



**THE UNIVERSITY OF GEORGIA
DEPARTMENT OF STATISTICS**

Colloquium Series

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**New Approaches for Inference on Optimal Treatment
Regimes**

Finding the optimal treatment regime (or a series of sequential treatment regimes) based on individual characteristics has important applications in precision medicine. We propose two new approaches to quantify uncertainty in optimal treatment regime estimation. First, we consider inference in the model-free setting, which does not require to specify an outcome regression model. Existing model-free estimators for optimal treatment regimes are usually not suitable for the purpose of inference, because they either have nonstandard asymptotic distributions or do not necessarily guarantee consistent estimation of the parameter indexing the Bayes rule due to the use of surrogate loss. We study a smoothed robust estimator that directly targets the parameter corresponding to the Bayes decision rule for optimal treatment regimes estimation. We verify that a resampling procedure provides asymptotically accurate inference for both the parameter indexing the optimal treatment regime and the optimal value function. Next, we consider the high-dimensional setting and propose a semiparametric model assisted approach for simultaneous inference. Simulations results and real data examples are used for illustration. (Joint work with Yunan Wu and Haoda Fu).

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