

Decision level data fusion in Speech and Image Recognition Systems

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Objectives

- TO RECOGNIZE 4 DIFFERENT WORDS THROUGH AUTOMATIC SPEECH RECOGNITION AND CONVERT TO 3 DIGIT BINARY WORD.
- Based on the 3 digit binary word, A Image Recognition system to be developed to recognize the object pertaining to the command given.

Approaches to Speech Recognition

- a)Acoustic Phonetic Approach
- b)PATTERN RECOGNITION APPROACH
- c)Artificial Intelligence Approach

Pattern Recognition Model

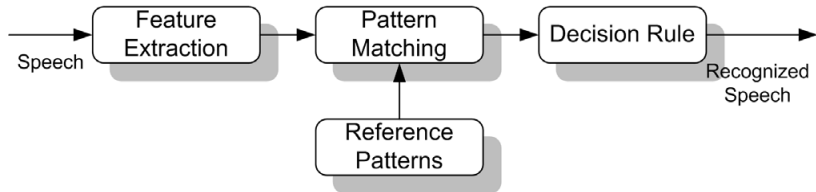


Figure: Basic model of speech recognition

Feature Extraction

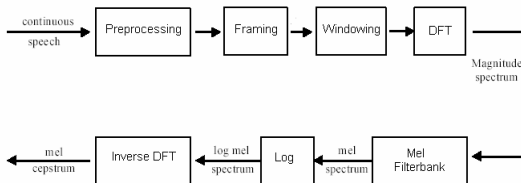


Figure: Steps followed for feature extraction

A Close look at MFCCs extraction

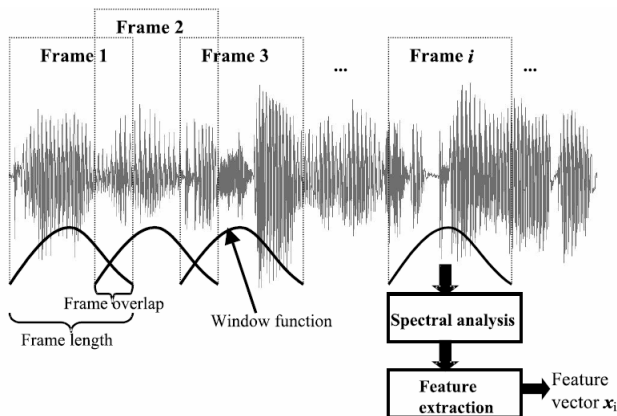


Figure: Frame Blocking[VoiceBox]

Pattern Recognition Model

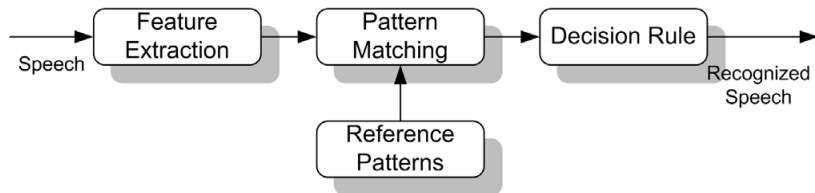


Figure: Basic model of speech recognition

Feature Classification

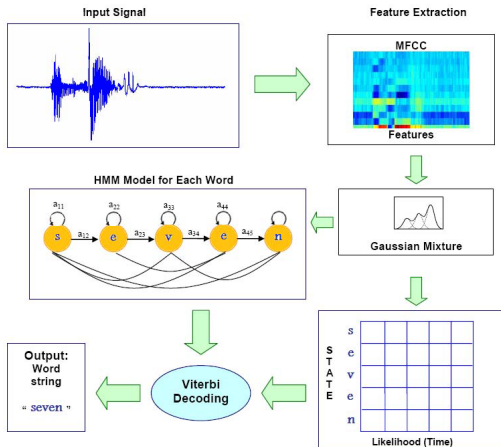


Figure: Classification using HMM

- For each word we have taken 20 male voice samples and 20 female voice samples. So a total of $4 \times (20 + 20) = 160$ samples have been collected.
- Out of 160 samples two third of them i.e., 120 samples are given for training and the remaining 40 samples for testing.

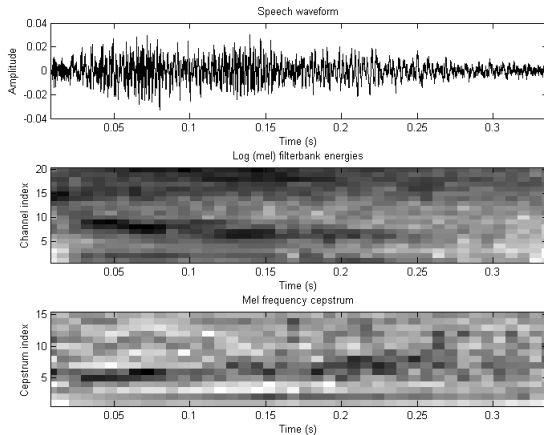


Figure: MFCC for Word : "Two"

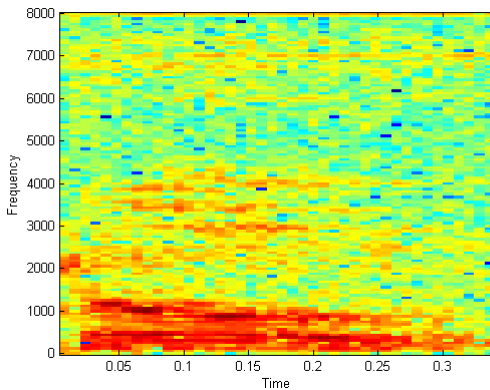


Figure: Spectrogram of Word: "Two"

Confusion Matrix

Words/Digits	1	2	3	4
1	40	0	0	0
2	0	38	2	0
3	0	1	38	1
4	0	1	0	39

Table 2.1: Confusion Matrix

- We have achieved a total of 98.33 percentage accuracy on training data and 92.5 percentage accuracy on test data samples.

References

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Burr, D.J., " *Experiments on neural net recognition of spoken and written text*", IEEE Transactions on , vol.36, no.7, pp.1162-1168, Jul 1988.

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