Indian Institute of Science

Mathematical Methods and Techniques in Signal Processing

Instructor: Shayan Srinivasa Garani
Home Work #4, Spring 2022

Late submission policy: Points scored = Correct points scored $\times e^{-d}$, d = # days late

Assigned date: Apr. 11^{th}, 2022 **Due date:** Apr. 21^{st}, 2022, 11:59 pm.

Record your voice, uttering the sentence "Signal processing is a fun applied math topic". This must be in raw format without any MPEG compression. You can use the sampling rate as you find it appropriate. Perform subband coding of the signal using (a) Haar wavelets, (b) Daubechies wavelets (db4, db8). Perform compression after the analysis stage using (a) uniform, and (b) non-uniform quantizer of your choice and reconstruct the signal (without much distortions). Experiment and strive to get the best compression ratio while maintaining reconstruction fidelity. Obtain the time-frequency uncertainty relationship at each scale for each wavelet choice. You may opt for maximum 4-level dyadic tree decomposition. Submit a report with all the results, along with the software code in the Appendix. You must also upload the original and reconstructed audio files. (100 pts.).