Machine Learning for Economists

ECTS : 3

Description du contenu de l'enseignement :

Economic science has evolved over several decades toward greater emphasis on empirical work. Ever increasing mass of available data ('big data') in the past decade is likely to have a further and profound effect on economic research (Einav and Levin, 2014). Beyond economic research, governments and the industry are also increasingly seeking to use 'big data' to solve a variety of problems, usually making use of the toolbox from machine learning (ML).

The question we ask in this course is the following : What do we (not) learn from big data and ML as economists? Is ML merely applying standard techniques to novel and large datasets? If ML is a fundamentally new empirical tool, how does it fit with what we know? In particular, how does it fit with our tools for causal inference problems? As empirical economists, how can we use big data and ML? We'll discuss in detail how ML is useful to collect new data, for prediction in policy, and to provide new tools for estimation and inference.

Compétence à acquérir :

Course objectives:

1. Present a way of thinking about ML that gives it its own place in the econometric toolbox.

2 Develop an intuition of the problems to which it can be applied, and its limitations.

3. Think of unstructured data (text, image) as data we can use when economic outcomes are missing.

4. Specific focus on application of ML to social policies (health/labor/taxation/environment etc.).

Mode de contrôle des connaissances :

Grading:

1. In-class pairwise presentation of an academic paper (30% of overall grade).

2. Final exam (in-class written text). 70% of overall grade.

Bibliographie, lectures recommandées :

- Mullainathan, Sendhil and Jann Spiess (2017). "Machine learning: An applied econometric approach". In: Journal of Economic Perspective 31.2, pp. 87-106.
- Kleinberg, Jon et al. (2015). "Prediction policy problems". American Economic Review 105.5, pp. 491-495.
- Athey, S. (2017): "Beyond prediction: Using big data for policy problems", Science 355, 483–485.
- Kleinberg, J., Lakkaraju, H., Leskovec, J., Ludwig, J. and S. Mullainathan (2018): "Human Decisions and Machine Predictions", The Quarterly Journal of Economics, Volume 133, Issue 1, Pages 237–293.
- Susan Athey, Guido W. Imbens. 2019. Machine Learning Methods That Economists Should Know About. Annual Review of Economics 11:1, 685-725.
- Athey, Susan, and Guido Imbens. 2016. "Recursive Partitioning for Heterogeneous Causal Effects". PNAS 113(27): 7353–60.
- Belloni, A., V. Chernozhukov, S. Mullainathan and J. Spiess and C. Hansen.(2014): "High-Dimensional Methods and Inference on Structural and Treatment Effects" Journal of Economic Perspectives, Volume 28, Number 2 – Spring 2014, Pages 29–50