CS6300 - Speech Technology: Laboratory 2

1. Generate two sinusoids at two different frequencies ω_0 and ω_1 (512 samples). Convolve the two signals. Compute DFT of the convolved signal. Plot the spectrum. Compute the DFT of each of the signals. Multiply the spectra, and compare them with that of the convolved signal. Remember that the DFT order should be $>= lengthofthesignal$.

2. Record isolated vowels from both yourself and your partner. Compute the DFT spectrum. Find the first two prominent peaks, say F_1, F_2. Plot F_1 vs. F_2.

3. Record unvoiced (UA, A) /k/ /tch/ /t/ /th/ /p/ and their voiced counterparts. Produce all the sounds by suffixing with vowels /a/, /i/ and /u/. What differences do you see in the formant frequencies of the vowels in comparison with that of the isolated vowels?

4. Record diphthongs /ai/ and /ao/. Plot the spectrogram. Compare the spectrograms with that of the individual spectrograms of the original vowels. Experiment with window sizes that include just one pitch period vs. another that includes at least two pitch periods.

5. Record fricatives /s/ and /h/ by suffixing with vowel /a/. Compare the spectrograms, and record the same.

6. Generate a set of tones in the range 350-440Hz (fixed amplitude). Make a composite signal by adding all these tones. This is called the masking noise. Next generate a fixed frequency tone from 100 Hz to that of 3000 Hz. Change the amplitude of the tone until the tone is just discernible. Plot the tone amplitude as a function of frequency.

7. Use Lab 1 data with marked vowel boundaries. Estimate F_1, F_2 for the vowels. Plot F_1 vs F_2. Compare with the vowel frequencies obtained in Question 2.