Causal Inference Program Opening Workshop
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SPEAKER TITLES/ABSTRACTS

Lu Wang
University of Michigan

"New Statistical Learning Methods for Estimating the Optimal Dynamic Treatment Regime"

We present recent advances and statistical developments for evaluating Dynamic Treatment Regimes (DTR), which allow the treatment to be dynamically tailored according to evolving subject-level data. Identification of an optimal DTR is a key component for precision medicine and personalized health care. Specific topics covered in this talk include several recent projects with robust and flexible methods developed for the above research area. We will first introduce a dynamic statistical learning method, adaptive contrast weighted learning (ACWL), which combines doubly robust semiparametric regression estimators with flexible machine learning methods. We will further develop a tree-based reinforcement learning (T-RL) method, which builds an unsupervised decision tree that maintains the nature of batch-mode reinforcement learning. Unlike ACWL, T-RL handles the optimization problem with multiple treatment comparisons directly through a purity measure constructed with augmented inverse probability weighted estimators. T-RL is robust, efficient and easy to interpret for the identification of optimal DTRs. However, ACWL seems more robust against tree-type misspecification than T-RL when the true optimal DTR is non-tree-type. At the end of this talk, we will also present a new Stochastic-Tree Search method called ST-RL for evaluating optimal DTRs.