Graduate Course in WINTER 2015
EECS598: Network Information Theory

Instructor: S. Sandeep Pradhan (pradhanv@eecs.umich.edu)

Time: TBD

Place: TBD

Prerequisite: EECS501 Probability and Random Processes (or equivalent)

Description: With the emergence of numerous applications involving different types of communication networks, such as packet-switched networks, wireless sensor networks and mobile cellular wireless networks, there has been a significant interest in obtaining a deeper understanding of the fundamental behavior of these networks. Network information theory deals with information in communication networks, i.e., obtaining optimal performance limits as well as efficient information processing strategies to achieve these limits in such networks. A communication network is modeled as a system involving many transmitters and receivers working with many information sources and channels. There have been several exciting new developments in the recent past in this area.

Goal: This course aims to develop a set of mathematical tools to study communication problems that arise in networks. A strong emphasis will be put on obtaining an intuitive framework to think about these problems. This course is aimed at graduate students working in the areas of electrical engineering, computer science, statistics, and mathematics. This course is offered once in 3 years.

Syllabus: Notion of information based on probability, Shannon's source coding and channel coding, multiple-access channels, broadcast channels, channel coding with feedback and/or state information, relay channels, distributed source coding, multiple description source coding, source coding with feedforward and/or state information. Introduction to Network Coding, and new results on linear and non-linear network coding.

Grading: Grading will be based on paper presentation, homeworks, and an exam.

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