Statistics Seminar

Department of Mathematics and Statistics

DATE:	Thursday, February 29, 2024
TIME:	1:15pm – 2:15pm
LOCATION:	WH 100E
SPEAKER:	Xinhai Zhang, Binghamton University
TITLE:	Semiparametric Proximal Causal Inference

Abstract

Skepticism about the assumption of no unmeasured confounding, also known as exchangeability, is often warranted in making causal inferences from observational data; because exchangeability hinges on an investigator's ability to accurately measure covariates that capture all potential sources of confounding. In practice, the most one can hope for is that covariate measurements are at best proxies of the true underlying confounding mechanism operating in a given observational study. In this article, we consider the framework of proximal causal inference introduced by Miao, Geng, and Tchetgen Tchetgen and Tchetgen Tchetgen et al. which while explicitly acknowledging covariate measurements as imperfect proxies of confounding mechanisms, offers an opportunity to learn about causal effects in settings where exchangeability on the basis of measured covariates fails. We make a number of contributions to proximal inference including (i) an alternative set of conditions for nonparametric proximal identification of the average treatment effect; (ii) general semiparametric theory for proximal estimation of the average treatment effect including efficiency bounds for key semiparametric models of interest; (iii) a characterization of proximal doubly robust and locally efficient estimators of the average treatment effect. Moreover, we provide analogous identification and efficiency results for the average treatment effect on the treated. Our approach is illustrated via simulation studies and a data application on evaluating the effectiveness of right heart catheterization in the intensive care unit of critically ill patients. Supplementary materials for this article are available online.