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Information Theory IS&T Lecture Series

Lecturer: Andy Fraser
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Elements of Information Theory
by Cover and Thomas, second edition

Thursday, November 18, 2010
9:00 - 11:00 AM
TA-03, Building 4200, Conference Room 203A
(Los Alamos Research Park)

Overview: Information Theory establishes theoretical limits on the performance of techniques for compression and error correction of signals. Initially the field seemed theoretical and not closely related to engineering applications, but with the declining cost of processing power, higher performance signaling techniques that approach the theoretical limits have been implemented. The key to developing or understanding these techniques is familiarity with Information Theory.

In the fifteen years before I came to LANL in 2005, I (Fraser) was on the faculty at Portland State where I taught Information Theory out of the text by Cover and Thomas almost every year. It was my favorite course. I will be using my old course notes and a new edition of the text as the basis for a series of lectures to my colleagues at LANL starting this month.

As I lecture, I will use a white board instead of slides. Although I invite questions and discussion, I expect to go through the material faster with my colleagues than I could with beginning graduate students. I will start with Chapter 2, Entropy, Relative Entropy, and Mutual Information, and stop at the end of Chapter 11, Information Theory and Statistics or when people stop attending.

In the first four lectures I will present a block diagram of systems for communicating between two points over a channel, define entropy and mutual information, explore their properties, and preview their use in describing limits on the performance of communication systems. The tentative schedule is:

Tuesday, November 16—Chap. 2. Entropy and Mutual Information
Thursday, November 18—Chap. 2. Entropy and Mutual Information
Tuesday, November 30—Chap. 3. Asymptotic Equipartion Property
Thursday, December 2— Chap. 4. Entropy Rate

At the end of the fourth lecture, I will arrange the remaining lectures with those still attending.

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