Séminaire ICI : Yuval Kochman

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Titre du séminaire et orateur

Some fundamental bounds in joint source-channel coding.

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Abstract

Suppose that Alice wants to convey to Bob the results of k iid fair coin flips, using n times an iid binary symmetric channel (that is, in each use Alice's inout is flipped with probability e). We measure the performance by the expected Hamming distortion D, i.e., the probability that Bob's guess of a coin flip after seeing the channel outputs is wrong. Let D*(k, r, e) be the optimal attainable expected distortion, where r=n/k. For any fixed r, as k tends to infinity the optimum is attained by the separation principle: Alice and Bob should use the concatenation of optimal compression and digital communication. However, other approaches, known collectively as joint source-channel coding (JSCC) may be superior in terms of finite-blocklength performance (D* for limited k) and robustness (the performance when Alice does not know e). For r=1, a simple scalar (k=1) scheme attains D* universally over all e, but in general there are many open questions regarding the fundamental bounds of JSCC. We present some old and new results, and in particular show a surprising connection: an impossibility bound on robustness leads to a finite-blocklength bound.
Based in part on joint work with Or Ordentlich and Yury Polyanskiy.

Bio

Yuval Kochman received the B.Sc., M.Sc. and Ph.D. degrees from Tel Aviv University in 1993, 2003, and 2010, respectively, all in electrical engineering. During 2009–2011, he was a Postdoctoral Associate with the Signals, Information and Algorithms Laboratory, MIT. Since 2012, he has been with the School of Computer Science and Engineering, Hebrew University of Jerusalem. Outside academia, he has worked in the areas of radar, digital communications and video compression. His research interests include information theory, communications and signal processing.

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