



ECE Distinguished Lecturer Series
Thursday, Oct. 22, 2009, Dana Research Center 442, 3-4pm

Rate-Constrained Simulation and Source Coding with Stationary Codes

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Host: Hanoch Lev-Ari

Abstract:

Two related questions are explored in this talk:

- 1) How good of an imitation of an IID Gaussian or uniform random process can be constructed from fair coin flips?
- 2) How well can an IID Gaussian or uniform source be compressed to one bit per sample?

These questions raise several interesting old and new theoretical issues in information theory and ergodic theory. The generalized Ornstein distance between random processes, an extension of the Monge/Kantorovich transportation distance, provides a useful tool for formulating the optimization problems and the properties of asymptotically optimal codes. In this talk some of these issues are sketched along with old and recent results. The connection between simulation and source coding suggests a new class of time-invariant trellis source encoders based on random permutations. The class is described and compared to other methods numerically and from the point of view of theory.

Bio:

Robert M. Gray received the B.S. and M.S. degrees from M.I.T. in 1966 and the Ph.D. degree from U.S.C. in 1969, all in Electrical Engineering. Since 1969 he has been with Stanford University, where he is currently the Lucent Technologies Professor of Engineering and Professor of Electrical Engineering. His research interests are in information theory and signal processing, especially in the theory and practice of quantization, compression, and classification. He is a Fellow of the Institute of Mathematical Statistics and the IEEE. He was awarded an IEEE Centennial medal (1984) and an IEEE Third Millennium Medal (2000). He received the 1993 Society Award, the 1998 Technical Achievement Award, and the 2005 Meritorious Service Award from the IEEE Signal Processing Society. He received a Golden Jubilee Award for Technological Innovation (1998) and the 2008 Shannon Award from the IEEE Information Theory Society. He received the 2008 IEEE Jack S. Kilby Signal Processing Medal. He received a 2002 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM) and the 2003 Distinguished Alumni in Academia Award from the University of Southern California. He is a member of the National Academy of Engineering (2007).