Distinguished Lecturer Series

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Constrained and Localized Estimation and Optimization

Abstract: We present work on two nonstandard frameworks relating statistical estimation and computation.

For the first problem, imagine that I estimate a statistical model from data, and then want to share my model with you. But we are communicating over a resource constrained channel. By sending lots of bits, I can communicate my model accurately, with little loss in statistical risk. Sending a small number of bits will incur some excess risk. What can we say about the tradeoff between statistical risk and the communication constraints? This is a type of rate distortion and constrained minimax problem, for which we provide a sharp analysis in certain nonparametric settings.

The second problem starts with the question "how difficult is it to minimize a specific convex function?" This is tricky to formalize--traditional complexity analysis is expressed in terms of the worst case over a large class of instances. We extend the classical analysis of stochastic convex optimization by introducing a localized form of minimax complexity for individual functions. This uses a computational analogue of the modulus of continuity that is central to statistical minimax analysis, which serves as a computational analogue of Fisher information.

Joint work with Sabyasachi Chatterjee, John Duchi, and Yuancheng Zhu.

Bio: John Lafferty is Louis Block Professor at the University of Chicago, with a joint appointment in Statistics and Computer Science. His research currently focuses on computational and statistical aspects of nonparametric methods, high-dimensional data, text modeling and graphical models. Prior to joining the University of Chicago in 2011, he was a faculty member at Carnegie Mellon University, here he helped to found the world's first machine learning department and Ph.D program. Before CMU, he was a Research Staff Member at IBM Thomas J. Watson Research Center, where he worked on natural speech and text processing in the group led by Frederick Jelinek. Lafferty received a Ph.D. in Mathematics from Princeton University, where he was a member of the Program in Applied and Computational Mathematics.

12:00 – 14:00 on Tuesday February 21, 2017 — Room 202, Alon Building (37/202)
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