Princeton University
Department of Electrical Engineering
Information Sciences and Systems (ISS)
Seminar ELE 519-Spring 2008

Speaker: Maxim Raginsky, Research Scientist, Duke University
Date: Thursday, March 27th
Time: 4:30pm
Room: B205 - Equad
Title: Shannon Meets Vapnik-Chervonenkis: Some Interactions Between Information Theory and Statistical Learning

Abstract: Information theory is concerned with fundamental limits of systems for transmission and processing of information. Statistical learning theory deals with fundamental limits on our ability to make accurate predictions on the basis of prior observations. In this talk, I will discuss some ways in which these two disciplines interact. I will sketch an application of learning theory to joint universal lossy coding and density estimation for parametric families of memoryless and weakly mixing stationary continuous-alphabet sources. I will show how learning-theoretic methods can be used to derive redundancy bounds in terms of learnability (combinatorial richness) of the underlying class of probability densities. I will also present an application of information theory to the problem of supervised learning under communication constraints, where the learning agent receives supervisory information over a noiseless digital channel of limited capacity. I will show how the theory of universal lossy source coding with side information can be used to derive bounds on the generalization error of empirical risk minimization in this communication-constrained setting.

Bio: Maxim Raginsky received the B.S. and M.S. degrees in 2000 and the Ph.D. degree in 2002 from Northwestern University, Evanston, IL, all in Electrical Engineering. From 2002 to 2004 he was a Postdoctoral Researcher at the Center for Photonic Communication and Computing at Northwestern University, where he pursued work on quantum cryptography and quantum communication and information theory. From 2004 to 2007 he was a Beckman Foundation Postdoctoral Fellow at the University of Illinois in Urbana-Champaign, where he carried out research on information theory, statistical learning and computational neuroscience. He has joined the Department of Electrical and Computer Engineering at Duke University in the Fall of 2007 as a research scientist. His interests include statistical signal processing, information theory, statistical learning and nonparametric estimation. He is particularly interested in problems that combine the communication, signal processing and machine learning components in a novel and nontrivial way, as well as in the theory and practice of robust statistical inference with limited information.