Department of Biostatistics and Medical Informatics Seminar

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Friday, November 12, 2021
12:00-1:00 pm
Zoom Link:
https://uwmadison.zoom.us/j/93605616843

Semiparametric Sensitivity Analysis: Unmeasured Confounding in Observational Studies

Abstract: Establishing cause-effect relationships from observational data often relies on untestable assumptions. It is crucial to know whether, and to what extent, the conclusions drawn from nonexperimental studies are robust to potential unmeasured confounding. In this paper, we focus on the average causal effect (ACE) as our target of inference. We build on the work of Franks et al. [2019] and Robins et al. [2000] by specifying non-identified sensitivity parameters that govern a contrast between the conditional (on measured covariates) distributions of the outcome under treatment (control) between treated and untreated individuals. We use semiparametric theory to derive the non-parametric efficient influence function of the ACE, for fixed sensitivity parameters. We use this influence function to construct a one-step bias-corrected estimator of the ACE. Our estimator depends on semiparametric models for the distribution of the observed data; importantly, these models do not impose any restrictions on the values of sensitivity analysis parameters. We establish sufficient conditions ensuring that our estimator has $\sqrt{n}$ asymptotics. We use our methodology to evaluate the causal effect of smoking during pregnancy on birth weight. We also evaluate the performance of estimation procedure in a simulation study. This is joint work with Razieh Nabi, Edward Kennedy, Ming-Yueh Huang, Matteo Bonvini and Marcela Smid.

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