



1SC4393 – Detection of anomalies in networks using IoT data processing

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Department: DÉPARTEMENT SIGNAL, INFORMATION, COMMUNICATION, DOMINANTE -
SYSTÈMES COMMUNICANTS ET OBJETS CONNECTÉS

Language of instruction:

Campus: CAMPUS DE PARIS - SACLAY

Workload (HEE): 40

On-site hours (HPE): 27,00

Description

This challenge week focuses on data science and anomaly detection in networks, its objective is to exploit IoT data to detect anomalies in a network. Data is captured from Bouygues Telecom

Prerequisites (in terms of CS courses)

none

Syllabus

- Manipulation of the software components provided by the supervision team
- Implementation of an AI algorithm for processing the collected information
- Demonstration of the platform and defense in front of a jury

Class components (lecture, labs, etc.)

One week of practical work in project mode

Grading

Report and defense in front of a jury

Resources

The challenge week will be supervised by professors from CentraleSupélec and engineers from Bouygues Telecom.

Learning outcomes covered on the course

At the end of this week, students will be able to handle distributed artificial intelligence methods for processing information and detecting anomalies in networks.

Description of the skills acquired at the end of the course

C4.1 C4.2 C6.1 C6.3 C7.1 C7.4 C8



ST4 – 44 – TIME SERIES AND AGENT-BASED MODELS IN FINANCE

Major: MDS (Mathematics, Data Sciences)

Teaching language: English

Campus: Paris-Saclay

Engineering problem statement:

Financial markets have been deeply transformed by mathematical pricing methods and the computerization of exchanges. Engineers and scientists with maths/physics/computer science backgrounds have thus gained prominent roles on financial markets.

One of the goals of this course sequence is to use standard statistical tools, time series modeling, econometric models, and agent-based models to describe contemporaneous financial markets, and understand how the analysis of price series can be at the core of trading strategies. Besides the mastering of statistical tools and econometric models, courses of this sequence will also try to show how a better use of empirical results may usefully question some standard modeling assumptions.

Prerequisite

Core curriculum CIP-EDP and Algorithmique & Complexité

Context and challenge modules: Some introductory conferences will present financial markets, credit in finance, statistical modeling in finance, challenges linked to large databases in finance, learning methods, etc.

Specific course (60 HEE): Time series and agent-based modeling in finance

- *Econometrics of financial time series:* Stylized facts of financial time series. Stationarity, covariance, correlation. ARMA linear models. Estimation. Prediction. Introduction to non-linear ARCH/GARCH models. Introduction to portfolio theory. - *Agent-based models:* Design of agent-based models. Simulation of financial markets. Reproduction of financial stylized facts

Challenge week: Statistical analysis of financial markets

Students in this course will analyze real data from modern financial markets and assess the relevance of time series models or agent-based approach to model this data.



List of recent subjects : VARMA models for commodities ; Autoregressive models and high-frequency financial data ; Calibration of agent-based models on financial market data and price prediction ; Developing a Bitcoin trading bot ; French regional electricity load forecasting ; Structural analysis of VAR models in finance

Recent industrial partners : BNP Paribas, Cap Gemini, SIA Partners

Academic CS partner : Quantitative Finance Team, MICS Lab