EE-414 Speech Processing Lab
Lab-6

AIM

- To understand the need for short term processing of speech.
- To compute short term energy and study its significance.
- To compute short term zero crossing rate and study its significance.
- To compute short term autocorrelation and study its significance.

PROBLEM STATEMENT

Record (16kHz, 16bit) the word "**speech signal**"; truncate long silence regions.

A. Short term energy(STE) :
    a. Compute and plot STE (as a function of frame index) using frame size as 20ms and frameshift as 10ms.
    b. Demonstrate and explain the effect of the window size on STE by taking window size of 20ms, 30ms, 50ms, 100ms. Also comment on which frame size is preferred.
B. Short term Zero Crossing Rate(ST-ZCR) :
    a. Compute and plot ST-ZCR for speech signal using frame size as 20ms and frameshift as 10ms.
    b. Demonstrate and explain the effect of the window on ST-ZCR by taking window size of 20ms, 30ms, 50ms, 100ms. Also comment on which frame size is preferred.
C. Short term Autocorrelation
    Do each of the following for one speech frame at the centre of the vowel, and another speech frame at the centre of the consonant "s".

    a. Compute and plot short term Autocorrelation function (as a function of delay index) for a 20ms long speech frame.
    b. Demonstrate and explain the effect of the window on Short term Autocorrelation by taking window size of 10ms, 20ms, 50ms, 100ms. Also comment on which frame size is preferred.
    c. Demonstrate and explain the effect of the window shape on Short term Autocorrelation by taking the 'rectangular', 'Hamming' and 'Hanning' window. Take frame size as the most preferred frame size computed in (b). Also comment on which window is preferred.

SUBMISSION

- Submit a single pdf file, consisting of the following for each problem:
    - Theory
    - Procedure to carry out the experiment
    - Code (Matlab/Python)
    - Plots of the signal in the time domain and the magnitude spectrum.
    - Observations/Explanations wherever asked.

SUBMISSION FORMAT

- Submit a single pdf file, having the name as your roll number, Eg: **170010037.pdf** OR Submit a single zip with name as your roll number **(Eg: 170010037.zip)** containing the report and the codes. Note: Don't create a zip of the files directly. Submit the zip of a folder containing the files.

DEADLINE: 5:00 PM 07/03/2021