Cornell University $\mathbb{I}$*nformation,* $\mathbb{S}$*ystems, and* $\mathbb{N}$*etworks seminar*

An Information-Theoretic Characterization for Sparse Signal Processing and Applications

Rhodes Hall 310: December 7, 2011 @ 12:00PM

ISN Seminar Speaker:
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Abstract

We present an information-theoretic characterization for problems in sparse signal processing. First, we consider the group testing problem where the goal is to recover a small distinguished subset of items from a large population while efficiently reducing the total number of tests. Establishing its connection to Shannon-coding theory, we formulate the group testing problem as a channel coding/decoding problem and derive a unifying result that characterizes the sample complexity through computation of a mutual information expression. We show that this result is fairly general and applicable to many interesting scenarios in sparse signal processing, including Bayesian compressive sensing and relevant features' identification. We derive precise sample complexity bounds for these cases.

Biography

George Atia joined the Department of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign in Fall 2009, where he is currently a postdoctoral research associate with the Coordinated Science Laboratory. He received his Ph.D. degree in Electrical and Computer Engineering from Boston University, Massachusetts, in 2009. He received the B.Sc. and M.Sc. degrees, both in Electrical Engineering, from Alexandria University, Egypt, in 2000 and 2003, respectively. He is the recipient of many awards including the outstanding graduate teaching fellow of the year award in 2003-2004, the 2006 College of Engineering Deans Award at the Science and Engineering Research Symposium, and the best paper award at the International Conference on Distributed Computing in Sensor Systems (DCOSS) in 2008. His main research interests are in wireless communications, statistical signal processing and information theory. His current research focus is on controlled sensing for inference and sparse signal processing.