Statistics Seminar
Department of Mathematics and Statistics

DATE:	Thursday, March 30, 2023
TIME:	1:15pm – 2:15pm
LOCATION:	[https://binghamton.zoom.us/j/94116525845]
SPEAKER:	Ruoqi Yu, UC Davis
TITLE:	Balancing weights in observational factorial studies

Abstract

Many scientific questions in biomedical research, environmental sciences, and psychology require an understanding how multiple factors affect the outcome of interest. Factorial design is a common and easy-to-use tool to evaluate the causal effects of multiple treatments and their interactions simultaneously. However, how to draw reliable causal inferences for multiple treatments in observational studies remains unclear. In particular, as the number of treatment combinations grows exponentially as the number of treatments, some treatment combinations can be rare or unobserved, raising new challenges in estimating factorial effects and the downstream inference. Motivated by this need, we develop a novel and practical weighting approach tailored for observational studies with multiple treatments. The main idea is to use the weighted observational data to approximate a randomized factorial experiment so that the same set of weights can be used to estimate the effects of multiple treatments and their interactions simultaneously. Our investigations suggest that the weights must be designed to balance the observed covariates and the treatments for each contrast in order to provide unbiased estimates of the factorial effects of interest. We discuss how to generalize the proposed weighting method when some treatment combination groups are empty. We study the asymptotic behavior of the new weighting estimators and propose a consistent variance estimator, allowing conducting inference for the factorial effects.

Abstract

Ruoqi is an assistant professor at the Department of Statistics, University of California, Davis. Previously, she received her Ph.D. in Statistics from the University of Pennsylvania and then worked as a Neyman Visiting Assistant Professor in Statistics at the University of California, Berkeley. Ruoqi's research focuses on causal inference in observational studies, with applications in public policy, health sciences, and social sciences.

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