THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

PhD Dissertation Proposal Presentation

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"Robust Estimation and Inference in Regression"

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Abstract

Regression is a fundamental tool in statistics and widely used. Classical regression theory often relies on assumptions that break down in the presence of contaminated data. This thesis studies robust linear regression from both statistical and computational perspectives, focusing on how the structure of contamination affects what can be estimated and inferred.

The first part considers estimation in regression with adaptive contamination. We develop regression-depth-based methods that exploit large leverage points. We also prove matching lower bounds and show that achieving the optimal rate may be computationally hard, revealing a statistical and computational gap.

The second part considers adaptive inference in regression with oblivious noise contamination. While median regression gives optimal estimation in this setting, inference are nontrivial without knowing the contamination level. We construct score-inversion intervals and shows there is no adaptation cost in terms of length.

We shall also discuss results from two ongoing projects. The first is about adaptive inference in high dimensional sparse regression. The second is about estimation in regression with oblivious label contamination.

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