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

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

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