

VIRGINIA TECH DEPARTMENT OF STATISTICS COLLOQUIUM

Bayesian Nonparametric Common Atoms Regression for Generating Synthetic Controls in Clinical Trials

SEPTEMBER 8 | 3.30 PM

VIRTUAL SEMINAR

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Abstract: The availability of electronic health records (EHR) has opened opportunities to supplement increasingly expensive and difficult to carry out randomized controlled trials (RCT) with evidence from readily available real world data. In this paper, we use EHR data to construct synthetic control arms for treatment-only single arm trials. We propose a novel nonparametric Bayesian common atoms mixture model that allows us to find equivalent population strata in the EHR and the treatment arm and then resample the EHR data to create equivalent patient populations under both the single arm trial and the resampled EHR. Resampling is implemented via a density-free importance sampling scheme. Using the synthetic control arm, inference for the treatment effect can then be carried out using any method available for RCTs. Alternatively the proposed nonparametric Bayesian model allows straightforward model based inference. In simulation experiments, the proposed method vastly outperforms alternative methods. We apply the method to supplement single arm treatment-only glioblastoma studies with a synthetic control arm based on historical trials.



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