Department of Applied and Computational Mathematics and Statistics Colloquium

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Optimal Stratification to Address Selection Bias in Observational Studies

Randomized controlled trials are the gold standard for determining a treatment effect. However, they are oftentimes too costly, infeasible, or unethical to carry out. In such situations, we turn to observational studies, where the treatment assignment is not randomized. This results in selection bias, leading to incomparable treatment and control groups. One of the most common techniques to address this is propensity score stratification, where we form strata that contain both treated and control individuals who look similar initially so that we can calculate a treatment effect within each stratum. However, propensity score stratification may leave residual imbalances in the covariate distributions between the treated and control groups. Our new technique of optimal refinement addresses this by splitting each propensity score stratum in two in such a way that optimizes the resulting covariate balance.

In this talk, we will start by examining the performance of propensity score stratification and then will move to discussing our new technique of optimal refinement. We will first carefully define the objective as an integer program. Because solving integer programs is often computationally intractable, we will use randomized rounding, an approximation algorithm, to obtain a provably good solution. We will look at the performance of this method both in simulations and via a real-world example studying the effect of right heart catheterization on 30-day mortality.

Mon, Jan 22, 2024
3:45 – 4:45 PM
127 Hayes-Healy Center

Colloquium Tea – 3:15 PM in 101A Crowley Hall