EE679 Computing Assignment 4 Due: Nov 4, 2012

As in the previous assignment, consider the speech signal in "machali.wav" (sampled at 8 kHz) Consider the following signal segments in the final word "pani": (1) /a/ (first half); (2) /n/; (3) /I/; and (4) /s/ in the word "uska". Use PRAAT to extract the above segments to separate .wav files for further analyses as below.

1. Obtain the real cepstrum from a 30 ms segment for each of the phones.
2. Use cepstral filtering to obtain the vocal tract magnitude response (dB) in each case. Compare it with the corresponding LP (p=10) magnitude spectrum obtained in the previous assignment by superposing both on the actual magnitude spectrum of the signal.
3. Estimate the pitch of the segment from the real cepstrum.
4. Next consider the synthetic signal generated from LP coefficients and pulse train in your previous assignment for the segment /a/. Repeat the parts 1, 2 and 3 with this synthetic signal.
5. Repeat 1,2,3 on /s/ sampled at 16 kHz using LP order = 18.

<u>Not for submission</u>

1. Prepare an experimental set-up to demonstrate auditory critical bands. One example: Play a loud, fixed tone (e.g. 1200 Hz). Next generate a simultaneous quiet tone at various frequencies below and above the loud tone. Record the masking effect by listening.

2. Discuss the path of perception for a simple 200 Hz sine wave from the outer ear to the neural firings in the cochlea. How would it change for a 3000 Hz sine wave of equal amplitude?

3. Assuming that the JND of intensity is equal to 1 dB, find out the masking threshold for a sound of similar frequency and duration.