

Announcement of a public lecture series on
Machine Learning in Econometrics

by

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April 8 - 11, 2019

The course is taught in FG 0.015 in 10 sessions of 45 Minutes starting

Monday April 8: 8.30, 9.30, 10.45, 11.45.
Tuesday April 9: 8.30, 9.30, 10.45
Thursday April 11: 8.30, 9.30, 10.45.

Draft course outline

Monday first half: Overview, terminology, estimating prediction error using cross-validation or goodness-of-fit measures.
Mon. second half: Regression: subset selection of regressors, shrinkage methods (ridge, lasso LAR), dimension reduction (PCA).
Tuesday first half: Nonlinear models: local regression, neural networks, regression trees, bagging, random forests and boosting.
Tues. second half: Classification (categorical y): logit, k-nn, LDA, SVM; Unsupervised learning (no y): PCA, cluster analysis.
Thursday: Causal inference with machine learning: IV estimation with many instruments; partial linear model with many controls; ATE with heterogeneous effects and many controls

There is no exam and credits cannot be collected. The material will cover applications using Stata, including the Stata addon lassopack, and R to illustrate the methods.

Readings

The lectures are based on two books

- Gareth James, Daniela Witten, Trevor Hastie and Robert Tibsharani (2013), An Introduction to Statistical Learning: with Applications in R, Springer.
- Trevor Hastie, Robert Tibsharani and Jerome Friedman (2009), The Elements of Statistical Learning: Data Mining, Inference and Prediction, Springer.

Key economics references are

- A. Belloni, V. Chernozhukov and C. Hansen: "High-Dimensional Methods and Inference on Treatment and Structural Effects in Economics" J. of Economic Perspectives Spring 2014, 29-50.
- S. Mullainathan and J. Spiess: "Machine Learning: An Applied Econometric Approach", J. of Economic Perspectives Spring 2017, 87-106.
- H. Varian Big Data: "New Tricks for Econometrics" J. of Economic Perspectives Spring 2014, 3-28.

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