

Speech Signal Processing

Assignment 3

Course Code **ECE448**

Max. points **20**

Note:

- Always cite your sources (be it images, papers or existing libraries). Follow proper citation guidelines
- Unless specifically permitted, collaborations are not allowed.
- Do not copy or plagiarise, if you're caught for plagiarism or copying, penalties are much higher (including an **F** grade in the course) than simply omitting that question.
- Need to mention clearly if any assumptions are being considered.
- No late submissions are accepted.

Syntax to be followed for submission

- A single zip folder has to be uploaded in the moodle, which should contain the snapshots of your Numericals as *ECE448_A2_ < RollNo. > .pdf* and computer based questions (code) should be placed in a folder and named it as *ECE448_A2_cbq*
 - For computer based questions you are expected to submit Codes (Matlab/Python)
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1. Record your name and the utterance should be "I am <yourname>". And save it as a wave file. Perform phone level transcription on the wave file. (Plot in a single figure window) **Note: Computer Based Question [2.5 pts]**
 - (a) 2D plot of STFT based Spectrogram (preferable Matlab). A sample snippet for output is attached Figure: 1
 - (b) 3D plot of STFT based Spectrogram (preferable Matlab). A sample snippet for output is attached Figure: 2
2. Load a speech signal of your interest and select voiced region then Find the pitch based on the Cepstral analysis? Plot the results (Speech, Cepstrum, Liftered signal;) **Note: Computer Based Question [2.5 pts]**
3. Take a recorded speech signal which you have done earlier (Your name from Question 1). Consider a voiced frame and unvoiced frame of your choice, apply the following. **Note: Computer Based Question [7.5 pts]**
 - (a) no. of points in N-point DFT (256,512,1024)
 - (b) size of window
 - (c) shape of window (Rectangular, Hamming, Hanning) on STFT magnitude spectrum.

And comment on each (3(a),3(b) and 3(c))

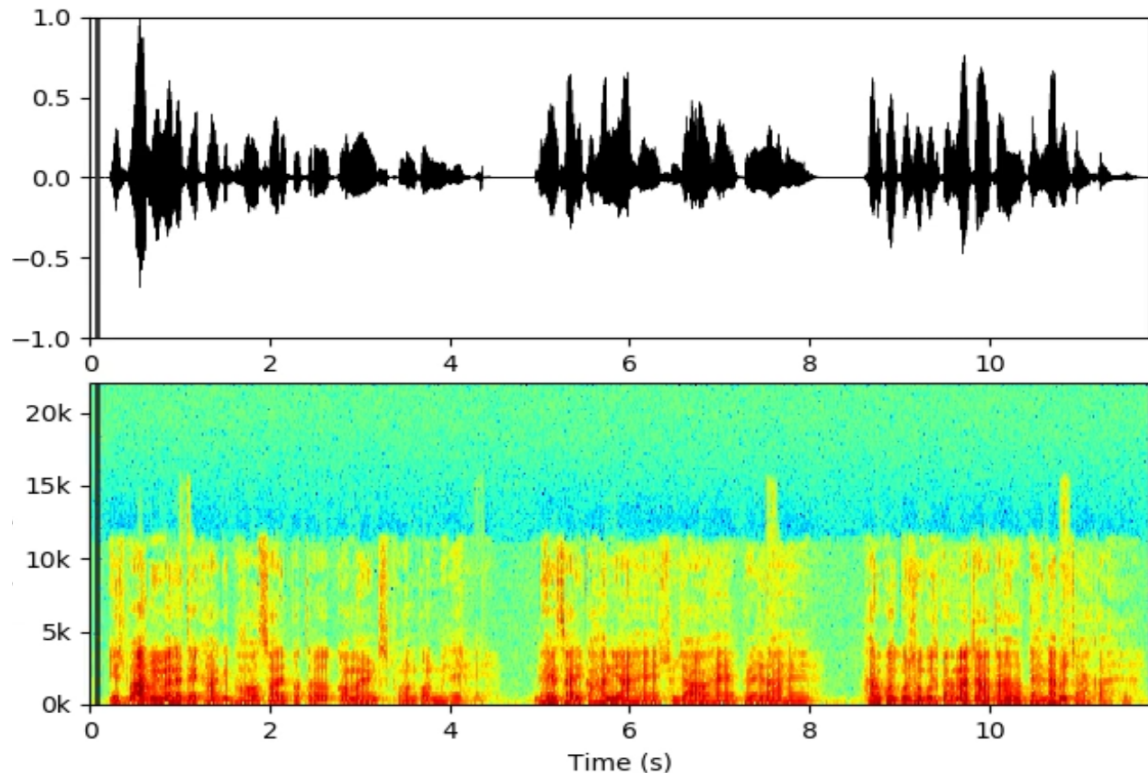


Figure 1: Output of 1(a) should be in this way

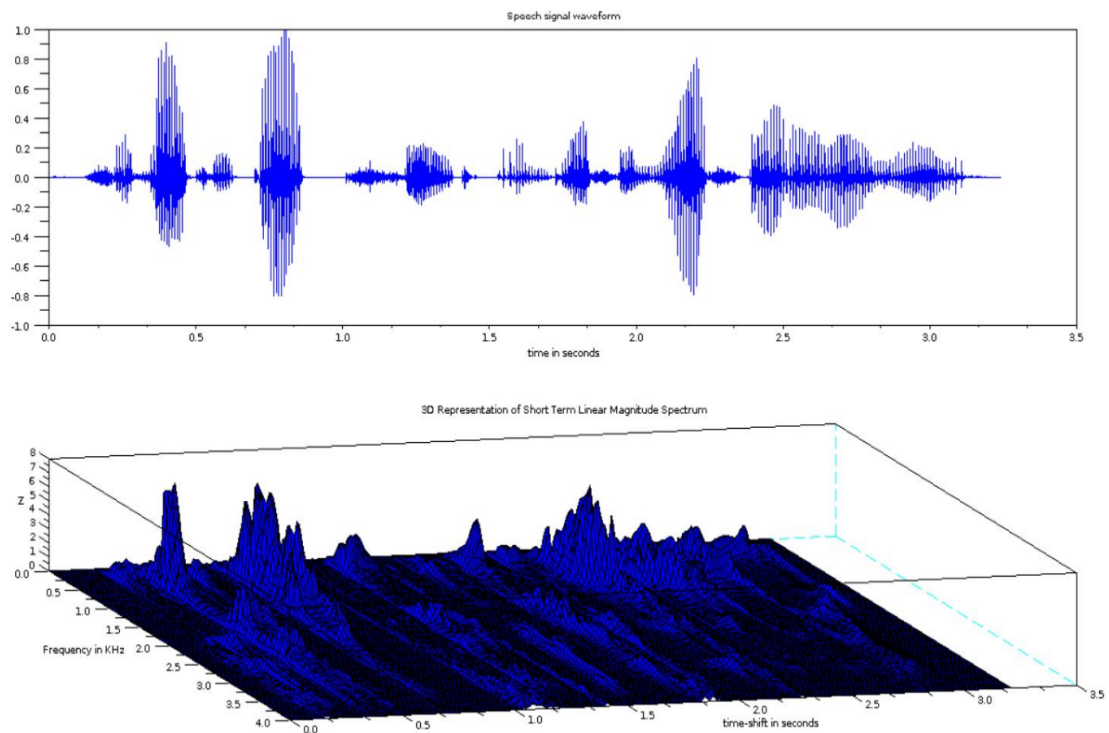


Figure 2: Output of 1(b) should be in this way

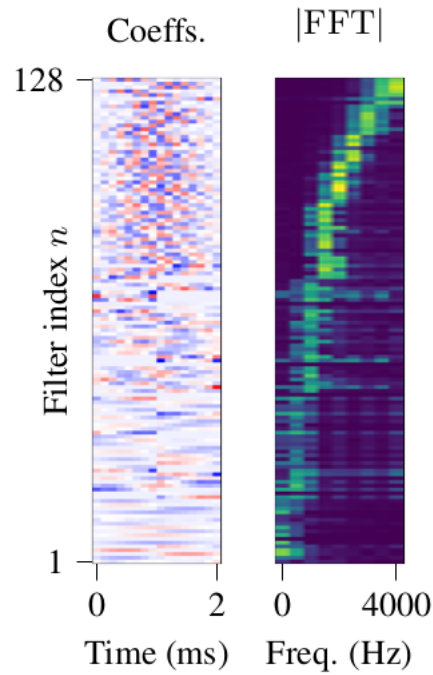


Figure 3: Output

4. Take a recorded speech signal which you have done earlier (Your name from Question 1). And extract MFCC for every 20 ms and save in txt file. Plot accordingly as shown below Figure. 3. And comment on the plot with proper explanation . **Note: Computer Based Question [7.5 pts]**

Note

1. Question 1(a), 1(b), 2(a), 3(a), 3(b), 3(c) and 4 are Computer Based Question so you are expected to code it in MATLAB(preferably) or PYTHON.