Statistics and Actuarial Science Seminar

Title: Categorical instrumental variable model: Characterization, partial identification, and statistical inference

Speaker: Richard Guo (University of Michigan)

Date: Thu 5th March 2026 at 3:00PM

Location: E0.32 (beside Pi restaurant)

Abstract: We study categorical instrumental variable (IV) models with instrument, treatment, and outcome taking finitely many values. We derive a simple closed-form characterization of the set of joint distributions of potential outcomes that are compatible with a given observed data distribution in terms of a set of inequalities. These inequalities unify several different IV models defined by versions of the independence and exclusion restriction assumptions and are shown to be non-redundant. Finally, given a set of linear functionals of the joint counterfactual distribution, such as pairwise average treatment effects, we construct confidence intervals with simultaneous finite-sample coverage, using a tail bound on the Kullback-Leibler divergence. We illustrate our method using data from the Minneapolis Domestic Violence Experiment.