

Machine learning and big data for macroeconomic analysis

The intersection of Machine Learning (ML) with econometrics and applied statistics is rapidly shaping up the research landscape in economics. ML has gained prominence due to the availability of large datasets (*Big Data*) and has opened up new research avenues. These developments led to interest from both public and private sectors.

However, little progress has been made to understand the properties of ML methods when applied to macroeconomic forecasting, and few attempts have been made to apply those techniques to structural analysis. The objectives of this course are: (i) introduce forecasting models that incorporate machine learning components; (ii) show how to use big data to improve the macroeconomic structural analysis.

Participants will first learn how to define the forecasting problem in presence of large sets of predictors. Then, how to use machine learning methods to reduce dimensionality and to extract relevant information for the prediction of important macroeconomic outcomes. Finally, they will learn how to estimate the effects of macroeconomic shocks through lenses of factor models. The theory will be presented in morning session, while practical examples will be covered in afternoon.

The course assumes basic knowledge of econometrics, statistics and time series modeling. Instructors will use Matlab for practical examples, but the techniques covered in this course can be used in R or Python as well. It consists of two components:

1. Forecasting macroeconomic aggregates in data-rich environment
2. Estimating the effects of macroeconomic shocks in data-rich environment