Practical Assignment (1)

Due Date: Oct 14th 2018

Consider a one-dimensional Rayleigh random variable X with a Rayleigh scale parameter of σ^2

1- Design a uniform Quantizer (i.e., write MATLAB code) for the signal X assuming a number of representation points L (Assume the uniform quantizer operates between 0 and x_1 such that $Pr[0 \leq X \leq x_1] = 0.99$)

2- Design an optimal Quantizer (i.e., write MATLAB code) for the signal X assuming a number of representation points L (use Lloyd-Max Algorithm)

NOTES:
You are encouraged to work in teams that SHOULD NOT exceed 2 students.

Submission & Evaluation:
- Each group should submit a report of maximum two pages. The report should include the following
    i.   Plot the SQNR versus the number of representation points for the uniform and optimal Quantizers with $\sigma^2 = 0.5$
    ii. Plot the SQNR versus the number of representation points for the uniform and optimal Quantizers with $\sigma^2 = 2$
    iii. Plot the gain of optimal Quantizer with respect to the uniform Quantizer (i.e., $SQNR_{optimal} / SQNR_{uniform}$) for $\sigma^2 = 0.5$ and $\sigma^2 = 2$
    iv. Write a paragraph to comment on the results you see in parts (i), (ii) and (iii)
- Evaluation will be conducted in the lab in the 4th and 5th slots on Oct. 14th. The evaluation will be 45 minutes. In the evaluation, each INDIVIDUAL student (NOT GROUP) will be assigned to write a small code related to the assignment.