STAT 991-304 Fall 2017
Contemporary Research in Linear Models and Post-Selection Inference
Friday 09:30 AM-12:30 PM

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Description
This course compliments and interacts with the research investigation of the Wharton Linear Models Group. The major contributors to the group are: Richard Berk, Andreas Buja, Lawrence Brown, Edward George, Arun Kuchibhotla, Weijie Su, Kai Zhang, and Linda Zhao.

Philosophy
We want to build a more realistic and rigorous formulation for what is going in real statistical practice. Following this philosophy, we build assumption-lean formulas for regression type situations, including generalized linear models.

Two Main Themes
- Assumption-lean Model
  - Build comprehensive theories and methodologies for interpreting and analyzing the situation when conventional linear model assumptions fail. What are the consequences and what are the right things to do?
- Post-Selection Inference (PoSI)
  - Concentrate on inference after variables selection in usual and assumption-lean linear model
  - Explore inference after other model building, such as transformation

Possible Topics
- Assumption-lean framework and methodology
  - Ordinary linear model
  - Generalized linear model
- Post-Selection Inference (PoSI)
  - Conventional set-up
  - Assumption-lean set-up
  - Post selection conditional inference (Stanford group)
- Model selection methods
  - Cp and GCp
  - Bootstrap
- Semi-supervised regression
  - Continuous response
  - Classification
  - Average Treatment Effect (ATE)
- Asymptotic Semi-parametric theory
  - General theory
  - Application to assumption-lean model
- Causality in the assumption-lean framework

Logistics
- Weekly in-class presentation (mostly by students) and discussion (1.5h)
- Join active on-going group meeting once a week (Optional, might be too difficult)