EE-622 (Biomedical Signal Processing)

Assignment-3

1. Given an ECG signal "**original_ECG.mat**", compute its DFT. Sampling frequency is 1000Hz.
   (a) Perform windowing using **Hamming**, **Hanning** and **Bartlett** windows with appropriate window length. Observe the effect on the spectrum of ECG signal.

2. Given an ECG signal "**givenECG3.mat**", compute its **DFT** and **DCT**. Sampling frequency of the signal is 360 Hz.
   (a) Reconstruct the ECG signal by performing inverse DFT on **80%**, **60%** and **40%** of total DFT coefficients of the given ECG signal respectively. The DFT coefficients corresponding to high frequencies can be discarded for the same. Plot both the given and reconstructed ECG signal and their DFT spectrum. Find out the **WEDD**, **WDD** and **PRD** values of the reconstructed signal.
   (b) Reconstruct the ECG signal by performing inverse DCT on **80%, 60%** and **40%** of total DCT coefficients of the given ECG signal respectively. The DCT coefficients corresponding to high frequencies can be discarded for the same. Plot both the given and reconstructed ECG signal and their DCT spectrum. Find out the **WEDD**, **WDD** and **PRD** values of the reconstructed signal.

WEDD: Wavelet energy based diagnostic distortion measure

WDD: Weighted diagnostic distortion

PRD: Percentage root mean square difference

Reference:

1. Manikandan, M. Sabarimalai, and Samarendra Dandapat. "Wavelet energy based diagnostic distortion measure for ECG." *Biomedical Signal Processing and Control* 2.2 (2007): 80-96.
2. Zigel, Yaniv, Arnon Cohen, and Amos Katz. "The weighted diagnostic distortion (WDD) measure for ECG signal compression." *IEEE transactions on biomedical engineering* 47.11 (2000): 1422-1430.