THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

Statistics Colloquium

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Post-Treatment Confounding in Causal Mediation Studies: A Cutting-Edge Problem and A Novel Solution via Sensitivity Analysis

MONDAY, MAY 23, 2022, at 4:30 PM via Zoom
Zoom information will be included in an email announcement.

ABSTRACT

In causal mediation studies that decompose an average treatment effect into indirect and direct effects, examples of post-treatment confounding are abundant. In the presence of treatment-by-mediator interactions, past research has generally considered it infeasible to adjust for a post-treatment confounder of the mediator-outcome relationship due to incomplete information: for any given individual, a post-treatment confounder is observed under the actual treatment condition while missing under the counterfactual treatment condition. This paper proposes a new sensitivity analysis strategy for handling post-treatment confounding and incorporates it into weighting-based causal mediation analysis. The key is to obtain the conditional distribution of the post-treatment confounder under the counterfactual treatment as a function of not just pretreatment covariates but also its counterpart under the actual treatment. The sensitivity analysis then generates a bound for the natural indirect effect and that for the natural direct effect over a plausible range of the conditional correlation between the post-treatment confounder under the actual and that under the counterfactual conditions. Implemented through either imputation or integration, the strategy is suitable for binary as well as continuous measures of post-treatment confounders. Simulation results demonstrate major strengths and potential limitations of this new solution. A re-analysis of the National Evaluation of Welfare-to-Work Strategies (NEWWS) Riverside data reveals that the initial analytic results are sensitive to omitted post-treatment confounding.

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