Developing a Speaker Recognition System using MATLAB

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Abstract— This paper presents Authentication of Speaker's identity by an User's voice. In order to authenticate speaker's identity real time speech signal is compared with the pre-recorded voice signals in the database. Here the sampled signal's power spectrum density is compared with power spectrum density of pre-recorded voice and on successful match the name of the particular speaker is displayed. The possible application of this project could to operate personalized digital gadgets with voice commands. Speaker recognition, in computer science, the ability of the computer to understand the spoken words for the purpose receiving commands and data input from speaker. Some systems have been developed that can recognize limited vocabularies are spoken by specific individual but developing a systems that deals with a variety of speech and accent, as well as with the various ways in which a request or a statement can be made has so proved a daunting task for system designer. It is based on either text dependent speech.

Key words: Speech recognition, Speaker recognition, FFT, DCT, Feature extraction

I. INTRODUCTION

Speaker recognition is the process of automatically recognizing who is speaking on the basis of individual included in speech waves. This technique makes it possible to use the speaker's voice to verify their identity and control access to services such as voice, dialling, banking by telephone, telephone shopping, database access services, information services, voice mail, security control for confidential information areas and remote access to computers. This traditional method suffers from basic problems such as: Extra Background noise can affect the output

The main aim of this project was to investigate and build a speaker recognition system that recognizes a person based on his/her speech patterns, capable of use in security applications.

Such a system could be used for example in a security application where the identity of a user is determined based on analysis of a pre-determined (text dependent) or unknown phrase. Also a speaker recognition system differ slightly from speaker verification systems, in a particular recognition involves choice of an identity from a set of possible users, while verification involve confirmation of a claimed identity (i.e Yes/No answer). Such a systems typically involve two main components 1. Front end Processor which processes the spoken input and extracts useful features from the signal and a Classifier whose function is to examine the features and make a decision based as to the identity of the speaker.

II. SYSTEM MODEL DESIGN

The system model design for the speaker recognition system can be diagrammatically specified as:

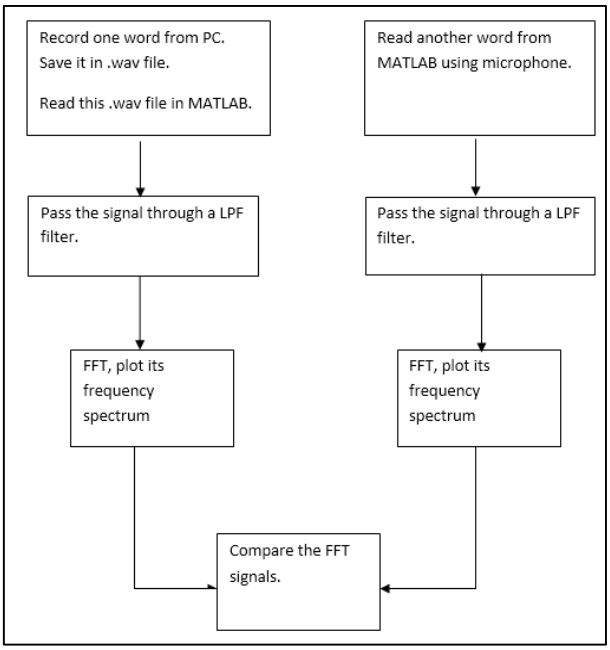

Fig. 1:

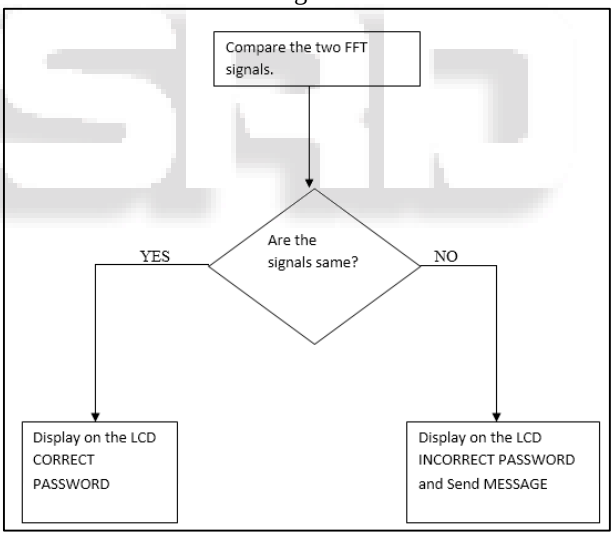

Fig. 2:

III. SYSTEM APPLICATION PHASE

A. *Speaker identification & Speaker Verification*

Speaker recognition can be classified into identification and verification. Speaker/voice identification is the process of determining which registered speaker provides a given utterance. Speaker verification on the other hand is the process of accepting or rejecting the identity claim of a speaker. Figure 1 shows the basis structure of speaker identification and verification system.

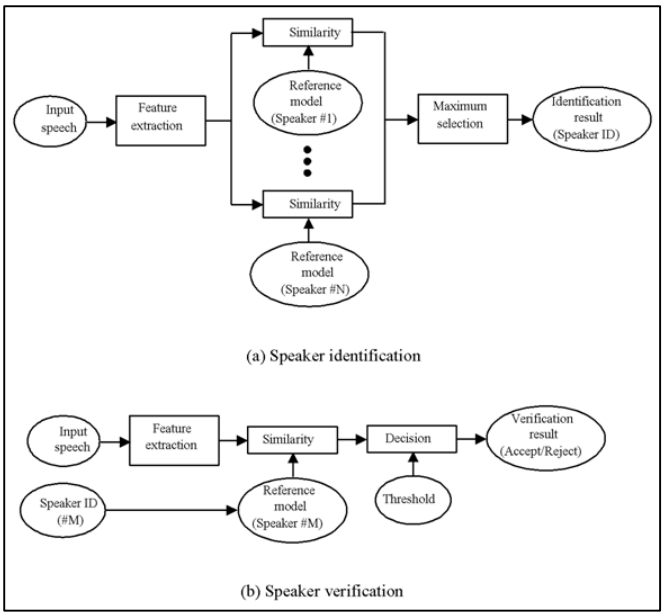

Fig. 3:

At the highest level, all speaker recognition systems contain two main modules. Figure Extraction and feature matching. Feature extraction is the process that extracts a small amount of data from the voice signal that can later be used to represent each speaker. Feature matching involves the actual procedure to identify the unknown speaker by comparing extracted features from his/her voice input with the ones from a set of known speakers.

B. Text-dependent recognition

If the text must be the same for enrolment and verification is called text-dependent recognition. In a text-recognition system prompts can either be common across all speakers (eg a common pass phrase) or unique. In addition the use of shared-secrets (e.g. passwords and PINs) or knowledge based information can be employed in order to create a multi-factor authentication scenario.

C. Text-Independent Recognition

Text-independent systems are most often used for speaker identification as they require very little if any cooperation by the speaker. In this case the text during enrolment and test is different, In fact the enrolment may happen without the user's knowledge as in the case for many forensic applications. As text-independent technologies do not compare what was said at enrolment and verification, verification applications tend to also employ speech recognition to determine what the user is saying at the point of authentication.

IV. PROCESS FLOW DESCRIPTION & WORKING

The system is divided into three main sub systems as shown below:

A. MATLAB

1) Save an audio signal as a password and take it as an input to the MATLAB.
2) Take input audio signal from the user using MATLAB.
3) Filter the input audio signal.

B. Speaker Recognition Algorithm

1) Converting voice signal to array – FunSoundSig
2) Calculation Sum-Coefficient & Correlation-coefficient
   Sum-Coefficient = ∑[X(i) x Y(i)]
   Correlation-coefficient = $\frac{1}{n} - 1 \sum(\frac{x-x'}{sx})(\frac{y-y'}{sy})$
3) Selecting the matched database entry & Comparison of real time sample and recorded voice signal.

C. Interfacing a GSM Module

After completion of above two steps we have interfaced GSM module to notify when the system has been accessed for to ensure whether authorised person has accessed or not

V. RESULTS

The work for this research has reached the identification or recognntion of Voice using MATLAB Toolbox are as follows:

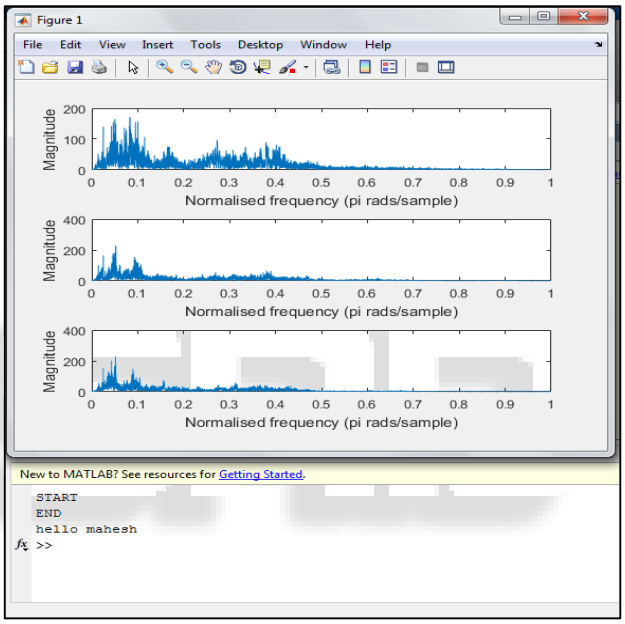

Fig. 2: Output of Comparison of Voice sigmal

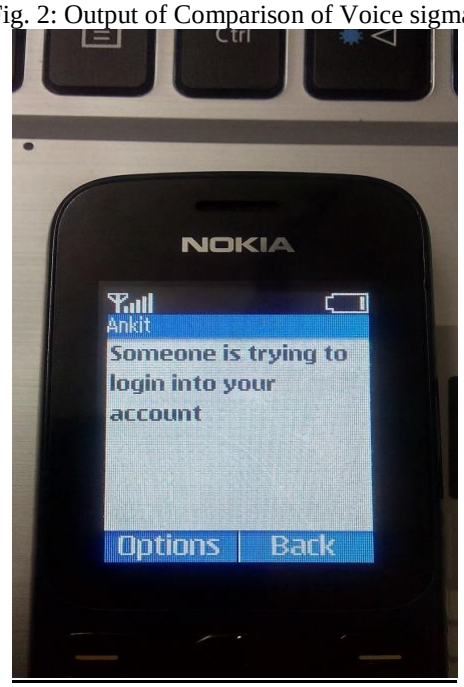

Fig. 3: Text Message using GSM Module

VI. APPLICATIONS

This technique makes it possible to use the speaker's voice to verify their identity and control access to services such as voice, dialling, banking by telephone, telephone shopping, database access services, information services, voice mail, security control for confidential information areas and remote access to computers. human mistakes will not affect the output noticeably, this will have a great effect on the exactness of the result.

VII. CONCLUSION

Statistical approach for speaker recognition system requires less calculation and is simple to achieve. Success rate for text dependent Speaker recognition was found to be higher than text independent. No single technique is sufficient to give 100% correct output so we have to use multiple technique for getting good results here we have used two technique to get the results.

We can see that success rate so this system can be used or applied for any practical applications. However important point to be highlighted here is that only statistical method were used in the program.

Important advantage of stastical method is much reduced calculations and simplicity. Other powerful algorithms can be applied to find and increase the success rate to nearly fool-proof.

REFERENCES

[1] S. Ahn and H. Ko,"Background noise reduction via dual- channel scheme for speech recognition in vehicular environment ", IEEE Trans. Consumer Electron., vol. 51, no . 1, pp. 22 - 27, 2005.
[2] Steven J. Anderson, A. C. M. Fong, Jie Tang,"Robust tri-modal automatic speech recognition for consumer applications", IEEE Trans. on Consumer Electronics, Vol. 59, No. 2, pp.352-360, May 2013. [3]Alhadidi, B. (2012).
[3] Buera, Luis, et al. ,"Cepstral vector normalization based on stereo data for robust speech recognition", IEEE Trans. on Audio, Speech, and Language Processing,pp, 1098-1113,2007.
[4] Ishwar S. Jadhav et al, " Human Identification using Face and Voice Recognition," International Journal of Computer Science and Information Technologies, Vol. 2 (3) , pp. 1248-1252,2011.
[5] http://in.mathworks.com/products/matlab/?refresh=true
[6] https://www.youtube.com/watch?v=WAvZ3SSQR74
[7] https://www.youtube.com/watch?v=sJVzuQv7GO8
[8] www.circuitstoday.com
[9] www.instructables.com.

