



Employing MaryTTS to Synthesize the Tamil Language and Narrate Children's Stories

M.I. Fathima Nihla

Reg. No: MS21900822

M.Sc. in IT

Supervisor: Prof. Koliya Pulasinghe

October 2022

**Faculty of Graduate Studies and Research
Sri Lanka Institute of Information Technology
Sri Lanka**

I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

.....

Prof. Koliya Pulasinghe

Approved for MSc. Research Project:

.....

Head/<Department >

Approved for MSc:

.....

Head – Graduate Studies

DECLARATION

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

Sign: *Nihla*

(M.I. Fathima Nihla)

October 2022
Date:

ABSTRACT

Over five million individuals of Sri Lanka, or 15% of the entire population, speak Tamil as their native language, where the particular language is considered to be the country's second official language. When given a task to speak or read a language, kindergarteners may struggle to read and learn a language on their own. Especially in their native language. For example, Tamil. Play schools taught in English are hosted across the island, thus this could be one of the reasons. Storytelling is a formative experience for children. Early on, stories can influence a child's growth. Reading helps people gain knowledge and language. Reading is said to help kids learn languages. Due to the compelling nature of storytelling, it can be utilized in both Early Childhood Education and Primary Education. This is because both of these phases require knowledge transmission. Storytelling is an essential instructional tool, as well as a significant means of preserving culture and transmitting essential values to future generations. Currently, the literary plot must be updated in order to suit the expectations of a new audience, which exists in a culture where knowledge and information are abundant. Tamil is a difficult language to master when compared to other spoken languages due to its complex grammatical structure. In the context of the Tamil language, natural language processing (NLP) technologies are still in their early phases of development. Many other languages, spoken worldwide, have efficient computer systems that can operate in their native language, despite today's more complex and language-independent Text-to-Speech frameworks. In this situation, Tamil text-to-speech could be used to communicate with the children. During the first few years of a child's life, the child's mental development should be a top priority. There are only a few computer systems that can work with the Tamil language. Even though there are a lot of apps for telling stories, most of them are mostly made for the English language. The objective of the research is consequently to create an application for children that uses text-to-speech (TTS) technology to convey stories. Therefore, the research focuses on the significance of text-to-speech technology in supporting kids with the narration of a story. Once the storyteller application was implemented, it was compared to human speech. The results of the paired samples t-tests conducted on the TTS-generated speech samples and the human-produced speech samples revealed that there is a statistical significance exists between the two types of samples for every metric (speech quality), which means that there is no acceptable amount of difference between the TTS produced story (speech) and the human produced story (speech). The findings of this research indicate that modern TTS systems appear ready to proceed to next stages of evaluation once the speech quality reaches the necessary level.

ACKNOWLEDGEMENTS

I would like to offer my most sincere gratitude to each and every remarkable person who assisted me in carrying out this research to the best of their abilities. To begin, I would like to express my gratitude to my supervisor, Professor Koliya Pulasinghe, Professor at the Faculty of Computing at the Sri Lanka Institute of Information Technology. He was instrumental in ensuring that I was able to successfully complete this research project by providing me with his extensive knowledge, expert advice, and helpful direction.

Regarding my research, I would like to express my deepest gratitude to Mr. Samantha Rajapaksha, who is a senior lecturer and the M.Sc. Coordinator (IT) in the Faculty of Computing at the Sri Lanka Institute of Information Technology. He offered me some really helpful comments and recommendations. In addition, I would like to express my deepest gratitude to the research progress review committee for their insightful comments and suggestions regarding how the quality of my study might be enhanced.

Lastly, but certainly not least, I would want to convey my thanks to my loving husband, Meer Ahamed. I am very grateful for his unwavering affection and tolerance. And for supporting me throughout this process and continually encouraging me when the tasks appeared difficult and overwhelming.

October 2022, Nihla Iqbal.

TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS.....	v
List of Figures	vii
List of Tables	viii
Chapter 1 Introduction	1
1.1 Introduction	1
1.2 Background of the Study.....	1
1.3 Problem Statement	3
1.4 Research Aim and Objectives	3
1.5 Research Questions	4
1.6 Research Novelty/Contribution.....	4
1.7 Significance of the Study	4
1.8 Summary	5
Chapter 2 Literature Review	6
2.1 Introduction	6
2.2 Existing Story Telling Applications.....	6
2.3 Design Considerations for Tamil Text to Speech	8
2.4 Adopting MaryTTS for Language Synthesis	11
2.5 Summary	14
Chapter 3 Methodology of Tamil Story Teller	15
3.1 Introduction	15
3.2 An Under Resourced Language Synthesize in MaryTTS	15
3.3 System Design & Implementation	18
3.3.1 Text - to – Speech.....	18
3.3.2 Tamil Story Teller Implementation	20
3.4 Summary	23
Chapter 4 Evaluation of Tamil Story Teller	24
4.1 Introduction	24
4.2 Evaluation of Text-to-Speech Synthesizers	24
4.3 Evaluation Methodologies.....	24
4.4 Evaluation of the System.....	25
4.4.1 Participants and Design	27

4.4.2 Stimuli and Materials.....	27
4.4.3 Analysis	31
4.4.4 Results	32
4.5 Summary	35
Chapter 5 Conclusions	36
5.1 Introduction	36
5.2 Novelty of Project Compared to Existing Converter	36
5.3 Conclusion.....	36
5.4 Advantages of the Implemented System and Future Works	40
5.5 Summary	41
References.....	42

List of Figures

Figure 1: The Word Processor Application [34].....	14
Figure 2: Process of Synthesizing an Under Resourced Language in MaryTTS framework.....	17
Figure 3: Proposed Algorithm	18
Figure 4: TTS Model Architecture	20
Figure 5: The Implementation of Tamil Story Teller Application	22
Figure 6: Input the Story as a Text.....	22
Figure 7: The Application Narrating the Story in an Audio Form	23
Figure 8: Evaluation Methodologies.....	25

List of Tables

Table 1 : Indicators o f the Questionnaire.....	28
Table 2: Scores (from 1 to 5) explained for the Indicators	30
Table 3: Descriptive Statics of TTS Indicators and Human Speech Indicators.....	32
Table 4: Descriptive Statics of TTS Produced Speech and Human Produced Speech	33
Table 5: Paired Samples Statistics	34
Table 6: Paired Samples Correlations.....	34
Table 7: Paired Samples Test.....	34