Department of Statistics

STATISTICS COLLOQUIUM

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Some Recent Developments in Machine Learning and Precision Medicine

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Eckhart 133, 5734 S. University Avenue
Refreshments before the seminar at 3:30PM in Jones 111

ABSTRACT

In this talk, we discuss recent developments in machine learning for precision medicine. One such development, outcome weighted learning, directly estimates optimal treatment rules without modeling the primary outcome as a function of patient-level features. The new approach helps leverage treatment heterogeneity to discover treatment rules with complex and multi-stage treatment options, including options on a continuum such as dose level as well real time decision making in mHealth. For the precision dose setting, an outcome weighted learning method, based on a non-convex loss function, is used to efficiently estimate the individualized dose rule (IDR) via a difference of convex functions algorithm. For the precision mHealth setting, a policy learning approach is developed in a Markov decision process framework to estimate the individualized treatment rule (ITR). Consistency and convergence rates for the estimated ITR and IDR are derived, and the approaches are evaluated via simulation studies and data analyses. The new approaches expand the use of machine learning in precision medicine.

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