



Mathematical Sciences



Fall 2016

Colloquium Series

Friday, September 9, 2016 at 3pm in Bell Hall 143

Dr. Xiaogang Su

Department of Mathematical Sciences
UTEP

A Look into Differential Treatment Effects via Interaction Trees

There has been a growing interest in assessing heterogeneous treatment effects in many application fields including precision medicine. Concerning experimental data collected from randomized trials, we explore stratified and individualized treatment effects with a machine learning approach – Interaction Trees (IT; Su et al., 2009). We first propose a smooth sigmoid surrogate (SSS) splitting method, as an alternative to greedy search, to speed up IT and amend deficiencies. On the basis of modified IT, causal inference at different levels are then made. More specifically, an aggregated grouping procedure stratifies data into refined subgroups where the treatment effect remains homogeneous. Ensembles of IT models can provide prediction for individualized treatment effects (ITE), which compares favorably to the traditional ‘separate regression’ methods. In order to extract meaningful interpretations, we have also made available several other features such as variable importance ranking, partial dependence plot to help identify important effect moderators for the treatment among high-dimensional covariates, and ensemble majority voting for determining the optimal treatment regime. An empirical illustration of the proposed techniques is made via an analysis of quality of life (QoL) data from breast cancer survivors.