

ECE 480

Final Design Project

Objective:

The objective of this project is to design a software-based system to analyze speech signals. Samples of speech signals are first sampled and read from a sound blaster into the MATLAB workspace. The duration of each signal is about 3 seconds long. MATLAB, SIMULINK, and/or other software packages might be used to design such a system. Parameters such as the short-time energy, short-time zero crossing, pitch (for vowels), etc., are the outputs of the design system. Such parameters will be necessary to classify voiced and unvoiced segments of speech signals. Also, it is required to analyze male and female speech in order to draw some conclusions regarding the general differences between the two speeches. Finally, a written report describing the design procedure and the results is required.

Procedure:

1. The useful bandwidth for speech signals is bandlimited to about 5 kHz. Thus, for signals recorded from the sound blaster at a higher sampling rate, must be down sampled to about 10 kHz.
2. A window of about 20 msec. is used to analyze each frame in order to extract the useful information from the speech signal. Consecutive windows are supposed to overlap by a ratio of 50%. Thus, a window is supposed to be displaced by 10 msec. with respect to the previous one.
 - The parameters needed to be generated from the speech signal are:
 - Short-time energy/magnitude
 - Short-time zero crossing rate
 - Pitch estimation (for voiced speech)

References:

- [1] L.R. Rabiner and R.W. Schafer, "Digital Processing of Speech Signals," Prentice-Hall, 1978.
- [2] C. Sidney, et al., "Computer-Based Exercises for Signal Processing using MATLAB," Prentice-Hall, 1994.