E9-221 Jan 3:0

Signal Quantization & Compression

Instructor

Prof.T.V. Sreenivas
Email: tvsreenivas@gmail.com

Teaching Assistant

Email:

Department: ECE

Course Time: T, Th, 2-3.30pm

Lecture venue: ECE 1.07

Detailed Course Page:

Announcements

Brief description of the course

The course is meant for serious students of Communication and Signal Processing, who are concerned with

representing information bearing signals into digital form. Techniques to suit a variety of signals 1D, 2D and

vector signals are analyzed based on their statistical and model based representation resulting in optimum

performance. Lossless and perceptually transparent quantizations are analyzed for their compression

performance.

Prerequisites

i) Digitial Signal Processing

ii) Probability fundamentals

Syllabus

i) Statistical ignal Models, Optimum scalar quantization, Dithering

ii) Linear prediction, quantization noise shaping, oversampling, Sigma-Delta modulation

iii) Transform Coding, optimum bit allocation, perceptual bit-allocation, filter-banks, sub-band coding, QMF

iv) Vector quantization, Generlized Lloyd-Max, structured Vq, hierarchical Multi-stage, product-VQ

v) Compressed Sensing, sub-Nyquist samples, sparse reconstruction, Bases pursuit, Signal adaptive bases.

Course outcomes

Students will gain in depth knowledge of digital representation of signals and information. Performance

measures of SQNR, Noise shaping, perceptual masking will be understood. The trade offs between signal

models and adaptive schemes will be realized. Offline optimum design Vs online adaptation of signal models

and quantization schemes will be appreciated.

Grading policy

20% project, 30% mid-term tests, 50% final exam

Assignments

Resources

i) Jayant & Noll : Digital Coding of Waveforms, 1984.

ii) Gersho & Gray : Vector Quantization and Signal Compression