Collegio Carlo Alberto

UNIVERSITÀ DEGLI STUDI DI TORINO

APPLIED MACHINE LEARNING

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Learning Objectives

The course permits to apply on real data sets the algorithms and tools studied in the "Machine Learning" course.
The attendants will employ the basic tools available on Python libraries for Machine Learning in order to perform analyses on real data sets, and will deal with both unsupervised (descriptive or explorative) and supervised (predictive) methods in Machine Learning, in order to extract valuable patterns and models from (large) data.
The combination of theory and practice offers students the background necessary to choose the right tool for the job at hand, the expertise to autonomously apply them to real data sets, and the competence to measure the quality of the obtained results.

Course Content

The module focuses on the following method:
1) Introduction (Python libraries for Machine Learning)
2) Clustering Algorithms: k-means, hierarchical clustering, DBSCAN, validation
3) Dimensionality Reduction: PCA, SVD, Feature selection
4) Factorization-based data clustering: NMF
5) Introduction to Neural Networks (NN)
6) Model Selection: general principles and applications to NN hyperparameters selection

Course Methodology

Frontal teaching and Lab.

Readings

- Tan, Steinbach, Kumar: Introduction to Data Mining. Addison Wesley
- Ian Goodfellow, Yoshua Bengio and Aaron Courville: Deep Learning

Slides: available during the course

Course Evaluation

Students will be evaluated with a final exam, where they will set up a quick machine learning case study based on some datasets provided by the teacher.

About the Instructors

Livio Bioglio received his M.Sc. degree in Computer Science in 2009 at the University of Turin, and his Ph.D. in Computer Science in 2013, in the same institution. In 2013 he was a Post-doc at INSERM, Paris (France), working on complex systems and epidemiology, in particular computational models for analyzing the spread of influenza in realistic populations. Since 2016 he is Post-doc at the University of Turin, studying the diffusion of information in social networks, with focus on privacy concerns.