



THE UNIVERSITY OF
CHICAGO

Department of Statistics

DISSERTATION PROPOSAL

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High Dimensional Feature Screening and Shape Restricted
Nonparametric Regression

WEDNESDAY, December 6, 2017, at 10:00 AM
Jones 226, 5747 S. Ellis Avenue

ABSTRACT

In the first half of the talk, I will present a new method for feature screening and variable ranking in high dimensional linear regression. Our method is a two-step approach: in the first step we use PCA to de-correlate covariates, whereas in the second step we explore the local covariance structure to rank variables. Our method is simple and fast, and is efficient in overcoming the so called ‘Signal Cancellation’ problem. Numerical experiments demonstrate the advantage of our method over other state-of-the-art screening approaches. I will also introduce the extension of our method to generalized linear models.

In the second half of the talk, I will discuss some properties of isotonic regression, which is the most commonly used shape restricted nonparametric regression. We study the contractive behavior of isotonic projection operator with respect to any norm, and the result enables a simple and non-asymptotic analysis of the uniform convergence properties of isotonic regression. The tools we developed can also be applied to study the convergence of Grenander estimator for estimating a non-increasing density. Future directions along this line include the study of other shape restricted nonparametric regression and the potential application of isotonic regression in the recalibration problem.

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