Machine Learning 1

Code: 104870
ECTS Credits: 6

2024/2025

Degree	Type	Year
2503852 Applied Statistics	OB	3

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

This course assumes that the student has obtained the knowledge taught in different courses on the following topics:

- Calculus in several variables.

- Probability.

- Linear models.

- Python programming.

Objectives and Contextualisation

This course aims to familiarize the student with different methods of machine learning by applying the point of view used when large amounts of data are available.

Learning Outcomes

1. CM11 (Competence) Create new machine learning models, running experiments to demonstrate their feasibility and improved performance compared to the state of the art.
2. KM16 (Knowledge) Recognise supervised and unsupervised, profound and generic machine learning models, fostering innovation in the field of statistics.
3. KM16 (Knowledge) Recognise supervised and unsupervised, profound and generic machine learning models, fostering innovation in the field of statistics.

Content

- Introduction to machine learning.
- Regularized linear and logistic regression.

- Statistical learning.
- Support vector machines.
- K-nearest neighbors.
- Naive Bayes.
- Decision trees.
- Ensembles.
- Text mining.
- Graph analysis.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab sessions	30	1.2	
Type: Supervised			
Theory sessions	50	2	
Type: Autonomous			
Personal study of the subject	46	1.84	

Teaching will combine classroom lessons by teachers and practical work for students with a computer.

In all aspects of teaching/learning activities, the best efforts will be made by teachers and students to avoid language and situations that can be interpreted as sexist.

To achieve continuous improvement in this subject, everyone should collaborate in highlighting them.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exam	50%	4	0.16	CM11, KM16
Practical Project	50%	20	0.8	CM11, KM16

Continuous grading

The grading for the course will be done in two parts: the theory part, NT, and the practice part, NP. The final grade for the course will be N = 0.5*NT + 0.5*NP.

The grading for the theory part will be based in two exams: a partial exam, NEP, and a final exam, NEF. The final grade for the theory part will be NT = max(NEF, 0.3*NEP + 0.7*NEF), as long as NEF is higher than 3,5, otherwise NT = NEF.

The grading for the practice part will have be based on deliverables during the course.

On the day of the second-chance exam only the grade for the theory part will be updated. If a student goes to the second-chance exam then the theory grade, NT, will be NT = min(5, NER), where NER is the grade for the second-chance exam.

In order for an activity to be taken into account in the final grade, the activity grade has to be a minimum of 3,5. If NT or NP are below 3,5, then the final grade for the course will be N = min(NT, NP).

The student who has submitted works for at least 50% of the subject will be considered evaluable. Otherwise, it will appear in the record as non-evaluable.

Single grading

The grading for a student who chooses to be evaluated with the single grading modality will be based on the final examn grade (50%) and the grade for a practical project (50%).

Bibliography

- Geron, A. (2019) Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow (O'Reilly)
- Hastie, T. et al (2008) The Elements of Statistical Learning: Data Mining, Inference, and Prediction

Software

Python

Language list

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	1	Catalan	first semester	afternoon
(TE) Theory	1	Catalan	first semester	afternoon