.01 | 240.60 | 0.20 | 64.59 | 208.10 |

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|---|---|---|---|---|---|---|---|
| 574 | de | 0.14 | 65.13 | 214.58 | 0.08 | 63.30 | 208.58 |
| 575 | ngan | 0.26 | 57.55 | 207.11 | 0.19 | 57.88 | 185.80 |
| 576 | se | 0.11 | 63.42 | 197.58 | 0.15 | 51.73 | 202.00 |
| 577 | la | 0.18 | 66.70 | 206.69 | 0.14 | 59.35 | 184.92 |
| 578 | mat | 0.27 | 62.79 | 197.50 | 0.32 | 56.58 | 230.43 |
| 579 | di | 0.19 | 56.29 | 183.88 | 0.18 | 45.22 | 377.52 |
| 580 | te | 0.23 | 53.52 | 200.74 | 0.18 | 48.39 | 337.95 |
| 581 | bing | 0.28 | 62.76 | 196.99 | 0.28 | 56.10 | 209.64 |
| 582 | su | 0.25 | 57.09 | 177.96 | 0.24 | 55.05 | 325.16 |
| 583 | ngai | 0.32 | 59.44 | 187.24 | 0.66 | 60.69 | 169.51 |
| 584 | be | 0.16 | 58.57 | 175.16 | 0.22 | 59.10 | 197.31 |
| 585 | be | 0.05 | 56.45 | 204.92 | 0.09 | 58.98 | 192.11 |
| 586 | ra | 0.29 | 61.54 | 225.87 | 0.19 | 53.10 | 178.51 |
| 587 | pa | 0.25 | 63.55 | 262.49 | 0.14 | 58.38 | 236.22 |
| 588 | ha | 0.21 | 62.51 | 184.78 | 0.23 | 63.27 | 215.33 |
| 589 | ri | 0.40 | 59.58 | 210.61 | 0.27 | 62.87 | 244.67 |
| 590 | ke | 0.07 | 58.09 | 249.77 | 0.15 | 56.99 | 228.76 |
| 591 | mu | 0.25 | 62.17 | 196.45 | 0.23 | 57.68 | 177.59 |
| 592 | di | 0.13 | 60.66 | 184.29 | 0.07 | 59.86 | 256.22 |
| 593 | an | 0.43 | 59.84 | 197.18 | 0.37 | 62.40 | 185.85 |
| 594 | se | 0.23 | 50.88 | 292.60 | 0.27 | 61.68 | 392.18 |
| 595 | o | 0.20 | 60.41 | 191.78 | 0.14 | 65.04 | 191.84 |
| 596 | rang | 0.31 | 61.86 | 235.43 | 0.26 | 65.84 | 242.60 |
| 597 | pem | 0.26 | 62.74 | 210.14 | 0.25 | 63.26 | 229.13 |
| 598 | bu | 0.20 | 59.85 | 200.73 | 0.20 | 65.99 | 195.31 |
| 599 | ru | 0.18 | 62.58 | 207.40 | 0.32 | 61.79 | 225.40 |
| 600 | me | 0.21 | 62.18 | 193.04 | 0.19 | 66.33 | 200.51 |
| 601 | li | 0.19 | 59.74 | 188.84 | 0.15 | 65.36 | 226.26 |
| 602 | hat | 0.40 | 52.87 | 207.37 | 0.33 | 58.80 | 190.80 |
| 603 | se | 0.16 | 55.87 | 435.85 | 0.23 | 52.47 | 479.38 |
| 604 | e | 0.23 | 56.45 | 197.16 | 0.24 | 59.16 | 192.46 |
| 605 | kor | 0.13 | 58.63 | 225.41 | 0.16 | 58.79 | 224.29 |
| 606 | mer | 0.36 | 60.49 | 200.63 | 0.36 | 62.87 | 199.78 |
| 607 | pa | 0.32 | 52.28 | 197.30 | 0.24 | 60.00 | 284.54 |
| 608 | ti | 0.27 | 59.96 | 205.90 | 0.20 | 59.20 | 223.15 |
| 609 | dan | 0.29 | 54.42 | 196.32 | 0.23 | 59.54 | 199.13 |
| 610 | i | 0.13 | 57.45 | 223.73 | 0.08 | 57.55 | 191.89 |
| 611 | ngin | 0.22 | 63.17 | 220.18 | 0.23 | 63.70 | 189.29 |
| 612 | me | 0.19 | 63.46 | 191.52 | 0.12 | 60.56 | 175.83 |
| 613 | nem | 0.23 | 58.92 | 183.52 | 0.19 | 62.07 | 170.54 |
| 614 | bak | 0.32 | 56.65 | 240.18 | 0.21 | 61.24 | 200.38 |
| 615 | nya | 0.15 | 59.18 | 190.73 | 0.40 | 65.74 | 225.65 |
| 616 | na | 0.18 | 65.47 | 193.64 | 0.30 | 66.87 | 222.25 |
| 617 | mun | 0.59 | 57.11 | 284.53 | 0.45 | 62.79 | 222.08 |
| 618 | se | 0.16 | 58.34 | 219.45 | 0.20 | 65.21 | 221.43 |
| 619 | mut | 0.38 | 55.66 | 250.68 | 0.30 | 59.42 | 175.47 |
| 620 | ter | 0.20 | 59.75 | 203.97 | 0.21 | 59.94 | 193.18 |
| 621 | li | 0.14 | 65.19 | 195.17 | 0.18 | 58.81 | 176.78 |
| 622 | hat | 0.35 | 55.71 | 217.07 | 0.42 | 56.36 | 221.55 |
| 623 | a | 0.20 | 53.33 | 168.49 | 0.27 | 53.79 | 199.70 |
| 624 | kan | 0.27 | 60.20 | 175.95 | 0.30 | 53.58 | 191.93 |
| 625 | per | 0.22 | 63.45 | 252.97 | 0.13 | 58.95 | 207.70 |
| 626 | la | 0.30 | 59.04 | 265.47 | 0.31 | 58.62 | 191.75 |
| 627 | ku | 0.09 | 64.09 | 295.51 | 0.17 | 57.65 | 282.32 |
| 628 | an | 0.26 | 61.18 | 188.48 | 0.30 | 71.54 | 302.47 |
| 629 | pem | 0.25 | 64.28 | 181.50 | 0.26 | 66.15 | 216.52 |
| 630 | bu | 0.20 | 63.25 | 197.33 | 0.20 | 65.09 | 188.13 |
| 631 | ru | 0.22 | 62.42 | 197.53 | 0.25 | 58.54 | 176.73 |
| 632 | i | 0.21 | 54.20 | 227.58 | 0.21 | 52.42 | 96.58 |
| 633 | tu | 0.28 | 57.26 | 191.97 | 0.22 | 56.14 | 214.05 |
| 634 | se | 0.18 | 59.29 | 139.59 | 0.15 | 69.64 | 278.33 |
| 635 | mut | 0.31 | 60.58 | 191.31 | 0.23 | 57.10 | 253.01 |
| 636 | pun | 0.23 | 66.86 | 261.09 | 0.17 | 64.89 | 299.40 |
| 637 | lan | 0.31 | 61.86 | 210.06 | 0.35 | 65.30 | 219.17 |
| 638 | tas | 0.28 | 58.47 | 237.52 | 0.25 | 58.94 | 262.85 |
| 639 | meng | 0.23 | 63.55 | 206.46 | 0.20 | 64.13 | 223.13 |
| 640 | gi | 0.19 | 56.58 | 197.90 | 0.17 | 60.50 | 204.36 |
| 641 | git | 0.30 | 52.22 | 211.66 | 0.27 | 55.44 | 339.71 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 642 | ka | 0.24 | 57.69 | 212.66 | 0.28 | 56.61 | 197.41 |
| 643 | ki | 0.28 | 55.15 | 236.98 | 0.32 | 54.45 | 211.18 |
| 644 | pem | 0.20 | 62.29 | 206.98 | 0.23 | 52.07 | 183.23 |
| 645 | bu | 0.15 | 62.73 | 198.79 | 0.12 | 51.15 | 180.70 |
| 646 | ru | 0.19 | 59.89 | 201.18 | 0.14 | 52.23 | 404.52 |
| 647 | i | 0.22 | 53.70 | 268.29 | 0.19 | 48.77 | 191.27 |
| 648 | tu | 0.32 | 63.26 | 295.73 | 0.16 | 52.67 | 338.94 |
| 649 | dan | 0.52 | 60.14 | 233.44 | 0.39 | 51.80 | 236.83 |
| 650 | tem | 0.28 | 65.73 | 194.56 | 0.24 | 46.85 | 377.73 |
| 651 | ba | 0.15 | 65.29 | 194.49 | 0.18 | 54.33 | 193.42 |
| 652 | kan | 0.23 | 60.93 | 222.57 | 0.25 | 63.35 | 261.13 |
| 653 | nya | 0.32 | 64.01 | 220.18 | 0.25 | 64.03 | 330.69 |
| 654 | ter | 0.21 | 60.05 | 201.51 | 0.14 | 65.11 | 274.23 |
| 655 | sa | 0.29 | 55.91 | 195.09 | 0.22 | 59.23 | 253.65 |
| 656 | sar | 0.35 | 54.29 | 223.58 | 0.56 | 57.22 | 253.07 |
| 657 | mer | 0.34 | 56.85 | 249.81 | 0.38 | 61.78 | 196.68 |
| 658 | pa | 0.27 | 57.54 | 214.26 | 0.26 | 56.85 | 188.90 |
| 659 | ti | 0.19 | 65.62 | 221.61 | 0.12 | 60.42 | 241.33 |
| 660 | yang | 0.31 | 62.83 | 193.90 | 0.31 | 67.52 | 253.27 |
| 661 | ter | 0.20 | 59.23 | 167.80 | 0.15 | 63.49 | 216.04 |
| 662 | de | 0.11 | 61.66 | 169.69 | 0.13 | 59.92 | 203.70 |
| 663 | ngar | 0.22 | 63.38 | 231.82 | 0.34 | 63.27 | 212.52 |
| 664 | je | 0.18 | 60.93 | 227.18 | 0.18 | 61.07 | 224.38 |
| 665 | ri | 0.24 | 57.30 | 206.44 | 0.20 | 62.76 | 198.20 |
| 666 | tan | 0.23 | 56.05 | 205.71 | 0.26 | 62.61 | 194.95 |
| 667 | pem | 0.25 | 58.61 | 202.71 | 0.14 | 59.20 | 190.51 |
| 668 | bu | 0.18 | 62.69 | 197.23 | 0.11 | 58.32 | 180.50 |
| 669 | ru | 0.15 | 61.03 | 200.15 | 0.25 | 54.45 | 174.25 |
| 670 | i | 0.23 | 45.63 | 210.48 | 0.12 | 45.59 | x |
| 671 | tu | 0.68 | 55.50 | 312.68 | 0.54 | 55.37 | 297.78 |
| 672 | se | 0.10 | 63.27 | 257.51 | 0.18 | 57.47 | 215.37 |
| 673 | ge | 0.18 | 58.91 | 240.97 | 0.18 | 53.56 | 184.10 |
| 674 | ra | 0.29 | 63.31 | 218.93 | 0.29 | 62.24 | 223.93 |
| 675 | ter | 0.29 | 59.62 | 211.69 | 0.28 | 61.96 | 233.38 |
| 676 | bang | 0.39 | 57.91 | 155.34 | 0.40 | 60.82 | 210.35 |
| 677 | ber | 0.33 | 55.73 | 210.40 | 0.16 | 60.25 | 189.46 |
| 678 | e | 0.19 | 63.52 | 258.00 | 0.14 | 58.38 | 184.38 |
| 679 | dar | 0.25 | 63.00 | 213.67 | 0.33 | 59.92 | 203.53 |
| 680 | da | 0.10 | 62.86 | 194.35 | 0.12 | 58.27 | 319.48 |
| 681 | ri | 0.20 | 56.08 | 205.62 | 0.20 | 58.71 | 176.83 |
| 682 | si | 0.23 | 47.18 | 229.74 | 0.13 | 48.63 | 496.15 |
| 683 | tu | 0.28 | 50.05 | 389.96 | 0.24 | 47.82 | 450.73 |

## Duration, Intensity And Pitch Features For Neutral_Data & Story_Data
## Female Storyteller 6 (Fst6)

| No. | Syllables | NEUTRAL_DATA | | | STORY_DATA | | |
|---|---|---|---|---|---|---|---|
| | | Duration (s) | Intensity (dB) | Pitch (Hz) | Duration (s) | Intensity (dB) | Pitch (Hz) |
| 1 | su | 0.15 | 55.48 | 369.25 | 0.17 | 59.22 | 197.68 |
| 2 | a | 0.20 | 60.94 | 197.51 | 0.25 | 62.63 | 191.14 |
| 3 | tu | 0.08 | 58.74 | 202.47 | 0.16 | 66.45 | 251.21 |
| 4 | ma | 0.14 | 67.59 | 198.57 | 0.08 | 68.49 | 315.87 |
| 5 | sa | 0.24 | 59.59 | 200.81 | 0.22 | 64.45 | 312.68 |
| 6 | da | 0.19 | 59.58 | 189.89 | 0.15 | 68.92 | 293.55 |
| 7 | hu | 0.31 | 54.74 | 178.19 | 0.11 | 66.79 | 281.93 |
| 8 | lu | 0.19 | 56.55 | 232.70 | 0.57 | 66.79 | 262.79 |
| 9 | ting | 0.21 | 63.69 | 202.65 | 0.18 | 65.09 | 200.26 |
| 10 | gal | 0.16 | 64.85 | 237.20 | 0.26 | 62.02 | 225.04 |
| 11 | se | 0.13 | 54.87 | 267.13 | 0.19 | 57.54 | 259.76 |
| 12 | o | 0.15 | 60.03 | 224.72 | 0.10 | 67.66 | 250.40 |
| 13 | rang | 0.17 | 62.55 | 194.35 | 0.14 | 63.19 | 276.08 |
| 14 | pe | 0.17 | 52.77 | 205.70 | 0.15 | 56.92 | 278.43 |
| 15 | ta | 0.22 | 53.99 | 215.13 | 0.18 | 64.19 | 272.86 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 16 | ni | 0.22 | 65.13 | 200.77 | 0.36 | 65.87 | 254.12 |
| 17 | yang | 0.35 | 53.69 | 197.86 | 0.29 | 67.28 | 206.74 |
| 18 | me | 0.17 | 43.40 | 178.77 | 0.11 | 65.72 | 190.44 |
| 19 | me | 0.07 | 50.12 | 181.43 | 0.10 | 60.76 | 189.99 |
| 20 | li | 0.11 | 60.02 | 189.18 | 0.18 | 63.22 | 207.13 |
| 21 | ha | 0.09 | 64.40 | 190.44 | 0.13 | 60.31 | 251.56 |
| 22 | ra | 0.19 | 66.04 | 199.12 | 0.11 | 58.89 | 246.34 |
| 23 | se | 0.21 | 52.90 | 205.53 | 0.26 | 54.48 | 349.53 |
| 24 | e | 0.24 | 42.39 | 196.50 | 0.30 | 53.92 | 277.62 |
| 25 | kor | 0.25 | 50.82 | 205.92 | 0.18 | 60.92 | 275.59 |
| 26 | ang | 0.14 | 63.71 | 208.54 | 0.22 | 54.78 | 207.94 |
| 27 | sa | 0.28 | 45.85 | 197.25 | 0.36 | 52.18 | 180.52 |
| 28 | pa | 0.18 | 66.04 | 198.39 | 0.16 | 66.90 | 196.20 |
| 29 | da | 0.07 | 65.47 | 243.00 | 0.12 | 65.90 | 192.10 |
| 30 | su | 0.15 | 53.70 | 235.00 | 0.11 | 57.55 | 224.98 |
| 31 | a | 0.17 | 60.09 | 200.35 | 0.06 | 67.20 | 305.90 |
| 32 | tu | 0.15 | 57.36 | 196.54 | 0.14 | 62.82 | 278.02 |
| 33 | ha | 0.15 | 60.38 | 178.93 | 0.20 | 67.52 | 203.10 |
| 34 | ri | 0.27 | 58.04 | 189.74 | 0.43 | 62.12 | 216.50 |
| 35 | ke | 0.18 | 51.20 | 203.68 | 0.18 | 54.64 | 204.31 |
| 36 | ti | 0.21 | 52.50 | 203.63 | 0.18 | 55.19 | 200.36 |
| 37 | ka | 0.10 | 57.76 | 487.78 | 0.14 | 61.77 | 261.36 |
| 38 | i | 0.26 | 56.79 | 224.65 | 0.23 | 60.86 | 208.22 |
| 39 | tu | 0.20 | 61.51 | 206.23 | 0.37 | 61.43 | 260.98 |
| 40 | di | 0.06 | 58.80 | 220.50 | 0.10 | 64.37 | 230.92 |
| 41 | a | 0.08 | 58.80 | 221.27 | 0.10 | 66.28 | 219.28 |
| 42 | i | 0.20 | 60.25 | 194.12 | 0.08 | 66.47 | 164.00 |
| 43 | ngin | 0.16 | 67.90 | 194.90 | 0.21 | 70.82 | 211.78 |
| 44 | me | 0.13 | 70.61 | 211.09 | 0.09 | 63.75 | 196.96 |
| 45 | ngam | 0.33 | 52.67 | 226.90 | 0.22 | 65.56 | 219.34 |
| 46 | bil | 0.27 | 54.84 | 253.33 | 0.24 | 60.09 | 236.52 |
| 47 | te | 0.14 | 54.53 | 201.63 | 0.14 | 58.62 | 210.01 |
| 48 | lur | 0.20 | 57.20 | 193.73 | 0.25 | 60.66 | 225.48 |
| 49 | ang | 0.12 | 58.53 | 193.47 | 0.16 | 56.75 | 228.83 |
| 50 | sa | 0.25 | 60.24 | 303.19 | 0.18 | 56.64 | 254.56 |
| 51 | nya | 0.18 | 56.86 | 178.52 | 0.31 | 59.33 | 213.23 |
| 52 | si | 0.26 | 57.45 | 219.84 | 0.32 | 55.13 | 239.52 |
| 53 | pe | 0.12 | 60.41 | 220.73 | 0.15 | 59.58 | 244.76 |
| 54 | ta | 0.19 | 63.37 | 224.10 | 0.11 | 63.48 | 255.21 |
| 55 | ni | 0.14 | 62.76 | 271.09 | 0.21 | 63.83 | 322.47 |
| 56 | men | 0.16 | 64.82 | 243.94 | 0.11 | 66.64 | 321.10 |
| 57 | da | 0.16 | 58.72 | 188.77 | 0.18 | 61.41 | 259.88 |
| 58 | pa | 0.24 | 47.63 | 183.32 | 0.19 | 61.56 | 193.86 |
| 59 | ti | 0.09 | 54.83 | 210.75 | 0.33 | 60.69 | 227.38 |
| 60 | te | 0.23 | 58.77 | 199.01 | 0.23 | 61.49 | 204.93 |
| 61 | lur | 0.33 | 50.18 | 193.06 | 0.24 | 62.84 | 193.32 |
| 62 | i | 0.13 | 56.88 | 215.72 | 0.27 | 56.16 | 186.84 |
| 63 | tu | 0.15 | 49.44 | 206.28 | 0.26 | 54.05 | 474.40 |
| 64 | ke | 0.06 | 53.26 | 191.54 | 0.15 | 59.79 | 234.53 |
| 65 | li | 0.06 | 57.37 | 185.44 | 0.10 | 63.26 | 220.71 |
| 66 | ha | 0.17 | 47.36 | 184.83 | 0.24 | 55.72 | 245.80 |
| 67 | tan | 0.12 | 57.87 | 207.50 | 0.26 | 60.70 | 233.43 |
| 68 | a | 0.20 | 49.04 | 211.84 | 0.13 | 55.28 | 183.89 |
| 69 | neh | 0.21 | 51.07 | 174.19 | 0.24 | 52.62 | 177.19 |
| 70 | war | 0.17 | 63.67 | 189.88 | 0.15 | 66.98 | 195.18 |
| 71 | na | 0.20 | 59.76 | 187.33 | 0.11 | 68.91 | 197.70 |
| 72 | nya | 0.16 | 49.86 | 186.98 | 0.31 | 64.79 | 211.08 |
| 73 | ku | 0.15 | 57.20 | 191.30 | 0.11 | 58.73 | 217.33 |
| 74 | ning | 0.23 | 62.09 | 211.94 | 0.33 | 67.01 | 223.20 |
| 75 | ke | 0.04 | 58.38 | 233.64 | 0.11 | 60.93 | 242.01 |
| 76 | e | 0.12 | 58.18 | 177.85 | 0.08 | 66.06 | 161.16 |
| 77 | ma | 0.20 | 56.46 | 183.43 | 0.16 | 68.49 | 212.80 |
| 78 | san | 0.26 | 55.55 | 187.64 | 0.36 | 63.13 | 219.90 |
| 79 | dan | 0.31 | 60.29 | 189.68 | 0.24 | 68.59 | 270.49 |
| 80 | be | 0.08 | 60.70 | 198.19 | 0.18 | 63.59 | 187.95 |
| 81 | rat | 0.31 | 58.99 | 203.38 | 0.19 | 54.63 | 175.32 |
| 82 | di | 0.14 | 63.25 | 201.15 | 0.12 | 62.38 | 205.48 |
| 83 | a | 0.17 | 63.18 | 244.78 | 0.17 | 69.02 | 260.19 |

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|---|---|---|---|---|---|---|---|
| 84 | me | 0.09 | 68.07 | 213.73 | 0.11 | 68.12 | 287.08 |
| 85 | nyang | 0.29 | 56.86 | 190.59 | 0.33 | 65.09 | 226.91 |
| 86 | ka | 0.22 | 60.90 | 212.26 | 0.22 | 63.95 | 243.62 |
| 87 | ji | 0.18 | 55.04 | 191.98 | 0.19 | 64.93 | 202.06 |
| 88 | ran | 0.21 | 53.59 | 180.61 | 0.20 | 61.80 | 187.38 |
| 89 | nya | 0.16 | 54.46 | 188.28 | 0.07 | 60.11 | 188.37 |
| 90 | cu | 0.24 | 51.45 | 199.69 | 0.22 | 60.37 | 192.66 |
| 91 | ba | 0.14 | 61.58 | 220.80 | 0.23 | 65.13 | 202.75 |
| 92 | ber | 0.21 | 61.37 | 204.92 | 0.12 | 66.49 | 214.15 |
| 93 | gu | 0.19 | 49.31 | 212.70 | 0.22 | 61.08 | 190.55 |
| 94 | rau | 0.30 | 53.61 | 275.06 | 0.27 | 60.45 | 219.08 |
| 95 | la | 0.31 | 52.19 | 170.24 | 0.29 | 64.18 | 215.18 |
| 96 | lu | 0.15 | 65.19 | 211.53 | 0.16 | 58.63 | 239.47 |
| 97 | ber | 0.10 | 61.59 | 194.91 | 0.12 | 65.09 | 223.10 |
| 98 | ca | 0.21 | 50.76 | 263.77 | 0.20 | 58.93 | 251.66 |
| 99 | dang | 0.22 | 50.33 | 232.04 | 0.32 | 59.11 | 299.20 |
| 100 | un | 0.16 | 49.50 | 412.00 | 0.18 | 54.90 | 306.24 |
| 101 | tuk | 0.18 | 55.39 | 234.09 | 0.15 | 63.01 | 273.72 |
| 102 | mem | 0.11 | 51.09 | 171.94 | 0.13 | 66.22 | 201.48 |
| 103 | bu | 0.16 | 48.16 | 419.45 | 0.11 | 64.95 | 190.98 |
| 104 | ang | 0.25 | 57.14 | 192.83 | 0.22 | 57.65 | 187.16 |
| 105 | te | 0.10 | 44.58 | 182.73 | 0.06 | 54.62 | 187.15 |
| 106 | lur | 0.16 | 56.63 | 194.29 | 0.11 | 56.75 | 195.94 |
| 107 | i | 0.15 | 51.27 | 220.18 | 0.15 | 59.63 | 202.83 |
| 108 | tu | 0.18 | 43.45 | 99.28 | 0.27 | 51.30 | 196.36 |
| 109 | na | 0.09 | 66.40 | 205.92 | 0.13 | 66.47 | 207.30 |
| 110 | mun | 0.20 | 66.90 | 250.98 | 0.29 | 67.16 | 224.73 |
| 111 | se | 0.16 | 59.33 | 253.43 | 0.28 | 60.11 | 261.96 |
| 112 | le | 0.25 | 59.61 | 194.89 | 0.23 | 57.32 | 218.06 |
| 113 | pas | 0.18 | 60.19 | 217.29 | 0.46 | 54.60 | 296.80 |
| 114 | ber | 0.25 | 55.46 | 193.06 | 0.21 | 57.66 | 201.22 |
| 115 | fi | 0.16 | 51.07 | 220.23 | 0.18 | 57.29 | 195.18 |
| 116 | kir | 0.35 | 53.16 | 199.66 | 0.40 | 59.59 | 148.38 |
| 117 | di | 0.15 | 63.15 | 207.64 | 0.08 | 63.11 | 196.54 |
| 118 | a | 0.19 | 63.05 | 234.05 | 0.18 | 69.59 | 192.72 |
| 119 | mem | 0.15 | 66.62 | 211.33 | 0.14 | 62.10 | 187.15 |
| 120 | ba | 0.24 | 64.11 | 186.88 | 0.16 | 70.97 | 194.95 |
| 121 | wa | 0.20 | 56.37 | 185.73 | 0.22 | 60.11 | 200.97 |
| 122 | te | 0.15 | 50.33 | 186.98 | 0.11 | 63.11 | 198.34 |
| 123 | lur | 0.10 | 52.57 | 187.15 | 0.12 | 63.90 | 197.43 |
| 124 | i | 0.25 | 52.56 | 195.68 | 0.20 | 57.45 | 160.82 |
| 125 | tu | 0.26 | 58.72 | 217.62 | 0.22 | 56.44 | 227.39 |
| 126 | pu | 0.10 | 63.52 | 207.73 | 0.08 | 55.20 | 246.76 |
| 127 | lang | 0.26 | 65.14 | 217.02 | 0.27 | 62.39 | 289.15 |
| 128 | ke | 0.14 | 58.59 | 195.73 | 0.22 | 59.35 | 255.31 |
| 129 | ru | 0.14 | 52.75 | 185.60 | 0.11 | 61.73 | 268.88 |
| 130 | mah | 0.23 | 58.51 | 194.96 | 0.20 | 65.56 | 277.98 |
| 131 | un | 0.12 | 55.29 | 179.64 | 0.06 | 59.22 | 198.74 |
| 132 | tuk | 0.13 | 54.02 | 219.86 | 0.17 | 58.54 | 207.06 |
| 133 | di | 0.19 | 45.69 | 200.47 | 0.08 | 50.90 | 197.49 |
| 134 | pe | 0.06 | 51.32 | 183.68 | 0.05 | 46.03 | 98.70 |
| 135 | rik | 0.16 | 54.15 | 195.53 | 0.09 | 58.36 | 170.79 |
| 136 | sa | 0.27 | 48.84 | 186.64 | 0.31 | 55.91 | 114.80 |
| 137 | si | 0.26 | 56.35 | 219.99 | 0.37 | 54.70 | 232.09 |
| 138 | pe | 0.11 | 61.05 | 229.43 | 0.09 | 60.51 | 231.74 |
| 139 | ta | 0.18 | 58.52 | 232.50 | 0.12 | 59.91 | 224.90 |
| 140 | ni | 0.16 | 63.98 | 263.50 | 0.21 | 63.79 | 231.48 |
| 141 | be | 0.07 | 64.26 | 218.26 | 0.07 | 67.08 | 220.48 |
| 142 | ra | 0.12 | 65.11 | 196.22 | 0.06 | 66.08 | 215.03 |
| 143 | sa | 0.22 | 56.23 | 198.49 | 0.17 | 63.37 | 221.48 |
| 144 | ter | 0.21 | 53.51 | 266.35 | 0.21 | 53.90 | 265.83 |
| 145 | ke | 0.13 | 47.50 | 346.30 | 0.17 | 62.61 | 197.63 |
| 146 | jut | 0.29 | 54.17 | 208.73 | 0.23 | 56.11 | 244.35 |
| 147 | a | 0.20 | 53.16 | 197.05 | 0.29 | 54.45 | 241.78 |
| 148 | pa | 0.13 | 59.84 | 198.44 | 0.10 | 61.97 | 249.51 |
| 149 | bi | 0.16 | 56.83 | 190.32 | 0.14 | 59.72 | 246.33 |
| 150 | la | 0.19 | 62.44 | 204.57 | 0.14 | 60.70 | 251.01 |
| 151 | men | 0.09 | 68.18 | 213.83 | 0.11 | 58.02 | 247.32 |

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|---|---|---|---|---|---|---|---|
| 152 | da | 0.26 | 57.37 | 197.45 | 0.11 | 61.46 | 244.34 |
| 153 | pa | 0.21 | 50.09 | 271.50 | 0.29 | 52.80 | 250.89 |
| 154 | ti | 0.25 | 57.29 | 217.30 | 0.23 | 55.65 | 278.65 |
| 155 | i | 0.27 | 50.54 | 200.06 | 0.24 | 50.84 | 232.55 |
| 156 | tu | 0.13 | 59.49 | 487.68 | 0.12 | 63.20 | 226.52 |
| 157 | a | 0.17 | 60.32 | 286.03 | 0.17 | 69.50 | 206.93 |
| 158 | da | 0.12 | 59.06 | 180.56 | 0.09 | 68.37 | 216.93 |
| 159 | lah | 0.26 | 56.49 | 191.30 | 0.20 | 55.83 | 231.97 |
| 160 | te | 0.17 | 54.36 | 140.49 | 0.09 | 64.00 | 212.44 |
| 161 | lur | 0.17 | 60.95 | 194.87 | 0.15 | 65.25 | 228.83 |
| 162 | e | 0.09 | 58.94 | 218.86 | 0.12 | 58.45 | 237.59 |
| 163 | mas | 0.31 | 56.32 | 185.99 | 0.31 | 59.57 | 195.88 |
| 164 | si | 0.25 | 56.55 | 231.53 | 0.28 | 55.95 | 245.41 |
| 165 | pe | 0.15 | 59.53 | 222.76 | 0.08 | 67.60 | 247.66 |
| 166 | ta | 0.11 | 59.81 | 198.06 | 0.15 | 65.15 | 241.36 |
| 167 | ni | 0.18 | 68.49 | 210.38 | 0.09 | 65.41 | 238.03 |
| 168 | sung | 0.22 | 58.47 | 214.45 | 0.37 | 66.23 | 261.45 |
| 169 | guh | 0.28 | 66.45 | 220.23 | 0.17 | 71.07 | 268.38 |
| 170 | gem | 0.14 | 56.83 | 191.46 | 0.19 | 66.61 | 193.69 |
| 171 | bi | 0.16 | 57.01 | 176.93 | 0.10 | 64.52 | 186.72 |
| 172 | ra | 0.27 | 57.31 | 186.92 | 0.22 | 57.67 | 181.40 |
| 173 | ha | 0.06 | 62.89 | 209.84 | 0.21 | 62.84 | 212.95 |
| 174 | ri | 0.23 | 63.36 | 254.39 | 0.18 | 68.37 | 262.83 |
| 175 | de | 0.11 | 65.96 | 214.48 | 0.12 | 67.41 | 295.52 |
| 176 | mi | 0.18 | 58.77 | 188.90 | 0.11 | 66.88 | 278.06 |
| 177 | ha | 0.12 | 54.13 | 197.33 | 0.19 | 62.86 | 258.90 |
| 178 | ri | 0.13 | 65.06 | 212.30 | 0.18 | 63.86 | 231.76 |
| 179 | se | 0.14 | 54.39 | 220.54 | 0.14 | 54.75 | 225.53 |
| 180 | le | 0.18 | 50.85 | 199.28 | 0.15 | 59.74 | 214.76 |
| 181 | pas | 0.26 | 51.55 | 137.35 | 0.15 | 61.38 | 202.94 |
| 182 | i | 0.09 | 47.18 | x | 0.21 | 56.92 | 179.72 |
| 183 | tu | 0.57 | 46.55 | 196.60 | 0.35 | 59.56 | 230.39 |
| 184 | si | 0.20 | 50.50 | 221.59 | 0.16 | 52.36 | 454.73 |
| 185 | ang | 0.19 | 64.15 | 196.32 | 0.17 | 66.72 | 208.67 |
| 186 | sa | 0.28 | 59.51 | 206.94 | 0.23 | 61.63 | 224.00 |
| 187 | te | 0.21 | 60.34 | 216.58 | 0.10 | 61.84 | 233.97 |
| 188 | rus | 0.22 | 57.47 | 275.46 | 0.21 | 61.74 | 224.58 |
| 189 | ber | 0.14 | 51.18 | 219.35 | 0.15 | 55.64 | 212.14 |
| 190 | te | 0.17 | 59.56 | 195.44 | 0.12 | 63.42 | 270.23 |
| 191 | lur | 0.06 | 57.38 | 186.09 | 0.11 | 67.47 | 282.97 |
| 192 | e | 0.12 | 56.81 | 189.44 | 0.10 | 64.82 | 133.11 |
| 193 | mas | 0.39 | 52.98 | 189.64 | 0.27 | 54.45 | 246.97 |
| 194 | si | 0.23 | 56.99 | 225.59 | 0.27 | 54.02 | 215.16 |
| 195 | pe | 0.16 | 55.15 | 211.63 | 0.14 | 54.67 | 212.53 |
| 196 | ta | 0.09 | 62.80 | 194.72 | 0.11 | 66.88 | 221.80 |
| 197 | ni | 0.19 | 65.50 | 223.74 | 0.27 | 66.57 | 227.56 |
| 198 | mu | 0.22 | 67.61 | 203.48 | 0.12 | 63.68 | 239.93 |
| 199 | la | 0.17 | 66.82 | 207.63 | 0.14 | 65.65 | 239.97 |
| 200 | men | 0.09 | 63.60 | 190.91 | 0.23 | 60.81 | 235.35 |
| 201 | ja | 0.14 | 56.84 | 190.07 | 0.20 | 67.69 | 277.21 |
| 202 | di | 0.19 | 52.65 | 201.17 | 0.20 | 65.20 | 246.68 |
| 203 | ta | 0.14 | 61.07 | 230.41 | 0.16 | 60.45 | 200.48 |
| 204 | mak | 0.22 | 57.64 | 207.30 | 0.25 | 52.01 | 253.29 |
| 205 | si | 0.29 | 55.70 | 251.61 | 0.27 | 52.98 | 209.00 |
| 206 | pe | 0.10 | 60.88 | 215.62 | 0.13 | 57.81 | 203.53 |
| 207 | ta | 0.12 | 61.37 | 201.21 | 0.09 | 64.43 | 208.54 |
| 208 | ni | 0.20 | 65.53 | 220.15 | 0.19 | 67.95 | 222.45 |
| 209 | me | 0.16 | 67.43 | 212.75 | 0.14 | 68.51 | 221.02 |
| 210 | ngam | 0.12 | 66.61 | 194.23 | 0.24 | 65.41 | 195.42 |
| 211 | bil | 0.21 | 65.12 | 196.01 | 0.08 | 49.83 | 196.07 |
| 212 | pi | 0.12 | 56.76 | 189.59 | 0.12 | 65.44 | 216.21 |
| 213 | sau | 0.55 | 53.20 | 203.44 | 0.58 | 60.70 | 238.26 |
| 214 | dan | 0.17 | 63.35 | 209.85 | 0.18 | 67.06 | 217.64 |
| 215 | me | 0.26 | 66.59 | 210.86 | 0.09 | 73.69 | 220.14 |
| 216 | nyem | 0.17 | 63.33 | 190.38 | 0.22 | 72.58 | 220.49 |
| 217 | be | 0.17 | 56.40 | 182.98 | 0.12 | 67.87 | 224.56 |
| 218 | lih | 0.25 | 60.73 | 193.74 | 0.12 | 64.52 | 230.46 |
| 219 | ang | 0.17 | 53.28 | 205.93 | 0.21 | 65.02 | 250.32 |

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|---|---|---|---|---|---|---|---|
| 220 | sa | 0.29 | 57.00 | 247.42 | 0.22 | 63.76 | 269.31 |
| 221 | ber | 0.20 | 61.61 | 196.61 | 0.14 | 61.24 | 206.32 |
| 222 | tu | 0.08 | 62.51 | 213.48 | 0.09 | 59.92 | 192.66 |
| 223 | ah | 0.14 | 60.72 | 238.23 | 0.12 | 63.59 | 185.76 |
| 224 | nya | 0.27 | 59.11 | 195.23 | 0.19 | 51.11 | 179.95 |
| 225 | a | 0.12 | 55.47 | 219.15 | 0.14 | 55.95 | 223.80 |
| 226 | pa | 0.11 | 60.83 | 236.52 | 0.10 | 63.93 | 245.58 |
| 227 | bi | 0.16 | 62.94 | 230.49 | 0.10 | 64.80 | 254.65 |
| 228 | la | 0.15 | 64.97 | 282.23 | 0.18 | 68.83 | 304.99 |
| 229 | men | 0.14 | 66.62 | 236.41 | 0.10 | 69.88 | 284.84 |
| 230 | da | 0.14 | 64.82 | 195.22 | 0.17 | 60.81 | 240.71 |
| 231 | pa | 0.24 | 50.46 | 186.70 | 0.26 | 57.11 | 212.93 |
| 232 | ti | 0.24 | 56.73 | 227.16 | 0.32 | 58.35 | 212.86 |
| 233 | ti | 0.04 | 48.68 | 215.55 | 0.05 | 60.78 | 217.50 |
| 234 | a | 0.14 | 66.21 | 199.23 | 0.08 | 67.63 | 202.70 |
| 235 | da | 0.12 | 63.13 | 209.02 | 0.12 | 63.81 | 200.08 |
| 236 | se | 0.22 | 56.92 | 201.50 | 0.21 | 57.22 | 199.35 |
| 237 | bi | 0.16 | 59.41 | 193.53 | 0.11 | 61.85 | 199.48 |
| 238 | ji | 0.25 | 54.99 | 220.20 | 0.26 | 57.72 | 296.65 |
| 239 | pun | 0.23 | 55.12 | 340.15 | 0.26 | 61.69 | 300.79 |
| 240 | te | 0.14 | 63.36 | 197.98 | 0.10 | 65.89 | 236.25 |
| 241 | lur | 0.08 | 62.51 | 222.30 | 0.08 | 67.46 | 146.36 |
| 242 | e | 0.17 | 59.04 | 219.00 | 0.14 | 66.73 | 158.89 |
| 243 | mas | 0.20 | 60.86 | 199.38 | 0.33 | 63.86 | 200.16 |
| 244 | di | 0.33 | 58.51 | 198.72 | 0.08 | 62.52 | 193.40 |
| 245 | da | 0.09 | 54.41 | 187.35 | 0.13 | 61.20 | 144.17 |
| 246 | lam | 0.27 | 57.83 | 196.75 | 0.19 | 59.94 | 189.83 |
| 247 | pe | 0.13 | 60.01 | 237.98 | 0.08 | 63.44 | 235.03 |
| 248 | rut | 0.14 | 60.25 | 196.95 | 0.16 | 62.61 | 252.21 |
| 249 | ang | 0.16 | 49.76 | 213.00 | 0.22 | 61.06 | 244.65 |
| 250 | sa | 0.28 | 56.57 | 198.47 | 0.26 | 57.88 | 226.37 |
| 251 | i | 0.14 | 50.54 | 193.01 | 0.16 | 59.07 | 164.88 |
| 252 | tu | 0.28 | 57.54 | 190.82 | 0.24 | 56.74 | 221.22 |
| 253 | si | 0.28 | 58.10 | 217.59 | 0.28 | 53.80 | 281.96 |
| 254 | pe | 0.14 | 58.35 | 211.53 | 0.14 | 58.52 | 215.43 |
| 255 | ta | 0.08 | 61.72 | 205.36 | 0.12 | 67.00 | 201.78 |
| 256 | ni | 0.19 | 64.39 | 232.63 | 0.14 | 65.03 | 224.33 |
| 257 | mu | 0.16 | 69.33 | 210.00 | 0.18 | 65.13 | 242.33 |
| 258 | la | 0.23 | 65.89 | 218.40 | 0.21 | 67.33 | 277.78 |
| 259 | me | 0.08 | 70.77 | 210.40 | 0.18 | 64.89 | 231.59 |
| 260 | nye | 0.24 | 67.18 | 196.63 | 0.22 | 67.23 | 231.25 |
| 261 | da | 0.19 | 61.58 | 182.58 | 0.20 | 65.99 | 192.55 |
| 262 | ri | 0.23 | 60.37 | 208.08 | 0.22 | 57.43 | 237.18 |
| 263 | ke | 0.17 | 58.72 | 225.17 | 0.08 | 52.80 | 249.80 |
| 264 | si | 0.15 | 55.25 | 212.72 | 0.23 | 59.85 | 223.03 |
| 265 | la | 0.22 | 54.24 | 189.46 | 0.26 | 60.02 | 198.08 |
| 266 | pan | 0.18 | 59.80 | 190.98 | 0.21 | 64.71 | 205.00 |
| 267 | nya | 0.19 | 67.00 | 210.68 | 0.15 | 61.49 | 244.28 |
| 268 | dan | 0.25 | 63.25 | 220.03 | 0.17 | 62.22 | 230.25 |
| 269 | be | 0.08 | 65.35 | 195.64 | 0.07 | 68.55 | 214.37 |
| 270 | ra | 0.12 | 57.76 | 193.58 | 0.08 | 64.89 | 212.18 |
| 271 | sa | 0.08 | 58.73 | 201.17 | 0.16 | 57.49 | 214.19 |
| 272 | sa | 0.26 | 55.29 | 193.33 | 0.23 | 59.02 | 252.41 |
| 273 | ngat | 0.26 | 58.15 | 205.05 | 0.19 | 63.80 | 291.03 |
| 274 | me | 0.09 | 42.50 | 198.70 | 0.11 | 63.56 | 216.33 |
| 275 | nye | 0.06 | 38.46 | x | 0.12 | 66.82 | 191.81 |
| 276 | sal | 0.39 | 53.60 | 169.33 | 0.24 | 56.51 | 185.93 |
| 277 | su | 0.12 | 57.15 | 102.55 | 0.13 | 58.00 | x |
| 278 | a | 0.19 | 58.09 | 202.84 | 0.19 | 63.54 | 197.53 |
| 279 | tu | 0.09 | 59.12 | 211.28 | 0.22 | 63.08 | 293.74 |
| 280 | ha | 0.25 | 55.96 | 193.39 | 0.14 | 64.26 | 269.54 |
| 281 | ri | 0.18 | 61.20 | 208.70 | 0.20 | 62.34 | 242.87 |
| 282 | se | 0.22 | 56.05 | 316.53 | 0.23 | 56.24 | 204.83 |
| 283 | e | 0.19 | 53.19 | 261.55 | 0.24 | 54.56 | 213.41 |
| 284 | kor | 0.13 | 59.52 | 210.15 | 0.14 | 59.96 | 272.56 |
| 285 | an | 0.24 | 54.36 | 175.20 | 0.20 | 56.98 | 245.22 |
| 286 | jing | 0.30 | 60.02 | 215.94 | 0.25 | 56.74 | 243.92 |
| 287 | ter | 0.14 | 64.31 | 199.47 | 0.15 | 62.24 | 225.95 |

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|---|---|---|---|---|---|---|---|
| 288 | jum | 0.23 | 59.91 | 210.45 | 0.26 | 54.32 | 232.88 |
| 289 | pa | 0.18 | 59.22 | 202.55 | 0.09 | 59.67 | 240.82 |
| 290 | se | 0.21 | 51.93 | 214.71 | 0.25 | 55.76 | 218.22 |
| 291 | ke | 0.21 | 55.00 | 190.67 | 0.28 | 46.47 | 205.63 |
| 292 | tul | 0.25 | 60.51 | 210.09 | 0.14 | 61.82 | 287.94 |
| 293 | da | 0.21 | 62.27 | 219.23 | 0.13 | 67.59 | 226.29 |
| 294 | ging | 0.24 | 51.17 | 173.82 | 0.40 | 58.21 | 184.87 |
| 295 | di | 0.12 | 64.42 | 197.78 | 0.13 | 64.75 | 208.57 |
| 296 | a | 0.14 | 68.21 | 249.08 | 0.22 | 69.42 | 274.09 |
| 297 | meng | 0.19 | 69.01 | 229.02 | 0.14 | 67.05 | 259.35 |
| 298 | gong | 0.27 | 64.80 | 192.56 | 0.22 | 69.70 | 222.74 |
| 299 | gong | 0.14 | 70.19 | 212.11 | 0.16 | 67.28 | 217.14 |
| 300 | da | 0.12 | 69.66 | 208.71 | 0.16 | 66.81 | 210.50 |
| 301 | ging | 0.12 | 59.17 | 188.00 | 0.16 | 62.09 | 196.92 |
| 302 | i | 0.34 | 50.59 | 191.66 | 0.26 | 47.74 | 207.10 |
| 303 | tu | 0.16 | 58.00 | 199.36 | 0.13 | 57.41 | 393.45 |
| 304 | di | 0.19 | 56.90 | 190.60 | 0.16 | 61.08 | 229.19 |
| 305 | mu | 0.15 | 49.79 | 179.00 | 0.26 | 64.67 | 194.88 |
| 306 | lut | 0.25 | 53.80 | 217.82 | 0.27 | 54.79 | 210.11 |
| 307 | un | 0.24 | 54.09 | 194.93 | 0.18 | 53.84 | 203.06 |
| 308 | tuk | 0.15 | 59.44 | 251.34 | 0.12 | 54.53 | 367.59 |
| 309 | me | 0.23 | 61.38 | 206.57 | 0.09 | 66.87 | 210.73 |
| 310 | ma | 0.19 | 46.77 | 182.63 | 0.22 | 63.01 | 196.93 |
| 311 | kan | 0.16 | 54.03 | 183.49 | 0.19 | 62.62 | 226.41 |
| 312 | nya | 0.30 | 62.82 | 214.98 | 0.14 | 70.87 | 214.49 |
| 313 | di | 0.19 | 51.77 | 191.84 | 0.19 | 56.00 | 209.14 |
| 314 | tem | 0.21 | 60.46 | 194.89 | 0.22 | 53.07 | 225.10 |
| 315 | pat | 0.21 | 62.14 | 195.68 | 0.24 | 58.84 | 220.86 |
| 316 | yang | 0.13 | 57.26 | 192.78 | 0.19 | 61.34 | 245.37 |
| 317 | se | 0.15 | 54.55 | 190.45 | 0.15 | 56.56 | 223.27 |
| 318 | la | 0.14 | 53.08 | 186.40 | 0.12 | 64.12 | 187.17 |
| 319 | mat | 0.20 | 54.20 | 175.99 | 0.14 | 51.94 | 252.04 |
| 320 | da | 0.12 | 60.71 | 189.57 | 0.14 | 63.01 | 195.80 |
| 321 | lam | 0.13 | 62.73 | 223.30 | 0.26 | 63.53 | 287.83 |
| 322 | per | 0.18 | 61.00 | 211.04 | 0.11 | 65.49 | 283.53 |
| 323 | ja | 0.11 | 64.97 | 189.02 | 0.14 | 69.33 | 226.57 |
| 324 | la | 0.21 | 61.35 | 175.84 | 0.15 | 66.66 | 191.62 |
| 325 | nan | 0.26 | 64.59 | 194.32 | 0.44 | 59.17 | 211.57 |
| 326 | di | 0.12 | 57.64 | 207.12 | 0.08 | 57.39 | 211.57 |
| 327 | a | 0.14 | 61.27 | 189.33 | 0.12 | 64.23 | 190.30 |
| 328 | la | 0.22 | 54.58 | 185.40 | 0.20 | 69.20 | 208.06 |
| 329 | lu | 0.16 | 65.85 | 209.43 | 0.27 | 66.74 | 231.61 |
| 330 | di | 0.13 | 58.49 | 196.93 | 0.15 | 60.43 | 207.55 |
| 331 | te | 0.21 | 50.65 | 193.18 | 0.20 | 48.24 | 226.22 |
| 332 | pi | 0.13 | 56.98 | 211.24 | 0.21 | 59.29 | 219.12 |
| 333 | a | 0.13 | 51.90 | 199.21 | 0.21 | 61.09 | 202.73 |
| 334 | nak | 0.17 | 58.84 | 193.09 | 0.22 | 63.53 | 246.04 |
| 335 | su | 0.18 | 54.83 | 203.12 | 0.23 | 56.11 | 217.72 |
| 336 | ngai | 0.29 | 57.47 | 182.82 | 0.22 | 59.10 | 211.70 |
| 337 | se | 0.16 | 53.26 | 193.28 | 0.22 | 59.71 | 293.16 |
| 338 | ma | 0.19 | 63.97 | 200.59 | 0.18 | 70.07 | 219.52 |
| 339 | sa | 0.26 | 58.19 | 242.16 | 0.26 | 60.67 | 269.05 |
| 340 | ber | 0.14 | 61.26 | 211.73 | 0.14 | 64.80 | 270.36 |
| 341 | ja | 0.16 | 60.51 | 192.53 | 0.16 | 63.85 | 233.33 |
| 342 | lan | 0.23 | 60.29 | 201.98 | 0.26 | 66.57 | 221.34 |
| 343 | an | 0.17 | 56.75 | 194.90 | 0.20 | 63.99 | 195.34 |
| 344 | jing | 0.26 | 57.00 | 245.45 | 0.10 | 64.59 | 194.59 |
| 345 | i | 0.10 | 48.06 | 192.63 | 0.23 | 61.62 | 219.93 |
| 346 | tu | 0.15 | 58.26 | 208.89 | 0.21 | 62.32 | 234.49 |
| 347 | me | 0.19 | 64.35 | 190.12 | 0.15 | 68.59 | 209.47 |
| 348 | li | 0.09 | 55.36 | 186.09 | 0.17 | 67.17 | 215.28 |
| 349 | hat | 0.33 | 54.20 | 197.30 | 0.25 | 58.85 | 216.01 |
| 350 | ke | 0.10 | 53.79 | 253.84 | 0.09 | 58.31 | 204.51 |
| 351 | da | 0.11 | 49.92 | 192.38 | 0.15 | 65.40 | 202.98 |
| 352 | lam | 0.14 | 59.92 | 215.87 | 0.23 | 62.28 | 265.07 |
| 353 | a | 0.07 | 59.60 | 208.16 | 0.09 | 55.18 | 228.17 |
| 354 | ir | 0.25 | 54.64 | 177.77 | 0.21 | 51.38 | 179.51 |
| 355 | a | 0.15 | 61.45 | 199.92 | 0.17 | 65.37 | 197.19 |

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|---|---|---|---|---|---|---|---|
| 356 | da | 0.10 | 65.02 | 257.08 | 0.20 | 66.15 | 251.19 |
| 357 | se | 0.16 | 56.70 | 264.81 | 0.12 | 57.84 | 283.79 |
| 358 | e | 0.22 | 57.90 | 131.35 | 0.17 | 62.38 | 245.69 |
| 359 | kor | 0.13 | 54.85 | 194.47 | 0.09 | 60.22 | 270.82 |
| 360 | an | 0.18 | 60.34 | 192.01 | 0.22 | 68.50 | 220.77 |
| 361 | jing | 0.29 | 60.12 | 189.33 | 0.19 | 67.57 | 207.49 |
| 362 | la | 0.20 | 58.49 | 177.31 | 0.12 | 64.76 | 188.40 |
| 363 | in | 0.14 | 61.76 | 208.35 | 0.40 | 57.88 | 245.09 |
| 364 | de | 0.33 | 59.45 | 198.14 | 0.17 | 61.58 | 204.50 |
| 365 | ngan | 0.21 | 61.69 | 214.35 | 0.15 | 67.64 | 232.79 |
| 366 | da | 0.15 | 64.57 | 205.86 | 0.18 | 68.09 | 267.70 |
| 367 | ging | 0.23 | 50.22 | 188.25 | 0.13 | 64.04 | 227.58 |
| 368 | di | 0.12 | 53.75 | 184.17 | 0.11 | 67.17 | 217.78 |
| 369 | mu | 0.14 | 56.16 | 177.83 | 0.18 | 67.78 | 202.58 |
| 370 | lut | 0.14 | 54.88 | 179.73 | 0.11 | 67.77 | 195.71 |
| 371 | nya | 0.18 | 64.08 | 204.67 | 0.20 | 66.50 | 211.17 |
| 372 | di | 0.09 | 58.59 | 209.68 | 0.13 | 64.13 | 219.06 |
| 373 | da | 0.13 | 51.82 | 185.00 | 0.10 | 61.68 | 193.58 |
| 374 | lam | 0.20 | 49.89 | 196.53 | 0.19 | 57.00 | 191.66 |
| 375 | a | 0.15 | 49.00 | 177.66 | 0.18 | 60.26 | 204.37 |
| 376 | ir | 0.18 | 55.30 | 192.97 | 0.07 | 64.52 | 224.83 |
| 377 | i | 0.15 | 56.64 | 197.12 | 0.15 | 59.88 | 267.78 |
| 378 | tu | 0.12 | 48.00 | 309.62 | 0.31 | 58.39 | 221.97 |
| 379 | di | 0.07 | 64.75 | 227.51 | 0.13 | 62.59 | 202.70 |
| 380 | a | 0.13 | 59.40 | 240.15 | 0.17 | 63.53 | 267.04 |
| 381 | ti | 0.09 | 60.77 | 225.70 | 0.08 | 60.67 | 258.84 |
| 382 | dak | 0.17 | 59.23 | 193.13 | 0.26 | 59.73 | 205.81 |
| 383 | ta | 0.20 | 56.35 | 177.63 | 0.17 | 59.31 | 187.56 |
| 384 | hu | 0.19 | 60.82 | 213.66 | 0.39 | 61.32 | 222.43 |
| 385 | i | 0.19 | 46.50 | 192.35 | 0.06 | 44.26 | x |
| 386 | tu | 0.12 | 53.35 | 216.84 | 0.24 | 61.31 | 213.46 |
| 387 | i | 0.09 | 64.09 | 152.78 | 0.07 | 65.37 | 113.96 |
| 388 | a | 0.14 | 60.76 | 185.40 | 0.14 | 64.47 | 178.59 |
| 389 | lah | 0.17 | 62.94 | 191.63 | 0.17 | 63.45 | 191.83 |
| 390 | ba | 0.14 | 60.98 | 179.64 | 0.21 | 60.04 | 184.88 |
| 391 | yang | 0.17 | 62.56 | 193.52 | 0.11 | 63.46 | 191.03 |
| 392 | ba | 0.12 | 64.16 | 183.04 | 0.16 | 64.48 | 182.38 |
| 393 | yang | 0.14 | 56.04 | 179.60 | 0.20 | 56.48 | 178.84 |
| 394 | nya | 0.11 | 46.50 | 182.41 | 0.08 | 66.48 | 199.15 |
| 395 | sen | 0.30 | 56.13 | 200.09 | 0.14 | 55.71 | 230.26 |
| 396 | di | 0.13 | 62.74 | 221.83 | 0.18 | 65.23 | 283.34 |
| 397 | ri | 0.26 | 55.30 | 184.02 | 0.30 | 59.61 | 204.33 |
| 398 | di | 0.13 | 66.89 | 199.75 | 0.07 | 61.96 | 206.69 |
| 399 | a | 0.24 | 66.71 | 225.70 | 0.16 | 71.00 | 196.03 |
| 400 | ma | 0.15 | 67.01 | 197.53 | 0.22 | 67.32 | 213.40 |
| 401 | hu | 0.11 | 65.91 | 205.62 | 0.20 | 68.84 | 269.70 |
| 402 | men | 0.09 | 61.73 | 190.34 | 0.16 | 69.73 | 277.68 |
| 403 | da | 0.18 | 52.66 | 184.81 | 0.14 | 61.32 | 259.43 |
| 404 | pat | 0.21 | 54.76 | 191.58 | 0.18 | 58.15 | 141.48 |
| 405 | kan | 0.23 | 64.49 | 195.62 | 0.11 | 62.33 | 207.20 |
| 406 | da | 0.20 | 59.42 | 188.48 | 0.16 | 66.16 | 192.88 |
| 407 | ging | 0.21 | 58.11 | 191.40 | 0.12 | 57.21 | 188.10 |
| 408 | i | 0.18 | 59.36 | 206.48 | 0.17 | 52.20 | 187.45 |
| 409 | tu | 0.19 | 52.11 | 167.28 | 0.15 | 46.46 | 468.90 |
| 410 | di | 0.17 | 61.77 | 193.88 | 0.11 | 62.32 | 192.60 |
| 411 | a | 0.19 | 57.68 | 186.06 | 0.23 | 61.27 | 186.70 |
| 412 | pun | 0.19 | 63.69 | 204.99 | 0.15 | 65.51 | 211.29 |
| 413 | me | 0.16 | 67.52 | 208.43 | 0.23 | 61.83 | 237.18 |
| 414 | nya | 0.26 | 59.79 | 176.91 | 0.20 | 65.92 | 284.08 |
| 415 | lak | 0.40 | 50.72 | 213.66 | 0.24 | 61.45 | 280.59 |
| 416 | ke | 0.14 | 48.17 | 418.02 | 0.16 | 57.67 | 219.90 |
| 417 | pa | 0.14 | 54.86 | 182.75 | 0.14 | 62.58 | 205.52 |
| 418 | da | 0.12 | 58.90 | 188.27 | 0.06 | 58.45 | 185.20 |
| 419 | an | 0.17 | 57.46 | 183.89 | 0.29 | 60.89 | 185.04 |
| 420 | jing | 0.24 | 62.17 | 198.97 | 0.26 | 65.66 | 193.22 |
| 421 | di | 0.09 | 59.91 | 184.42 | 0.06 | 61.87 | 190.19 |
| 422 | da | 0.14 | 60.99 | 188.67 | 0.08 | 58.74 | 186.48 |
| 423 | lam | 0.07 | 59.65 | 198.44 | 0.17 | 56.61 | 185.97 |

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|---|---|---|---|---|---|---|---|
| 424 | a | 0.06 | 61.60 | 180.30 | 0.09 | 56.46 | 180.30 |
| 425 | ir | 0.19 | 57.51 | 171.93 | 0.24 | 54.54 | 177.80 |
| 426 | se | 0.25 | 58.21 | 231.30 | 0.21 | 59.19 | 199.74 |
| 427 | ba | 0.15 | 62.43 | 192.18 | 0.19 | 65.93 | 190.13 |
| 428 | ik | 0.15 | 62.11 | 229.68 | 0.14 | 62.75 | 197.41 |
| 429 | sa | 0.27 | 57.84 | 224.37 | 0.20 | 61.79 | 212.19 |
| 430 | ja | 0.24 | 63.44 | 195.83 | 0.21 | 66.00 | 215.92 |
| 431 | di | 0.06 | 60.65 | 190.35 | 0.05 | 68.08 | 220.27 |
| 432 | a | 0.15 | 65.46 | 192.13 | 0.07 | 70.90 | 220.94 |
| 433 | mem | 0.17 | 55.15 | 186.21 | 0.12 | 65.32 | 211.88 |
| 434 | bu | 0.11 | 44.76 | 180.03 | 0.07 | 51.19 | 215.21 |
| 435 | ka | 0.16 | 57.14 | 258.01 | 0.16 | 63.67 | 198.24 |
| 436 | mu | 0.15 | 61.73 | 166.67 | 0.15 | 60.41 | 179.14 |
| 437 | lut | 0.29 | 58.25 | 208.10 | 0.34 | 59.63 | 224.97 |
| 438 | da | 0.22 | 60.95 | 191.44 | 0.18 | 65.39 | 199.43 |
| 439 | ging | 0.15 | 58.39 | 213.99 | 0.23 | 65.11 | 242.25 |
| 440 | di | 0.17 | 66.36 | 211.42 | 0.09 | 64.18 | 241.68 |
| 441 | mu | 0.16 | 63.54 | 189.40 | 0.20 | 72.16 | 219.53 |
| 442 | lut | 0.16 | 59.60 | 188.52 | 0.13 | 63.90 | 213.02 |
| 443 | nya | 0.20 | 64.53 | 203.25 | 0.37 | 63.72 | 274.40 |
| 444 | ter | 0.12 | 61.17 | 195.81 | 0.12 | 62.22 | 235.72 |
| 445 | ja | 0.32 | 53.96 | 207.56 | 0.22 | 63.96 | 290.23 |
| 446 | tuh | 0.29 | 52.02 | 215.74 | 0.20 | 60.51 | 252.49 |
| 447 | ke | 0.16 | 55.36 | 195.88 | 0.08 | 61.93 | 213.09 |
| 448 | da | 0.10 | 52.56 | 187.98 | 0.07 | 67.40 | 192.41 |
| 449 | lam | 0.18 | 53.03 | 203.89 | 0.20 | 57.77 | 186.70 |
| 450 | a | 0.16 | 58.97 | 174.23 | 0.10 | 54.99 | 227.29 |
| 451 | ir | 0.31 | 56.69 | 181.42 | 0.22 | 60.42 | 173.76 |
| 452 | se | 0.26 | 56.14 | 215.98 | 0.19 | 57.63 | 161.56 |
| 453 | e | 0.23 | 51.20 | 164.80 | 0.22 | 63.80 | 193.77 |
| 454 | kor | 0.22 | 61.25 | 285.97 | 0.15 | 65.90 | 285.48 |
| 455 | se | 0.12 | 59.14 | 199.16 | 0.24 | 60.57 | 288.31 |
| 456 | mut | 0.23 | 68.08 | 202.00 | 0.37 | 65.05 | 223.44 |
| 457 | yang | 0.24 | 61.91 | 202.12 | 0.23 | 66.45 | 197.97 |
| 458 | ke | 0.11 | 51.31 | 191.43 | 0.10 | 54.40 | 188.20 |
| 459 | hau | 0.17 | 53.23 | 177.28 | 0.19 | 61.65 | 192.19 |
| 460 | san | 0.57 | 54.36 | 191.79 | 0.50 | 59.30 | 217.41 |
| 461 | i | 0.14 | 60.82 | 194.59 | 0.14 | 69.63 | 217.83 |
| 462 | ngin | 0.22 | 64.62 | 209.90 | 0.15 | 68.43 | 285.84 |
| 463 | me | 0.18 | 65.03 | 203.61 | 0.14 | 70.02 | 252.26 |
| 464 | mi | 0.24 | 49.81 | 185.59 | 0.07 | 72.58 | 208.80 |
| 465 | num | 0.28 | 53.60 | 206.18 | 0.23 | 68.55 | 201.26 |
| 466 | a | 0.18 | 54.80 | 170.94 | 0.21 | 62.33 | 190.78 |
| 467 | ir | 0.49 | 53.38 | 195.61 | 0.15 | 68.32 | 207.48 |
| 468 | da | 0.16 | 61.09 | 188.66 | 0.23 | 63.43 | 201.57 |
| 469 | ri | 0.17 | 63.66 | 196.12 | 0.20 | 55.27 | 214.46 |
| 470 | a | 0.16 | 51.62 | 410.22 | 0.10 | 56.90 | 288.31 |
| 471 | ir | 0.15 | 51.95 | 193.34 | 0.22 | 61.40 | 217.21 |
| 472 | ter | 0.19 | 53.31 | 188.90 | 0.14 | 56.74 | 199.31 |
| 473 | jun | 0.24 | 59.56 | 193.48 | 0.26 | 67.90 | 213.30 |
| 474 | yang | 0.19 | 54.78 | 187.64 | 0.19 | 67.77 | 260.98 |
| 475 | ber | 0.13 | 47.35 | 185.59 | 0.08 | 60.69 | 228.86 |
| 476 | ham | 0.20 | 43.76 | 185.44 | 0.17 | 62.27 | 195.86 |
| 477 | pi | 0.11 | 55.93 | 194.75 | 0.14 | 55.31 | 189.65 |
| 478 | ran | 0.22 | 48.77 | 176.64 | 0.25 | 52.69 | 178.78 |
| 479 | na | 0.17 | 58.14 | 187.36 | 0.21 | 61.81 | 186.38 |
| 480 | mun | 0.38 | 56.31 | 221.60 | 0.40 | 60.18 | 225.02 |
| 481 | na | 0.14 | 62.92 | 199.25 | 0.12 | 63.96 | 202.75 |
| 482 | sib | 0.18 | 56.59 | 211.20 | 0.17 | 60.31 | 315.00 |
| 483 | nya | 0.23 | 68.02 | 219.13 | 0.17 | 69.05 | 257.23 |
| 484 | ma | 0.22 | 61.45 | 180.83 | 0.25 | 66.91 | 250.37 |
| 485 | lang | 0.35 | 58.19 | 200.00 | 0.28 | 68.53 | 255.26 |
| 486 | a | 0.13 | 56.95 | 192.49 | 0.17 | 55.76 | 190.04 |
| 487 | pa | 0.08 | 54.51 | 186.61 | 0.16 | 62.45 | 192.78 |
| 488 | bi | 0.10 | 58.28 | 190.35 | 0.16 | 62.30 | 176.82 |
| 489 | la | 0.09 | 55.28 | 193.17 | 0.23 | 64.63 | 210.65 |
| 490 | ka | 0.13 | 58.96 | 187.43 | 0.17 | 59.64 | 220.51 |
| 491 | ki | 0.19 | 53.65 | 191.22 | 0.08 | 55.65 | 241.91 |

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|---|---|---|---|---|---|---|---|
| 492 | nya | 0.26 | 63.80 | 207.25 | 0.11 | 58.17 | 240.80 |
| 493 | ter | 0.16 | 60.15 | 197.24 | 0.11 | 60.16 | 256.63 |
| 494 | ge | 0.16 | 59.11 | 189.51 | 0.09 | 62.65 | 257.21 |
| 495 | lin | 0.15 | 43.20 | 184.63 | 0.19 | 64.67 | 305.62 |
| 496 | cir | 0.35 | 52.73 | 269.33 | 0.25 | 63.06 | 278.59 |
| 497 | dan | 0.21 | 61.30 | 235.65 | 0.24 | 65.60 | 194.99 |
| 498 | ter | 0.12 | 60.03 | 217.41 | 0.15 | 62.27 | 204.56 |
| 499 | ja | 0.22 | 62.66 | 202.20 | 0.24 | 59.91 | 308.23 |
| 500 | tuh | 0.24 | 57.17 | 254.66 | 0.18 | 66.48 | 290.22 |
| 501 | di | 0.15 | 61.86 | 197.73 | 0.08 | 66.38 | 248.48 |
| 502 | da | 0.14 | 57.10 | 184.69 | 0.13 | 66.67 | 216.46 |
| 503 | lam | 0.28 | 57.35 | 198.20 | 0.26 | 60.09 | 208.55 |
| 504 | a | 0.16 | 55.49 | 182.00 | 0.12 | 60.49 | 190.90 |
| 505 | ir | 0.28 | 60.55 | 201.42 | 0.23 | 61.73 | 191.65 |
| 506 | ter | 0.21 | 59.40 | 196.25 | 0.12 | 64.73 | 204.50 |
| 507 | jun | 0.17 | 59.74 | 194.89 | 0.13 | 67.00 | 221.27 |
| 508 | yang | 0.24 | 61.97 | 189.01 | 0.17 | 66.62 | 252.74 |
| 509 | de | 0.14 | 55.62 | 187.83 | 0.14 | 63.45 | 217.83 |
| 510 | ras | 0.29 | 53.96 | 172.07 | 0.30 | 54.55 | 181.49 |
| 511 | a | 0.14 | 59.26 | 151.95 | 0.09 | 60.65 | 217.18 |
| 512 | pa | 0.09 | 64.18 | 218.59 | 0.11 | 65.55 | 260.61 |
| 513 | bi | 0.09 | 67.42 | 224.52 | 0.14 | 66.89 | 268.90 |
| 514 | la | 0.21 | 65.36 | 265.35 | 0.09 | 67.98 | 315.11 |
| 515 | di | 0.11 | 61.58 | 245.16 | 0.06 | 67.47 | 332.86 |
| 516 | a | 0.19 | 59.00 | 226.75 | 0.11 | 68.50 | 311.39 |
| 517 | ham | 0.28 | 58.39 | 207.90 | 0.23 | 65.66 | 251.51 |
| 518 | pir | 0.16 | 61.86 | 227.15 | 0.12 | 65.07 | 243.38 |
| 519 | ham | 0.18 | 65.97 | 198.16 | 0.17 | 68.00 | 215.40 |
| 520 | pir | 0.10 | 63.90 | 195.42 | 0.09 | 64.23 | 208.17 |
| 521 | le | 0.13 | 60.32 | 181.74 | 0.15 | 66.28 | 190.79 |
| 522 | mas | 0.50 | 55.75 | 196.29 | 0.49 | 59.31 | 214.86 |
| 523 | se | 0.11 | 60.64 | 199.63 | 0.21 | 57.83 | 196.52 |
| 524 | e | 0.18 | 58.29 | 195.65 | 0.23 | 62.27 | 199.73 |
| 525 | kor | 0.15 | 58.41 | 239.18 | 0.10 | 56.39 | 195.83 |
| 526 | mer | 0.22 | 64.46 | 208.87 | 0.29 | 62.20 | 188.36 |
| 527 | pa | 0.23 | 57.32 | 190.35 | 0.23 | 61.30 | 212.36 |
| 528 | ti | 0.17 | 61.30 | 214.85 | 0.24 | 55.71 | 241.69 |
| 529 | yang | 0.19 | 65.72 | 210.57 | 0.18 | 63.65 | 254.78 |
| 530 | ber | 0.23 | 59.76 | 218.68 | 0.26 | 65.08 | 313.40 |
| 531 | teng | 0.24 | 52.03 | 188.55 | 0.15 | 60.26 | 282.10 |
| 532 | gek | 0.25 | 53.45 | 215.76 | 0.27 | 61.50 | 234.90 |
| 533 | ti | 0.11 | 49.69 | 285.34 | 0.06 | 54.00 | 209.32 |
| 534 | dak | 0.17 | 55.45 | 191.84 | 0.16 | 62.26 | 146.61 |
| 535 | ja | 0.20 | 55.49 | 270.88 | 0.18 | 65.95 | 189.20 |
| 536 | uh | 0.18 | 61.97 | 205.00 | 0.21 | 66.10 | 221.74 |
| 537 | da | 0.09 | 65.15 | 215.28 | 0.14 | 65.76 | 227.42 |
| 538 | ri | 0.20 | 60.12 | 192.53 | 0.09 | 66.75 | 201.48 |
| 539 | po | 0.20 | 50.22 | 167.16 | 0.09 | 59.32 | 192.55 |
| 540 | kok | 0.20 | 53.34 | 201.37 | 0.27 | 59.01 | 198.14 |
| 541 | i | 0.15 | 44.23 | x | 0.19 | 55.65 | 202.73 |
| 542 | tu | 0.14 | 56.07 | 223.20 | 0.29 | 57.96 | 284.07 |
| 543 | men | 0.14 | 63.36 | 225.73 | 0.17 | 66.53 | 279.79 |
| 544 | ja | 0.26 | 63.13 | 189.98 | 0.16 | 67.05 | 291.62 |
| 545 | tuh | 0.25 | 55.70 | 115.11 | 0.19 | 59.24 | 343.33 |
| 546 | kan | 0.19 | 60.05 | 194.13 | 0.13 | 64.33 | 248.58 |
| 547 | se | 0.18 | 60.30 | 191.77 | 0.22 | 63.15 | 199.48 |
| 548 | he | 0.13 | 52.98 | 184.03 | 0.18 | 66.83 | 237.60 |
| 549 | lai | 0.24 | 50.65 | 226.27 | 0.27 | 67.94 | 267.26 |
| 550 | da | 0.12 | 58.92 | 191.55 | 0.13 | 65.34 | 195.99 |
| 551 | un | 0.24 | 58.35 | 177.35 | 0.33 | 59.68 | 154.81 |
| 552 | se | 0.19 | 59.73 | 211.52 | 0.15 | 56.51 | 247.80 |
| 553 | mut | 0.32 | 61.50 | 234.01 | 0.16 | 66.99 | 288.07 |
| 554 | i | 0.14 | 57.05 | 198.76 | 0.15 | 62.73 | 305.64 |
| 555 | tu | 0.23 | 51.97 | 191.96 | 0.23 | 61.45 | 313.88 |
| 556 | pun | 0.13 | 59.94 | 222.88 | 0.22 | 67.79 | 316.30 |
| 557 | me | 0.13 | 67.37 | 218.90 | 0.12 | 69.57 | 285.50 |
| 558 | man | 0.32 | 60.20 | 184.85 | 0.31 | 68.75 | 224.80 |
| 559 | jat | 0.30 | 53.99 | 207.84 | 0.29 | 62.50 | 281.94 |

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| 560 | ke | 0.11 | 58.27 | 201.99 | 0.08 | 57.15 | x |
| 561 | a | 0.24 | 54.37 | 189.29 | 0.12 | 58.49 | 212.77 |
| 562 | tas | 0.25 | 57.54 | 219.83 | 0.16 | 60.38 | 223.73 |
| 563 | da | 0.11 | 59.03 | 185.84 | 0.15 | 67.84 | 214.03 |
| 564 | un | 0.23 | 61.98 | 236.06 | 0.24 | 65.63 | 258.62 |
| 565 | ter | 0.14 | 57.01 | 210.45 | 0.12 | 65.99 | 312.91 |
| 566 | se | 0.25 | 54.70 | 179.93 | 0.18 | 59.42 | 289.42 |
| 567 | but | 0.29 | 53.06 | 211.30 | 0.24 | 62.89 | 245.04 |
| 568 | dan | 0.22 | 57.76 | 204.47 | 0.24 | 67.98 | 214.48 |
| 569 | ak | 0.18 | 59.30 | 133.08 | 0.21 | 63.60 | 199.60 |
| 570 | hir | 0.12 | 52.83 | 182.54 | 0.18 | 69.84 | 200.03 |
| 571 | nya | 0.25 | 53.74 | 212.13 | 0.25 | 62.84 | 213.33 |
| 572 | ti | 0.20 | 60.58 | 196.49 | 0.15 | 66.10 | 220.38 |
| 573 | ba | 0.14 | 67.28 | 215.08 | 0.10 | 64.98 | 267.71 |
| 574 | de | 0.16 | 59.86 | 210.28 | 0.08 | 63.68 | 260.10 |
| 575 | ngan | 0.09 | 56.29 | 186.14 | 0.15 | 60.19 | 250.64 |
| 576 | se | 0.15 | 52.13 | 292.79 | 0.11 | 58.99 | 406.19 |
| 577 | la | 0.20 | 51.73 | 215.78 | 0.15 | 66.05 | 329.45 |
| 578 | mat | 0.35 | 50.85 | 193.76 | 0.14 | 66.06 | 306.24 |
| 579 | di | 0.15 | 48.92 | 187.43 | 0.21 | 59.67 | 200.20 |
| 580 | te | 0.08 | 49.44 | 187.69 | 0.09 | 61.84 | 288.32 |
| 581 | bing | 0.07 | 48.53 | 187.19 | 0.21 | 68.60 | 260.24 |
| 582 | su | 0.21 | 52.83 | 263.06 | 0.14 | 59.35 | 200.68 |
| 583 | ngai | 0.27 | 57.49 | 178.07 | 0.36 | 54.43 | 189.84 |
| 584 | be | 0.19 | 64.29 | 212.84 | 0.14 | 67.43 | 196.45 |
| 585 | be | 0.12 | 68.06 | 216.20 | 0.09 | 67.26 | 191.40 |
| 586 | ra | 0.19 | 63.29 | 228.91 | 0.20 | 62.40 | 186.38 |
| 587 | pa | 0.16 | 63.71 | 290.88 | 0.21 | 65.98 | 231.03 |
| 588 | ha | 0.12 | 61.87 | 245.52 | 0.08 | 63.79 | 278.90 |
| 589 | ri | 0.19 | 58.52 | 198.77 | 0.19 | 61.96 | 242.19 |
| 590 | ke | 0.10 | 60.07 | 183.72 | 0.08 | 65.23 | 223.29 |
| 591 | mu | 0.12 | 60.99 | 171.11 | 0.13 | 67.41 | 259.11 |
| 592 | di | 0.06 | 60.07 | 180.28 | 0.07 | 62.18 | 255.71 |
| 593 | an | 0.71 | 55.97 | 265.52 | 0.56 | 63.84 | 236.23 |
| 594 | se | 0.22 | 59.74 | 198.26 | 0.16 | 58.74 | 271.50 |
| 595 | o | 0.17 | 64.52 | 161.98 | 0.12 | 71.01 | 193.52 |
| 596 | rang | 0.22 | 61.71 | 219.78 | 0.21 | 69.15 | 240.39 |
| 597 | pem | 0.17 | 65.51 | 203.68 | 0.14 | 67.26 | 288.30 |
| 598 | bu | 0.12 | 67.32 | 194.94 | 0.14 | 67.92 | 285.59 |
| 599 | ru | 0.13 | 65.03 | 214.24 | 0.17 | 67.12 | 280.03 |
| 600 | me | 0.18 | 67.86 | 204.48 | 0.08 | 70.01 | 271.93 |
| 601 | li | 0.21 | 61.60 | 191.05 | 0.10 | 69.63 | 260.77 |
| 602 | hat | 0.19 | 61.80 | 208.38 | 0.23 | 64.29 | 240.73 |
| 603 | se | 0.18 | 55.87 | 211.20 | 0.11 | 62.02 | 147.21 |
| 604 | e | 0.21 | 61.76 | 206.53 | 0.13 | 65.67 | 212.91 |
| 605 | kor | 0.16 | 56.63 | 216.11 | 0.12 | 56.57 | 246.27 |
| 606 | mer | 0.22 | 65.65 | 208.73 | 0.23 | 64.68 | 278.92 |
| 607 | pa | 0.25 | 56.76 | 189.25 | 0.21 | 59.21 | 272.05 |
| 608 | ti | 0.26 | 61.05 | 215.03 | 0.33 | 60.21 | 244.09 |
| 609 | dan | 0.21 | 63.58 | 199.77 | 0.18 | 62.69 | 227.61 |
| 610 | i | 0.15 | 67.55 | 206.34 | 0.05 | 59.25 | 239.44 |
| 611 | ngin | 0.28 | 68.34 | 207.36 | 0.20 | 65.47 | 320.48 |
| 612 | me | 0.13 | 65.37 | 197.72 | 0.07 | 69.40 | 275.87 |
| 613 | nem | 0.27 | 64.61 | 191.62 | 0.11 | 69.97 | 216.47 |
| 614 | bak | 0.17 | 60.14 | 196.98 | 0.22 | 65.38 | 194.28 |
| 615 | nya | 0.23 | 54.19 | 175.77 | 0.27 | 54.32 | 179.02 |
| 616 | na | 0.25 | 57.18 | 192.05 | 0.17 | 68.23 | 192.93 |
| 617 | mun | 0.40 | 59.33 | 209.12 | 0.51 | 60.08 | 187.94 |
| 618 | se | 0.18 | 57.70 | 205.21 | 0.20 | 61.88 | 220.32 |
| 619 | mut | 0.27 | 60.75 | 229.11 | 0.20 | 65.49 | 262.26 |
| 620 | ter | 0.13 | 58.64 | 195.57 | 0.09 | 64.75 | 259.34 |
| 621 | li | 0.16 | 59.93 | 189.03 | 0.18 | 69.43 | 218.63 |
| 622 | hat | 0.24 | 59.15 | 212.96 | 0.23 | 68.32 | 239.93 |
| 623 | a | 0.20 | 57.13 | 192.53 | 0.18 | 64.76 | 210.11 |
| 624 | kan | 0.18 | 59.21 | 247.84 | 0.18 | 62.85 | 215.47 |
| 625 | per | 0.16 | 59.33 | 228.07 | 0.08 | 63.72 | 237.50 |
| 626 | la | 0.11 | 66.50 | 193.33 | 0.11 | 67.80 | 221.85 |
| 627 | ku | 0.09 | 58.61 | 196.73 | 0.07 | 59.28 | 225.41 |

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|---|---|---|---|---|---|---|---|
| 628 | an | 0.18 | 63.12 | 198.68 | 0.06 | 65.14 | 219.33 |
| 629 | pem | 0.11 | 61.75 | 191.92 | 0.08 | 62.47 | 229.29 |
| 630 | bu | 0.16 | 52.77 | 183.03 | 0.07 | 67.49 | 224.54 |
| 631 | ru | 0.09 | 59.60 | 198.91 | 0.08 | 63.14 | 235.00 |
| 632 | i | 0.17 | 54.25 | 206.97 | 0.18 | 61.67 | 284.67 |
| 633 | tu | 0.22 | 52.97 | 200.01 | 0.46 | 59.70 | 218.84 |
| 634 | se | 0.21 | 58.28 | 207.03 | 0.17 | 56.14 | 235.74 |
| 635 | mut | 0.24 | 60.38 | 212.31 | 0.23 | 64.21 | 212.99 |
| 636 | pun | 0.16 | 57.73 | 225.56 | 0.18 | 67.56 | 255.43 |
| 637 | lan | 0.22 | 66.51 | 205.61 | 0.24 | 65.43 | 286.73 |
| 638 | tas | 0.31 | 58.55 | 233.40 | 0.20 | 61.74 | 309.84 |
| 639 | meng | 0.23 | 68.60 | 197.88 | 0.22 | 69.45 | 217.97 |
| 640 | gi | 0.11 | 61.88 | 195.93 | 0.08 | 66.05 | 198.01 |
| 641 | git | 0.14 | 57.25 | 214.93 | 0.14 | 67.80 | 198.44 |
| 642 | ka | 0.24 | 52.68 | 214.53 | 0.24 | 56.12 | 204.73 |
| 643 | ki | 0.26 | 55.89 | 254.69 | 0.16 | 57.90 | 202.64 |
| 644 | pem | 0.17 | 63.82 | 208.52 | 0.11 | 65.53 | 202.65 |
| 645 | bu | 0.09 | 62.74 | 193.50 | 0.10 | 65.32 | 194.25 |
| 646 | ru | 0.14 | 65.43 | 203.50 | 0.10 | 66.98 | 193.15 |
| 647 | i | 0.11 | 52.12 | 200.58 | 0.22 | 61.43 | 193.99 |
| 648 | tu | 0.33 | 56.54 | 218.66 | 0.11 | 61.73 | 221.85 |
| 649 | dan | 0.26 | 59.79 | 223.25 | 0.25 | 62.77 | 249.50 |
| 650 | tem | 0.14 | 62.15 | 197.80 | 0.11 | 62.07 | 250.60 |
| 651 | ba | 0.17 | 59.03 | 188.78 | 0.15 | 61.09 | 248.95 |
| 652 | kan | 0.14 | 62.30 | 192.72 | 0.14 | 61.73 | 259.89 |
| 653 | nya | 0.19 | 64.58 | 206.16 | 0.12 | 64.44 | 251.68 |
| 654 | ter | 0.22 | 53.25 | 196.20 | 0.16 | 62.38 | 294.82 |
| 655 | sa | 0.17 | 48.35 | 388.93 | 0.14 | 60.19 | 342.43 |
| 656 | sar | 0.20 | 48.09 | 205.37 | 0.31 | 53.78 | 201.38 |
| 657 | mer | 0.18 | 63.79 | 215.88 | 0.15 | 61.93 | 231.29 |
| 658 | pa | 0.21 | 53.92 | 225.57 | 0.21 | 59.56 | 261.90 |
| 659 | ti | 0.14 | 56.88 | 281.38 | 0.09 | 57.48 | 377.92 |
| 660 | yang | 0.09 | 63.06 | 263.29 | 0.21 | 67.94 | 338.78 |
| 661 | ter | 0.13 | 63.72 | 235.44 | 0.10 | 67.35 | 263.35 |
| 662 | de | 0.11 | 65.22 | 201.47 | 0.19 | 70.83 | 212.96 |
| 663 | ngar | 0.22 | 67.06 | 207.62 | 0.27 | 66.68 | 225.61 |
| 664 | je | 0.11 | 62.22 | 203.65 | 0.11 | 66.19 | 209.12 |
| 665 | ri | 0.30 | 52.04 | 201.23 | 0.14 | 62.11 | 174.72 |
| 666 | tan | 0.28 | 57.99 | 241.63 | 0.20 | 61.66 | 200.59 |
| 667 | pem | 0.11 | 65.52 | 209.80 | 0.11 | 67.00 | 202.92 |
| 668 | bu | 0.11 | 65.49 | 192.88 | 0.06 | 64.59 | 112.62 |
| 669 | ru | 0.15 | 65.04 | 195.38 | 0.06 | 68.05 | 99.07 |
| 670 | i | 0.15 | 58.01 | 198.14 | 0.15 | 64.43 | 198.10 |
| 671 | tu | 0.13 | 51.63 | 226.85 | 0.08 | 64.03 | 232.19 |
| 672 | se | 0.22 | 55.72 | 222.48 | 0.24 | 60.47 | 294.68 |
| 673 | ge | 0.12 | 57.63 | 199.24 | 0.11 | 68.49 | 221.49 |
| 674 | ra | 0.14 | 61.18 | 192.87 | 0.12 | 64.61 | 221.43 |
| 675 | ter | 0.19 | 62.00 | 199.68 | 0.21 | 60.77 | 276.94 |
| 676 | bang | 0.24 | 65.93 | 206.38 | 0.25 | 67.04 | 277.16 |
| 677 | ber | 0.11 | 64.71 | 193.18 | 0.13 | 63.70 | 256.08 |
| 678 | e | 0.13 | 66.82 | 206.80 | 0.18 | 63.67 | 316.90 |
| 679 | dar | 0.11 | 61.57 | 197.39 | 0.17 | 68.68 | 249.74 |
| 680 | da | 0.17 | 59.13 | 188.23 | 0.11 | 66.12 | 196.39 |
| 681 | ri | 0.16 | 51.48 | 186.31 | 0.10 | 64.79 | 192.37 |
| 682 | si | 0.18 | 48.47 | 374.93 | 0.22 | 57.84 | 215.91 |
| 683 | tu | 0.32 | 53.64 | 204.88 | 0.29 | 63.28 | 185.34 |

# AUTHOR'S PROFILE

Muhammad Izzad bin Ramli completed his PhD at the Faculty of Computer and Mathematical science, Universiti Teknologi MARA. He received his PhD in Information Technology and Quantitative Science, Universiti Teknologi MARA. He was a UiTM's Young Lecturer's Scheme from 2014-2017.

## LIST OF PUBLICATIONS

1. Izzad Ramli, Nursuriati Jamil, Noraini Seman, and Norizah Ardi. **An Improved Syllabification for a Better Malay Language Text-to-Speech Synthesis (TTS)**. *Procedia Computer Science* 2015, 76, pp. 417-424.

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5. Izzad Ramli, Nursuriati Jamil, Noraini Seman, and Norizah Ardi. **The First Malay Language Storytelling Text-to-Speech (TTS) Corpus for Humanoid Robot Storytellers**. Journal of Fundamental and Applied Sciences, 2017,9(4S), pp. 340-358

## LIST OF AWARD

1. **Gold medal** – Invention, innovation and design exposition (IIDEX 2016), UITM Shah Alam, 2016.