Introduction

Sandro Cumani

sandro.cumani@polito.it

Politecnico di Torino

Course organization

01URTOV - Machine learning and pattern recognition

01HERUU - Machine learning

- Same core subject (40 hours)
- With some differences (20 hours)

The course(s) will be held by

- Sandro Cumani (sandro.cumani@polito.it)

Course organization

01URTOV: 01HERUU:

Python

Dimensionality reduction

Clustering

Gaussian models

Categorical models

Decision making and evaluation

Logistic Regression

Support Vector Machines *Neural networks*

Mixture models

Score calibration and fusion

Course organization

01URTOV:

- 40 lecture hours
- 20 laboratory hours, divided in 3 squads (in class, bring your own laptop)
  - Squad 1: A - E
  - Squad 2: F - M
  - Squad 3: N - Z

Squads *rotate* during the semester to avoid the same cohort attending in the “less appealing” slots

Please stick to the squad subdivision

Should you be interested, you can also attend the 01HERUU lectures on the topics that are not covered in the 01URTOV course (this is completely optional and will not affect in any way your exam, which will cover only the 01URTOV topics)

Course organization

01HERUU:

- 40 lecture hours
- 20 laboratory hours, single squad (in class, bring your own laptop)

Some laboratories will be shared with 01URTOV students, please follow the provided schedule

Should you be interested, you can also attend the 01URTOV lectures on the topics that are not covered in the 01HERUU course (this is completely optional and will not affect in any way your exam, which will cover only the 01HERUU topics)

Course organization

The lessons will mainly cover theoretical aspects of Machine Learning and Pattern Recognition

The laboratories will allow implementing and employing the techniques presented during lessons

Attendance to laboratories is strongly encouraged. The written exam will have a section that will cover the activities of the laboratory.

Course organization

The exam consists of a written exam, covering both theoretical (24 points) and practical (8 points) aspects

It will consist of four open questions

Duration: 140 minutes

Bring your own sheet of paper (exercise paper — fogli protocollo)

Course organization

The theoretical questions will cover the machine learning theory presented during lectures

The practical questions will cover the topics presented in laboratories

Laboratories will consist of both in-class and home assignments

The class part will mainly cover the implementation of the ML algorithms

Home assignments (also referred as project) will require applying the algorithms to a specific task and analyzing the results

The laboratories will present a set of analysis questions, that correspond to possible exam questions

The exam may also require writing simple code snippets related to the ML algorithms and their usage

Course organization

There is *no project submission*

You are *not required* to (and therefore should not) submit *any report* covering the laboratory / project parts

You are encouraged to do the laboratories and answer the analysis questions (in any format you find comfortable for you), since the analysis questions will be part of the written exam

Course organization

Since this course presents the basis of Machine Learning, *avoid* using ML libraries or ML toolboxes for the project (using toolboxes for code snippets in the practical exam questions will be penalized — one of the goal of the course is that you learn how to implement the approaches)

- Exception: 01HERUU students will use some toolkit, which can be employed for the exam - however, these will be clearly marked as allowed when we will introduce them

The laboratories are already organized as to allow you to implement many of the techniques that we will discuss

Should you have issues with your own implementation we will also provided a reference implementation (i.e. laboratory solution) for the different algorithms that you can use for the analysis part, or study for the coding questions.

Course organization

In the teaching portal you will find the text of the laboratories and the slides used during classes for your course. These will come in two versions:

- Slides projected during the classes
- Print-friendly version with less color

Reference books:

[1] Kevin P. Murphy. 2012. Machine Learning: A Probabilistic Perspective. The MIT Press.

[2] Christopher M. Bishop. 2006. Pattern Recognition and Machine Learning (Information Science and Statistics). Springer-Verlag, Berlin, Heidelberg.