Publication date : 10/02/2025

Course : Machine learning, the state of the art

Seminar - 2d - 14h00 - Ref. MLE
Price : 2020 CHF E.T.

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This seminar details the issues involved in processing data using artificial intelligence, and in particular machine learning algorithms. It shows decision-makers the main algorithms in the field, along with concrete solutions and the project approach to be applied according to business use cases.

Teaching objectives

At the end of the training, the participant will be able to:

- Positioning machine learning in the data processing chain
- Distinguish between the skills needed and the profiles to be recruited
- Identify the keys to a successful machine learning project
- Understand machine learning concepts and the evolution from Big Data to machine learning
- Understand the challenges of using machine learning, including expected benefits and usage examples

Intended audience

Corporate executives (CEO, COO, CFO, SG, HRD, etc.), CIOs, CDOs, IT managers, consultants, big data project managers.

Prerequisites

General computer literacy, and notions of probability and statistics are recommended.

Practical details

Teaching methods

Illustrated by case studies. Presentation of the main use cases by sector (automotive, industry, consumer goods, finance, health, energy, agriculture, transport, telecommunications, etc.).

Course schedule

PARTICIPANTS

Corporate executives (CEO, COO, CFO, SG, HRD, etc.), CIOs, CDOs, IT managers, consultants, big data project managers.

PREREQUISITES

General computer literacy, and notions of probability and statistics are recommended.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

1 The history of machine learning and the big data context

- Put the concepts of artificial intelligence and machine learning back into perspective...
- The link with mathematics, (inferential) statistics, data mining and data science.
- Move from descriptive analysis to predictive and prescriptive analysis.
- Machine Learning applications (search engines, spam detection, check reading).
- Dominique Cardon's typology of algorithms.
- The data science community and Kaggle challenges (e.g. Netflix).

Case study

Studies of concrete machine learning applications (search engines, spam detection, check reading).

2 Available data: collection and preparation

- Structured, semi-structured and unstructured data.
- Statistical nature of data (qualitative or quantitative).
- Connected objects (IoT) and streaming.
- Opportunities and limits of open data.
- Identifying correlations, the problem of multicollinearity.
- Dimension reduction by Principal Component Analysis.
- Outlier detection and correction.
- ETL (Extract Transform Load).
- Web scraping.

Demonstration

ETL (Extract Transform Load) demonstration. Web data collection.

3 Market tools for data processing and machine learning

- Traditional software (SAS, SPSS, Stata...) and its openness to open source.
- Choose between the two open source leaders: Python and R.
- Cloud platforms (Azure, AWS, Google Cloud Platform) and SaaS solutions (IBM Watson, Dataïku).
- New corporate jobs: data engineer, data scientist, data analyst, etc.
- Match the right skills to these different tools.
- Online APIs (IBM Watson, Microsoft Cortana Intelligence...).
- Chatbots (conversational agents).

Demonstration

Demonstration of a chatbot (conversational agent) and Azure Machine Learning.

4 The different types of machine learning

- Supervised learning: repeating an example.
- Unsupervised learning: discovering the data.
- Online (machine) learning as opposed to batch techniques.
- Reinforcement learning: reward optimization.
- Other types of learning (transfer, sequential, active...).
- Illustrations (recommendation engines...).

Demonstration

Demonstrations of the different types of machine learning possible.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.

5 Machine learning algorithms

- Simple and multiple linear regression. Limitations of linear approaches.
- Polynomial regression (LASSO). Time series.
- Logistic regression and scoring applications.
- Hierarchical and non-hierarchical classification (KMeans).
- Classification using decision trees or the Naïve Bayes approach.
- Ramdom Forest (decision tree development).
- Gradiant Boosting. Neural networks. Vector support machine.
- Deep learning: examples and reasons for current success.
- Text mining: analysis of textual data corpora.

Demonstration
Demonstrate the various basic algorithms in R or Python.

6 Algorithm training and evaluation procedure

- Data set separation: training, testing and validation.
- Bootstrap (bagging) techniques.
- Example of cross-validation.
- Definition of a performance metric.
- Stochastic gradient descent (metric minimization).
- ROC and lift curves to evaluate and compare algorithms.
- Confusion matrix: false positives and false negatives.

Demonstration
Demonstrating the choice of the best algorithm.

7 Production launch of a machine learning algorithm

- Description of a big data platform.
- How PLCs work.
- From development to production.
- Corrective and evolutionary maintenance strategy.
- Evaluation of production operating costs.

Demonstration
Demonstration of geolocation and sentiment analysis APIs.

8 Ethical and legal aspects of artificial intelligence

- CNIL missions and future developments.
- Right of access to personal data.
- The question of the intellectual property of algorithms.
- New corporate roles: chief data officer and data protection officer.
- The question of the impartiality of algorithms.
- Beware of confirmation bias.
- Sectors and professions affected by automation.

Group discussion
Brainstorming to identify the keys to success.

Dates and locations

REMOTE CLASS
2026 : 18 June, 1 Oct., 24 Nov.

LAUSANNE
2026 : 18 June, 1 Oct.

GENÈVE
2026 : 18 June, 1 Oct.