Department of Decision Sciences

Statistics Seminars

Estimation of a score-explained non-randomized treatment effect in fixed and high dimensions

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Abstract

Non-randomized treatment effect models are widely used for the assessment of treamtment effects in various fields and, in particular, social science disciplines like economics, political science, psychometry, psychology. More specifically, these are situations where treatment is assigned to an individual based on some of their characteristics (e.g. scholarship is allocated based on merit or antihypertensive treatments are allocated based on blood pressure level) instead of being allocated randomly, as is the case, for example, in randomized clinical trials. Popular methods that have been largely employed to date for estimation of such treatment effects suffer from slow rates of convergence (i.e. slower than parametric rate $\sqrt{n}$, where n is the number of sample sizes). In this presentation, we present a new model coined SCENTS: Score Explained Non-Randomized Treatment Systems and a correspondingnmethod that allows estimation of the treatment effect at $\sqrt{n}$ rate in the presence of fairly general forms of confoundedness when the `score' variable on whose basis treatment is assigned can be explained via certain feature measurements of the individuals under study. We show that our estimator is asymptotically normal in general and semi-parametrically efficient (i.e achieves minimum variance) under normal errors. We further extend our analysis to high dimensional covariates and propose a $\sqrt {n}$ consistent and asymptotically normal estimator based on a de-biasing procedure. We analyze two real datasets via our method will conclude this presentation with a discussion on some possible extensions of our approach.

This is joint work with Debarghya Mukherjee and Ya'acov Ritov.

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