

FIN-423

Financial machine learning projects

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Cursus	Sem.	Type
Financial engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	3
Withdrawal Session	Unauthorized Winter
Semester	Fall
Exam	During the semester
Workload	90h
Weeks	14
Hours	3 weekly
Lecture	2 weekly
Project	1 weekly
Number of positions	

Remark

MA3 only

Summary

The objective of this course is to acquire experience in financial machine learning by solving real-world problems. Different groups of students will work on different industry projects during the semester. Lectures will discuss best practices and tools.

Content

Projects:

- from local industry partners (bank, market maker, broker, asset manager, etc.)
- working in different asset-class (commodities, crypto-currencies, equity, FX, etc.)
- with distinct applications (trading signal, portfolio optimization, volatility prediction, factors extraction, etc.)
- each group of students will work on one dedicated project during the semester

Machine learning:

- review of standard methods (regularized linear regressions, tree methods, neural networks)
- study the challenges of applying data-driven algorithms in finance
- present various use-cases in financial engineering (model pricing and calibration, time-series simulation, etc.)
- transform text as data using natural language processing tools
- discuss selected advanced topics in reinforcement learning (e.g. derivatives hedging)

Keywords

- finance
- machine learning
- projects

Learning Prerequisites**Required courses**

- Programming knowledge of Python
- Basic probability and statistical knowledge
- Basic knowledge of finance
- Basic knowledge of machine learning

Recommended courses

- Introduction to finance
- Financial econometric
- Derivatives
- Investments

Learning Outcomes

By the end of the course, the student must be able to:

- Choose an appropriate model to solve a problem in finance
- Assess / Evaluate and benchmark a model performance
- Design flexible models for financial applications
- Implement data processing and models in python code
- Develop a fast system to replace slow numerical methods
- Manipulate and transform data

Transversal skills

- Manage priorities.
- Make an oral presentation.
- Write a scientific or technical report.
- Demonstrate a capacity for creativity.
- Take feedback (critique) and respond in an appropriate manner.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Demonstrate the capacity for critical thinking

Teaching methods

- Lectures, 2 hours per week for 14 weeks
- Project sessions, 1 hour per week for 14 weeks

Expected student activities

- Actively participate to the lectures and the presentations

Assessment methods

- Class participation 20%
- Project presentations 20%

- Project report 60%

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes