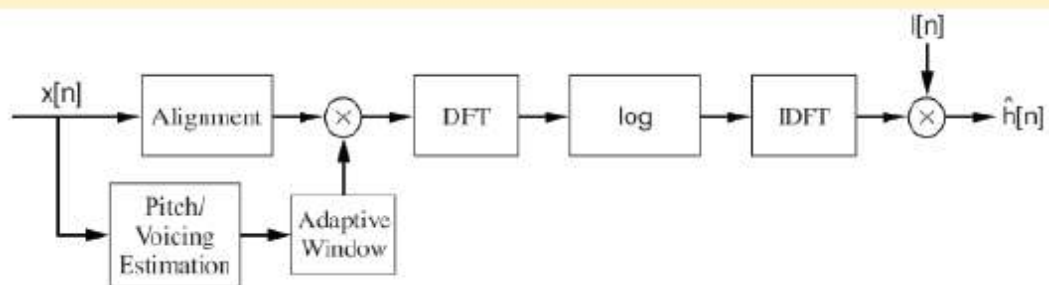# CEPSTRUM via HOMOMORPHIC FILTERING

1. Acquire voice samples. In this part, please either record or find at least 10 voice samples of a male and female individual making the five vowel sounds – "a", "e", "i", "o", "u". If you are going to record them yourself or using a friend, then exaggerate the sounds a little and keep your voice extended for a while. Please make note of the conditions used to obtain the voice samples (e.g., what smartphone, what type of speaker – built-in or microphone, using which software program, or where or from whom the files were obtained). You should have 10 files in the end. If you want to be keen and impressive, you can get more than one male and female voice to obtain a better understanding of differences between both signals in the cepstral domain. Have fun with this.
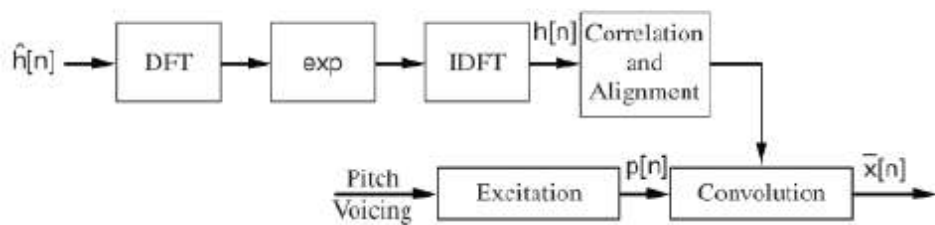
2. Compute the cepstrum of each voice signal and discuss any difference qualitatively and quantitatively amongst male and female voices in general and amongst the different vowel sounds. This is an important component of the project, so please be creative and as comprehensive as possible. Your report should provide figures with original time-domain signals as well as cepstrum signals. Female voices should generally have more peaks than male voices in the cepstrum domain. You should discuss why you think this would be the case.

3. Lifter the cepstrum domain signals. Design a window (length is an important design parameter and you should discuss how and what you select – it can be the same or different for each speech sample depending on what you would like to experiment with) to remove the transfer function dependency. Then, compute the time domain signal of the corresponding windowed result to obtain the deconvolved signal. Plot the deconvolved result. Is there anything you can say about the signal and its difference from the original time domain recorded sample? Again, your discussion is an important part of the report.

4. Try to synthesize back the voiced signals as follows and comment on your results.

(a)

(b)