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2018 ACIC - Poster Abstract

1 message

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Hi,

Thank you for your submission. The planning committee will be in touch by TBD.

Sincerely,
ACIC 2018 Organizing Committee

2018 ACIC - Poster Abstract

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Poster Title *	Robust Nonparametric Inference for Stochastic Interventions Under Multi-Stage Sampling

Poster Abstract (Max 500 Words) *

Perhaps too often, work in statistical causal inference focuses on the effect of deterministic interventions, under which, for each unit, the magnitude of the treatment is set to a fixed value. Under violations of the assumption of positivity, the evaluation of such interventions faces a host of problems, among them non-identification and inefficiency. Prior work has proposed a flexible solution: stochastic shift interventions, under which, in the simplest case, for each unit, the treatment is set to be an additive shift of the observed value of the treatment. What's more, in real-life applications, data analyses are often further complicated by pragmatic sub-sampling schemes, the effects of which cannot safely be ignored when drawing statistical inferences. Building on much previous work, we present a novel approach for such settings --- an augmented targeted maximum likelihood estimator for interventions that shift observed values of the treatment, with consistency and efficiency guarantees even in the presence of multi-stage sampling, and we show that this estimator enjoys these essential theoretical properties by way of a form of multiple robustness inherited from its constituent parts. After providing a general characterization of shift interventions, we illustrate the utility of employing our proposed nonparametric estimator via simulation studies, showing that it attains fast convergence rates even when incorporating machine learning estimators; moreover, we introduce a recent software implementation (the "txshift" R package) and apply this methodology in an investigation of the

effects of immune response biomarkers on HIV vaccine efficacy, contrasting our proposed approach with several classical techniques. Specifically, we show that our proposed method obtains efficient inference on a parameter defined as the overall risk of HIV infection in the vaccine arm of an efficacy trial, under various posited shifts of the distribution of an immune response biomarker away from its observed distribution in the efficacy trial. Our proposed technique provides a highly interpretable variable importance measure -- defined through the formalism of statistical causal inference -- for ranking multiple immune responses based on their utility as immunogenicity study endpoints in future HIV-1 vaccine trials that evaluate putatively improved versions of the vaccine. Time permitting, we discuss extensions of this approach that consider recent and novel ideas in stochastic interventions, such as the induction of shifts in the treatment in terms of the propensity score rather than on the observed treatment scale.