**Assignment 3**

1. Use wavelet decomposition (wavedec) to decompose an audio signal (Q1.mat, sample rate 8192 Hz) three level decomposition using db1.
2. Plot the approximated and detailed coefficients.
3. Plot the reconstructed signal obtained using db1 and db2.
4. Hear (use sound in MATLAB) the reconstructed signals using both wavelets. Report your observations.
5. Also, comment on the error obtained on the reconstructed signals for db1 and db2.
6. Add Gaussian noise (µ = 0, σ = 3) to the original test EEG signal (Q2.mat). Visualize both images (the original and its noisy version) side by side.
7. Compute signal to noise ratio (SNR).
8. Decompose the signal using wavedec (Haar, and db2).
9. Plot the subbands obtained using Haar and db2 decomposition.
10. Observe the subbands and list your observations.
11. Perform DWT on a given EEG signal with noise (Q3.mat) and thresholding the detail coefficients in the following way:
12. Select a threshold T = σ , where n is the length of detail coefficients and σ is an estimate of the noise level.
13. Set all detail coefficients with their absolute value < =T to zero.
14. Compute the SNR for different σ values and values of σ = {0.5, 1, 2, 4}.
15. Plot the original, noisy, and denoised signal in anyone case.
16. Evaluate the RMSE and comment on your interpretations for each case.