

15D017

3 ECTS

Computational Machine Learning

Overview and Objectives

The main idea behind the Computational Machine Learning course is for the students to get a good overview of modern Machine Learning methods along with practical hands on experience. The course will focus around supervised and unsupervised learning methods that are often used in industry settings. The course will have a strong emphasis on hands-on usage of the algorithms introduced, we will make use of python and the many Machine Learning libraries available in python on some real world datasets. Students are expected to have a working installation of python on their laptops.

Course Outline

Stochastic Gradient Descent and variants

- Classification, Regression with SGD

Generalized Linear Models

- Logistics Regression
- Lasso
- Elastic Net

Kernel Methods

- SVM's
- Kernel PCA
- Spectral clustering

Naive Bayes

Gaussian Processes

- Gaussian Process Regression and Classification

Decision Trees

- Classification Regression with Decision Trees

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Ensemble methods

- Gradient Boosted methods, xgboost
- AdaBoost
- Random Forest

Feature Selection

Dimensionality reduction

- PCA

Nearest Neighbor Methods

- k-means

Hierarchical Clustering

Collaborative Filtering and Recommenders

- Memory-based methods
- Matrix Factorization, Tensor Factorization, Factorization Machines

Evaluation

100% Project

Materials

Friedman, J., Hastie, T., & Tibshirani, R. 2nd ed. (2009). The elements of statistical learning. Springer.
Free version <http://statweb.stanford.edu/~tibs/ElemStatLearn/>

Bishop, C. M. (2006). Pattern recognition and machine learning. Springer.