AEDE 6130 – Advanced Quantitative Methods III (condensed)

Description

The increasing availability of large-scale datasets and rapid improvement in computing power and software provide an opportunity to develop more reliable quantitative models of economic behavior and policy analysis. This course builds upon the applied econometric content by introducing complementary practical methods of data analytics. Topics include data exploration and visualization, model selection and regularization for high dimensional data, supervised and unsupervised machine learning methods.

Logistics

- Lecture: Two 1.5 hours session per week
- Lab: One 1.5 hours session per week

Materials

- Required book: An Introduction to Statistical Learning with Application in R (Gareth James, Daniela Witten, Trevor Hastie, Rob Tibshirani) ~ *freely available*
- R and R Studio

Schedule

Week 1) Introduction to Big Data and Machine Learning
Week 2) Review of Linear Regression
Week 3) Classification Models: Logistic, LDA, QDA, KNN
Week 4) Resampling, Cross Validation, and Bootstrapping
Week 5) Subset and Shrinkage (Ridge and Lasso) Methods
Week 6) Dimension Reduction Methods
Week 7) Midterm
Week 8) Decision Trees
Week 9) Economic Applications of Supervised Learning
Week 10) Presentations: Supervised Learning
Week 11) Principal Component Analysis
Week 12) Clustering Methods
Week 13) Economic Applications of Unsupervised Learning
Week 14) Presentation: Unsupervised Learning

Evaluation

- Five Problem Sets (25%)
- Lab Practice Sets (5%)
- In-class Midterm (20%)
- Two Group Projects (20%)
- Take-home Final Exam (30%)