



Design and Development of Speech Database of Marathi Numerals

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Abstract— *This paper describes the approach followed for development of speech database of Marathi digits starting from Shunya (zero) up to Nau (nine). The following paper describes the step by step procedure followed for the development of the speech database. For the development of automatic speech recognition (ASR) it is necessary to have a speech databases and the recognition rate depends upon the quality of the used speech databases.*

Keywords— *Automatic Speech Recognition, Isolated words, Marathi language, PRAAT, Speech Database, Speech recognition*

I. INTRODUCTION

Speech is the way communication between humans where human can share their information with each other. The researchers around the world are trying to develop new interface system for communication between human and computer. Speech is having the capability of being used as a mode of interaction between human and Computer. Estimated number of languages spoken around the world varies between 6,000 and 7,000. Language technologies can play a vital role in the natural interfaces for those who can't understand the particular language. The language technologies can be very useful in various domains like education sector, domestic sector, military sector, medical sector, agriculture sector, artificial intelligence sector etc. [1].

So to perform any type of research, researcher requires some previous data. Generally databases are fundamental for research. The research has done with other European languages and some Indian languages. That's why there is a scope for developing a speech database for Indian languages.

There are so many languages numbered 17 which are accepted by our constitution of India. The official languages of the Republic of India are Hindi (speakers of the various Hindi languages who consider their language to be "Hindi" account for 41% of the country) and English. According to the article 343(1) of the India, "The Official Language of the Union shall be Hindi in Devanagari script". The individual states can legislate their own official languages, depending on their linguistic demographics. Besides Hindi, 17 languages recognized by the constitution of India are: 1) Assamese 2) Tamil 3) Malayalam 4) Gujarati 5) Telugu 6) Oriya 7) Urdu 8) Bengali 9) Sanskrit 10) Kashmiri 11) Sindhi 12) Punjabi 13) Konkani 14) Marathi 15) Manipuri 16) Kannada and 17) Nepali [2].

II. ABOUT MARATHI LANGUAGE

Marathi language is Indo-Aryan language. It is official language of Maharashtra state of India and it is one of 23 official languages spoken by about 71 million people mainly in Indian state of Maharashtra state and neighboring state. The number of Marathi speakers all over the world is close to 72 million [3, 4]. Marathi uses agglutinative, inflectional and analytic forms. It displays abundant amount of both derivational (wherein attachment of suffixes to a word form changes its grammatical category) and inflectional morphology. About 15% of the word forms are participial forms known as Krudantas, which result from the influence of Dravidian languages. Traditional grammars of Marathi classify the derived forms in Marathi into two categories- Krudantas and Taddhitas. Krudantas are the adjectives, adverbs and nouns derived from verbs, while Taddhitas are nouns, adjectives and adverbs derived from words of any category other than verb.

This is also accompanied by inflectional processes which help lend the words features of gender, number, person, case, tense, aspect and modality (the latter 3 for verbs only). In addition to all universities in Maharashtra, Maharaja Sayajirao University of Baroda (Gujarat), Osmania University (Andhra Pradesh), Gulbarga University (Karnataka), Devi Ahilya University of Indore and Goa University (Panaji) all have special departments for higher studies in Marathi linguistics. Jawaharlal Nehru University (New Delhi) has announced plans to establish a special department for Marathi.

Marathi first appeared in writing during the 11th century in the form of inscription on stone and copper plates. From the 13th century until mid of 20th century, it was written with the Modi alphabet. Since 1950 it has been written with Devanagari alphabet.

Many government and semi-government organizations exist which work for the regulation, promotion and enrichment of the Marathi language. These are either initiated or funded by Government of Maharashtra. The major dialects of Marathi are called standard Marathi and warhdi Marathi. Standard Marathi language is based on dialects used by academics and print media. The work for Marathi language is majorly being carried out in IIT Bombay and TIFR (Mumbai). Few universities have also started working for development of system in Marathi Language in Maharashtra state [5].

III. DATABASE COLLECTION

It contains the procedure for collection of data for use of speech recognition.

A. Selection of Text corpora

For developing a speech database the basic requirement is of correct Text corpus which would be recorded from various speakers. The text corpus designed should be grammatically correct. The isolated Marathi digits are selected from Zero (Shunya) to Nine (Nau).

Table 1: Text Corpus

शुन्य	पाच
एक	सहा
दोन	सात
तीन	आठ
चार	नऊ

B. Data collection

Following steps are followed for the data collection for the speech database, which contains

- Selection of speaker
- Data collection
- Statistic of data

Selection of Speaker

Number of speakers selected are 100. The speech data will be collected from the native speakers of Marathi Language. The selected speakers were from different geographical region of Marathwada region of Maharashtra state. The Speakers were comfortable with reading and speaking the Marathi Language. The speakers are classified on the basis of gender and were in between the age group of 18 to 30 years. The selected speakers were 50 males and 50 females.

Data Collection

We used PRAAT software for recording the speech. We used Sennheiser PC360 and Sennheiser PC350 headset for recording the speech samples. The PC360 and PC350 headsets are having noise cancellation facility and the signal to noise ratio (SNR) is less.

Statistic of Data

Each speaker is asked to speak the numbers Shunya (zero) up to Nau (nine) i.e. ten numbers with three utterances of each number. Total data collected is about 3000. The data collected is divided into male and female speakers. For the collection of data the software used is PRAAT.

PRAAT is a very flexible tool to do speech analysis. It offers a wide range of standard and non-standard procedures, including spectrographic analysis, articulator synthesis, and neural networks. [6]

The steps followed for recording the speech samples was as follows:

Step 1: Selected speakers were asked regarding any problem with reading or speaking the Marathi words.

Step 2: Speakers were given the basic information about the headset used and when to speak the word.

Step 3: The sampling frequency was set to 24000 Hz with Mono sound type.

Step 4: The speaker was asked to read each word and the recorded sample was saved as .wav file.

Step 5: Step 4 was repeated for all 10 utterances that were recorded from the speaker. All the steps were repeated for all the 100 speakers.

IV. CONCLUSION AND FUTURE WORK

In this study we have present the procedure for development of speech database for Marathi numerals. Here we have to face many problems during the data collection (convincing people to collect speech sample) and development of database. Future work is done on this database for developing the ASR for the Marathi numerals for the agriculture purpose.

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