llsms2138

2020

Big data in finance

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h	Q2

Teacher(s)	Ghysels Eric ;Lassance Nathan (compensates Ghysels Eric) ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	The course will cover important developments in the fields of statistical learning, machine learning and big data. These interrelated fields provide statistical models to learn structure from high-dimensional data and make accurate predictions. The course is divided in four sections: 1. Robust linear regression 2. Principal and independent component analysis 3. Bayesian estimation 4. Ensemble learning For each section, we will see state-of-the-art applications in portfolio selection (investment strategies), based on recent scientific papers. The students will see why portfolio theory, covered in the Q1 course LLSMS2013 "Investments", leads to disappointing investment performance in practice when it is naively applied, and how the methods seen in the course help to make portfolio theory work in practice.
Aims	1 ***By the end of the course, the student will have mainly developed the following elements of the « référenciel de compétence » of the Louvain School of Management.*** **From the lectures:** 2. Maîtriser des savoirs, 3. Appliquer une démarche scientifique. **From the group assignment :** 6. Travailler en équipe et en exercer le leadership, 7. Gérer un projet, 8. Communiquer. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Final exam, assignment
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Lectures + group assignment
Content	This course covers theoretical and practical concepts related to: 1. Robust linear regression: Reminder on linear regression, bias-variance tradeoff, subset selection and cross-validation, shrinkage methods, the case of big data, refresher on portfolio theory, two portfolio-selection papers as application 1. Principal and independent component analysis: PCA, choosing the number of factors, sparse PCA, Stein's estimator, ICA, FastICA algorithm, three portfolio-selection papers as application 1. Bayesian estimation: Bayesian versus maximum-likelihood estimation, conjugate priors, bayesian interpretation of robust linear regression and portfolio selection, one portfolio-selection paper as application 1. Ensemble learning: Single estimate versus combination of estimates, bayesian and shrinkage methods, parallel with robust portfolio selection, one portfolio-selection paper as application

Faculty or entity in charge	CLSM

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] : Business Engineering	INGM2M	5		🔍
Master [120] : Business Engineering	INGE2M	5		🔍