FIN-622

Big Data and Machine Learning for Financial Economics

Malamud Semyon

Cursus	Sem.	Type
Finance		Opt.

Language of teaching	English
Credits	3
Session	
Exam	Written
Workload	90h
Hours	**64**
Courses	24
Exercises	40
Number of positions	

Remark

To register, please contact edfi@epfl.ch. The timetable and location is available on the Google doc below under "Websites" (1 tab per term).

Summary

This class is an introduction to Machine Learning and High-Dimensional Statistics in Finance. We start with a purely empirical approach, focusing first on high-dimensional regressions, then moving to kernel methods and deep learning, and then studying equilibrium implications.

Content

This class is an introduction to Machine Learning and High Dimensional Statistics in Finance. We start with purely empirical approach, focusing first on high dimensional regressions and the ideas of over-parametrization and over-fitting. We then discuss the role of non-linearities, inductive biases, and ways to think and model non-linear structures in financial markets and economic systems.
We then move to kernel methods and deep learning, and then investigate equilibrium models in economies populated agents that are aware of the statistical complexity on the underlying systems: The fact that we do not have enough observations to make efficient inference. We show how "complexity corrections" emerge in every single statistical test and every single economic model, and that these corrections have first order effects on equilibrium dynamics. Here is list of topics we will cover:

- Understand and apply modern methods for big data models with many predictors and factors.
- Understand and apply big data models and neural networks, and the role of complexity corrections and limits to learning.
- Construct high-dimensional factor models for the cross-section of returns and economic time series and develop an efficient, theory-based way of optimally incorporating high-dimensional information into portfolio construction and economic factor analysis.
- Understand how to develop equilibrium models in the presence of statistical complexity.
- Study Double Debiased Machine Learning and the general role of Debiasing Non-parametric estimators.

Assessment methods

Written Exam

Resources

Websites

- https://docs.google.com/spreadsheets/d/1snQnXI0uXc-tff-oR-Q61zP3mqCKlTND77jio2o9SBc/edit?usp=sharing

Moodle Link

- https://go.epfl.ch/FIN-622