TCN 5455: Information Theory

Catalog Description:
Entropy and measures of information, proof and interpretation of Shannon's source and channel coding theorems.

Prerequisites:
Permission of instructor.

Course Objectives:
The course covers on topics in classical information theory including modeling and quantification of information, the asymptotic equipartition property, data compression, channel coding, Lossy source coding and rate distortion theory, and a brief overview of Kolmogorov complexity.

Topics:
- Information measures: entropy, relative entropy and mutual information,
- Asymptotic equipartition property, entropy rates of stochastic processes, modeling sources of information,
- Lossless source encoding theorems and source coding techniques, data compression,
- Differential entropy and the Gaussian data compression and transmission,
- Lossy source coding and rate distortion theory, Kolmogorov complexity.

Textbook/ Course Material:
- TM Cover and JA Thomas. Elements of Information Theory. 2nd Edition. John Wiley & Sons, 2006.
- RG Gallager, Information Theory and Reliable Communication. Vol. 2. New York: Wiley, 1968.
- I Csiszar, and J Körner. Information Theory: Coding Theorems for Discrete Memoryless Systems. Cambridge University Press, 2011.

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