



THE UNIVERSITY OF
CHICAGO

Department of Statistics
STATISTICS COLLOQUIUM

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Beyond Classical Minimality

MONDAY, April 23, 2018 at 4:30 PM
Eckhart 133, 5734 S. University Avenue
Refreshments before the seminar at 4:00PM in Jones 111

ABSTRACT

Minimax theory is one of the cornerstones of statistical decision theory and forms the basis of several methods that we use to assess the quality of statistical inferential procedures. Recent theoretical research has focused on developing refinements of minimax theory either by incorporating constraints into the framework -- for instance privacy, computational or robustness constraints -- or by identifying and addressing the inherent pessimism in the minimax framework -- typically exploiting structural assumptions like sparsity. We present two vignettes that refine minimax theory by localizing it in an appropriate sense. We first consider the classical problem of non-parametric goodness-of-fit testing. Classical methods based on the chi-squared or likelihood ratio tests can perform poorly when strong assumptions (smoothness, boundedness, uniformity) are relaxed. The difficulty of goodness-of-fit depends strongly, and in a precise way, on the null hypothesis being tested and we provide a sharp characterization of the "local minimax rate" in this problem. In the second part of the talk, we consider the problem of optimizing a function using noisy function-value queries (i.e. zeroth-order optimization). In this context, the classical minimax framework is unable to dichotomize an adaptive optimization algorithm from one that attempts to estimate the function well everywhere. We show that once again a local minimax perspective is able to address these shortcomings and we provide a function-specific characterization of the difficulty of zeroth-order optimization.

Based on joint works with Aarti Singh, Yining Wang and Larry Wasserman.

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