MICRO-401 **Machine learning programming**

Billard Aude

Cursus	Sem.	Type
Microtechnics	MA1, MA3	Opt.

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	During the semester
Workload	60h
Weeks	14
Hours	**2 weekly**
TP	2 weekly
Number of positions	

Summary

This is a practice-based course, where students program algorithms in machine learning and evaluate the performance of the algorithm thoroughly using real-world dataset.

Content

This programming class complements courses on machine learning given in the school. It offers students the possibility to understand some machine learning algorithms in depth by programming them and testing them rigorously. Students will be working in team of two. They will be offered a choice of methods to program. Programming can be done in matlab or C/C++. Proper evaluation of machine learning will be stressed out. Students will learn about various methods to evaluate machine learning methods (crossvalidation, grid search, F-measure, ROC curve, etc) and will be asked to put these in practice.

Keywords

Programming in C/C++ or matlab. Machine Learning. Statistics.

Learning Prerequisites

Required courses

Students must have taken a machine learning course or follow one during the same semester. This programming class is meant to complement the Applied Machine Learning course, but can also complement other machine learning courses given at EPFL.

Recommended courses

Applied Machine Learning - MICRO-455
Pattern Classification and Machine Learning: CS-433
Data Analysis and Model Classification - EE-516

Important concepts to start the course

Basic notions in Machine Learning:
Supervised versus unsupervised learning
Classification, non-linear regression, clustering

Learning Outcomes

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

- Apply Knowledge in Machine Learning
- Assess / Evaluate Machine Learning Algorithms
- Choose Appropriate model and data

Transversal skills

- Write a scientific or technical report.

Teaching methods

Computer-based practice session. Some short ex-cathedra lectures will be given at the beginning of the class.

Expected student activities

Attendance to all sessions is necessary to progress rapidly and benefit from assistants' support.

Assessment methods

The students will be evaluated on the report and code handed out at the end of the course.

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Ressources en bibliothèque

- Kernel Methods for Pattern Analysis / Shawe-Taylor
- Pattern Recognition and Machine Learning / Bishop
- Learning with Kernels / Scholkopf
- Pattern Classification / Duda
- Information Theory, Inference and Learning Algorithms / Mackay
- Spiking Neuron Models / Gerstner
- Independent Component Analysis / Hyvarinen
- Self-organizing Maps / Kohonen
- Introduction to Neural Networks / Haykins

Prerequisite for

Students must know how to program either in Matlab or C/C++.