Machine Learning for Economists

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Prerequisites:

Couse participants should know some basic machine learning estimators, such as lasso, tree, and forest. The CES lecture does not cover an introduction to machine learning. Furthermore, participants should have basic knowledge of statistics and microeconometrics (keywords: OLS, MSE, inverse probability weighting).

Schedule:

- Lecture 1: Promises and Perils of Machine Learning in Economics
- Lecture 2: Machine Learning to Account for High-Dimensional Confounding
- Lecture 3: Efficient Policy Learning

Course Description:

The purpose of the course is to give participants a short overview about how they can deploy machine learning methods in their own research projects. The first lecture gives an overview about the scope of machine learning applications in business and economic research including example applications. We discuss which research tasks can be pegged to machine learning algorithms and which tasks have to remain under human control. We discuss the difference between predictive and causal machine learning. The second lectures covers the double machine learning approach. This is a method that uses machine learning to account for high-dimensional confounders. It is an alternative to the multivariate OLS or matching estimators, which are widely used for policy evaluations under conditional independence assumptions. The third lecture introduces a method for efficient policy learning. Policy learning is useful to target training programs at unemployed, solicitation letters at customers, or political campaigns at voters in a utility maximizing way.

Reading List:

Sendhil Mullainathan and Jann Spiess, 2017, Machine Learning: An Applied Econometric Approach, Journal of Economic Perspectives, 31(2), 67-106.

Susan Athey, 2017, Beyond Prediction: Using Big Data for Policy Problems, Science, 335 (6324), 483-485.

Victor Chernozhukov, Denis Chetverikov, Mert Demirer, Esther Duflo, Christian Hansen, Whitney Newey, 2017, Double/Debiased/Neyman Machine Learning of Treatment Effects, American Economic Review, 107(5), 261-265.