

# Speaker Recognition System using MATLAB

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**Abstract** - The main purpose of this paper is to recognize the speaker by using simple MATLAB programming. In this system we compute the pitch feature of audio signal to recognize the speaker. By finding out the closest feature from database the speaker can be easily recognize. In this system we can recognize the speaker very correctly this can be verify by testing the system many times.

**Key Words:** System design, ,pre-processing, FFT, Pitch, training, testing.

## 1.INTRODUCTION

Speech signal play important part in our daily life communication. Due to covide-19 situation, all this thinks become virtual so the demand for cyber security will increase. In which speaker recognition is one of the most important parameter in cyber security which can be easily achieved by using simple MATLAB program. In speaker recognition we will automatically identify who is speaking and identify speaker without visualizing the speaker. The main advantage of speaker recognition is to mark attendance of the students in school, colleges on the basis of their voice or speech only. Also, in the area of company, offices, banking this speaker recognition system is used. This system is useful in major military operations.

## 2. Literature Review

Many of the researches perform the work on speaker recognition by using various technique which was involved in this section of paper.

In 2019 Ledisi G. Kabari and Kebin Ogie[1] perform work on “speaker recognition system using signal processing tool in MATLAB”. In this system they extract the speech feature accordingly recognize speaker depending on feature matching. In this system they have upload dataset of five samples and verify the result by recognizing two samples.

In 2010 Vibha Tiwari[2] work on “MFCC and its applications in speaker recognition” . In this system feature extraction was done by using Mel Frequency Cepstrum Coefficient (MFCC) to identify the speaker.

By using various number of MFCC filters it is observed that the result may varied and better result may obtain for lower number of mfcc filter.

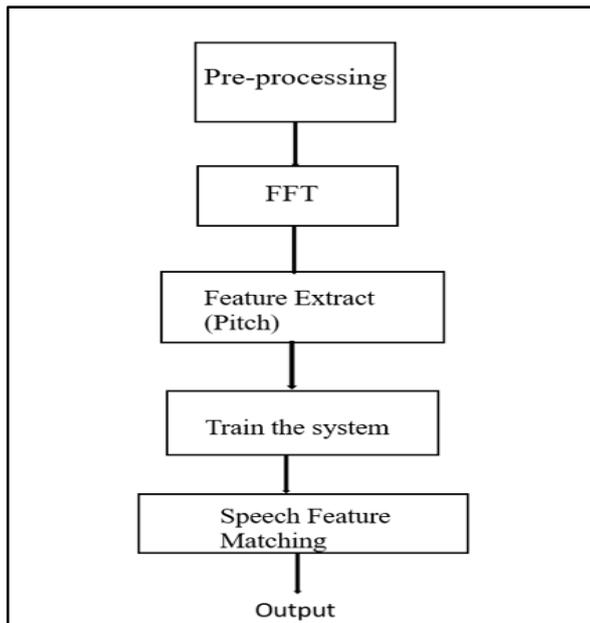
In 2015 K. Kau and N. Jain[3], present the paper on “Feature Extraction and Classification for Automatic Speaker Recognition System”. They are using various algorithm techquie to speaker recognition system. The maximum accuracy observed by using GMM classifier.

In 2015 K. Dhameliya[4], work on the topic “Feature Extraction and Classification Techniques for Speaker Recognition “ In this system they used MFCC, LPC GMM, ANN classifier and achieved maximum accuracy by combine two or more technique.

In 2016 Jyoti B. Ramgire and Sumati M. Jagdale[5] published paper on “Speaker Recognition with Various Feature Extraction and Classification Techniques”. In this paper they compare different classification technique for speaker recognition. The main goal of this paper is to study the various technique for speaker recognition and analyse that technique.

## 3. System Design

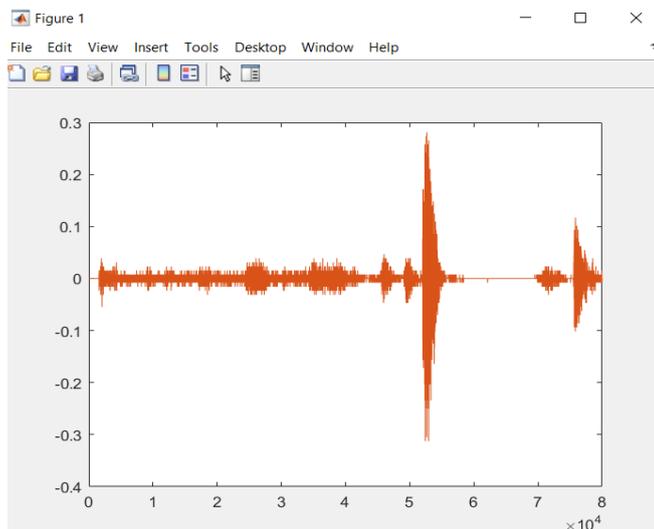
Speaker recognition is applicable for recognizing speaker on the basis of database. The first step involved in speaker recognition is to record the voice of speakers and from that create an overall database. After that feature extraction is needed for recognizing speaker and at last it involved the feature matching step and easily identify the speaker. The overall workflow of system are shown in fig. 1 below flowchart.



**Fig.-1** FLOWCHART OF SPEAKER RECOGNITION SYSTEM

### 3.1 PREPROCESSING:

In pre-processing we have to create a database by recording speech of the persons and all the recorded signal is in .wav form. In this system we are taking recording frequency of 16000, each of the sample will be represented by 8 bit and their will be two channels. Display the recorded audio by using MATLAB command.

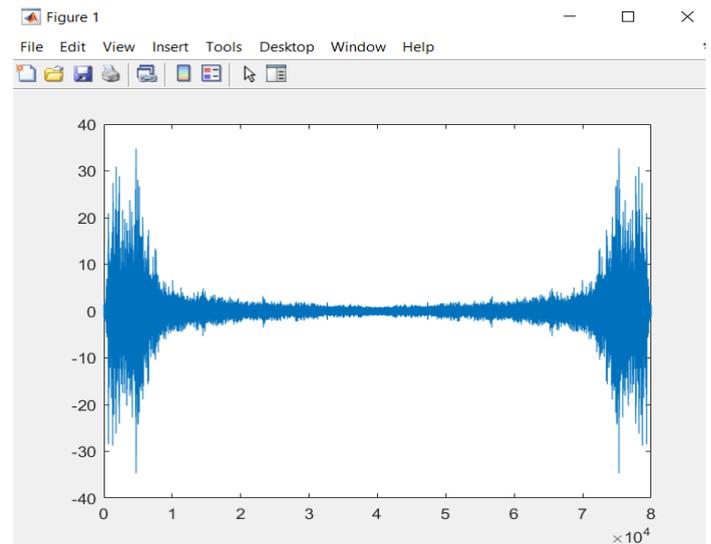


**Fig.-2** Audio signal

The next step in preprocessing is to perform frame segmentation in which we signal speech signal is splits into 15-20ms with 50% overlap. After that to avoid the effect distortion of signal at starting and end of the point we need to apply windowing technique to each individual frame. Here we are using hamming window.

### 3.2 Fast Fourier Transform (FFT)

After pre-processing we need convert each sample of speech signal into frequency domain so, for that Fast Fourier Transform is used. FFT is obtained by multiplying any time series data with its complex conjugate the result will be always a complex number, which we can't display, so we for that we are display only real part of data. The FFT is symmetric function, in which last value represent the highest frequency component. The plot of FFT is shown below.



**Fig.3** FFT

### 3.3 Pitch Extraction

Speaker recognition is the technique in which we extract the pitch and based on that speech we can identify the users. From entire database we take average of speech signal and different value obtained which are represented as pitch to recognize the speaker. Pitch parameter is used as feature vector in case of speaker recognition.

### 3.4 Train the data

After extracting the feature, we need to train the model, for that first of all we are saving the database. Next step is to save feature vector. Once we train the system a message is display "your voice is registered" and voice of the speaker is registered.

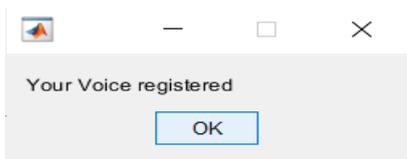


Fig. 4: Message

### 3.5 Speech Feature Matching

The next step is speech feature matching for that we need to find out the closet feature from database. After finding the closet distance it compare with train model and accordingly detect the class of the speaker.

## 4. Result

This system accurately detect the speaker by recording audio of the person depending on training database. Fig 4 shows the recognize waveform for first person similarly fig. 5 shows the recognize audio waveform for second person.

In MATLAB command window it will display detected class is 1 for fig.4 and detected class is 3 for fig. 5.

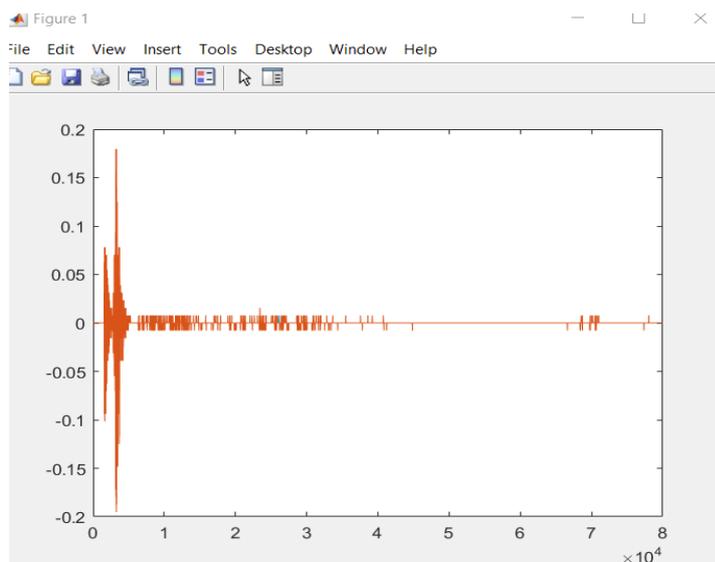


Fig. 5 Recognize Speech waveform

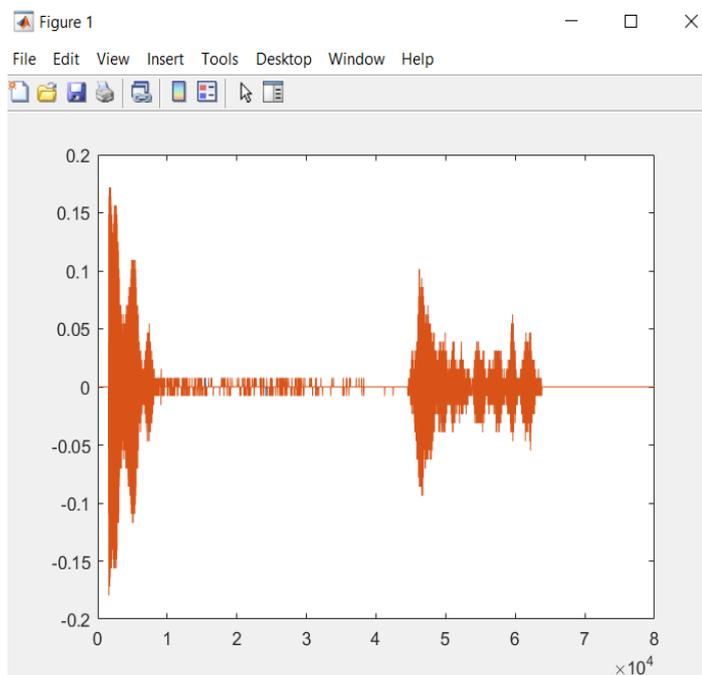


Fig. 4 Recognize Speech waveform

## 5. CONCLUSIONS

In this system first we create a database by recording some audio sample of the speaker. After that by applying feature extraction and feature matching technique we can easily recognize speaker. By using simple MATLAB programming here can easily detect the speaker.

## REFERENCES

- [1] Kabari LG, Ogie K. "SPEAKER RECOGNITION SYSTEM USING SIGNAL PROCESSING TOOL IN MATLAB". International Journal of Advanced Research in Computer Science. 2019 Jul 1;10(4).
- [2] V. Tiwari, "MFCC and its applications in speaker recognition", IEEE International Journal on Emerging Technologies, Volume-1, Issue-7, May 2013, pp 33-37.
- [3] K. Kau and N. Jain, "Feature Extraction and Classification for Automatic Speaker Recognition System – A Review", International Journal of Advanced Research in Computrt Science and Software Engineering, Volume 5, Issue 1, January 2015, pp. 1-6.
- [4] K. Dhameliya, "Feature Extraction and Classification Techniques for Speaker Recognition: A Review", IEEE International Conference on Electrical, Electronics, Signal, Communication and Optimization, January 2015, pp. 1-4.
- [5] Ramgire JB, Jagdale SM. A survey on speaker recognition with various feature extraction and classification techniques. International Research Journal of Engineering and Technology. 2016 Apr;3(04):709-12.