Machine learning in data mining

Academic Year: (2025 / 2026) **Review date: 28/04/2025 12:04:58**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: ALER MUR, RICARDO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Programming

LEARNING OUTCOMES

K2: Know basic humanistic contents, oral and written expression, following ethical principles and completing a multidisciplinary training profile.
K6: Demonstrate basic programming skills in order to use and develop statistical packages
K12: now how to identify or be able to create the statistical or probabilistic model appropriate to the specific problem arising in each business activity (finance, marketing, production planning and control, etc.).
C1: Develop and master interpersonal skills on initiative, responsibility, conflict resolution and negotiation, which are essential in the professional environment.
C4: Ability to develop and validate statistical models that help to address and solve problems relevant to today's society.
C6: Ability to interpret the results of quantitative analysis, prepare clear reports and communicate conclusions effectively, using advanced data analysis tools.
C7: Ability to access, analyze and classify large volumes of data of a highly heterogeneous nature (Big Data), as well as to manage and design advanced data analysis and AI tools in social and business applications.
S1: To plan and organize team work making the right decisions based on available information and gathering data in digital environments.
S4: Plan integrated offline and online strategies, through the use of social media communication, display advertising, affiliation marketing, email, remarketing, gamification, Big data
S5: Manipulate computationally and analytically the established models, taking advantage of the power of statistical methods, optimization, etc., and perform the analysis of the results obtained.
S7: Describe, synthesize and graphically represent the information contained in a data set

OBJECTIVES

Recall the basic concepts and methodology of machine learning (model training, evaluation, hyperparameter tuning, preprocessing).
Understand and apply neural network techniques, deep learning, and recurrent networks.
Understand convolutional networks and their main fields of application.
Learn reinforcement learning techniques.

DESCRIPTION OF CONTENTS: PROGRAMME

Topic 1. Introduction to machine learning and neural networks
Topic 2. Deep learning and Recurrent Networks
Topic 3. Convolutional networks
Topic 4. Reinforcement learning

LEARNING ACTIVITIES AND METHODOLOGY

Theory: Lectures will be focused on teaching all concepts related to machine learning, deep learning, and reinforcement learning.

Practical computer Sessions: The practical classes will be developed so that, in a supervised way, students learn to solve problems with machine learning, deep learning, and reinforcement learning. The practices will be carried out in groups of 2 students. There are several assignments related to topics in the course.

There will be tutorials to help the understanding both of theory and practice.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	30
% of continuous assessment (assigments, laboratory, practicals…):	70

A)Final exam, focusing on the theoretical side: 30% (3 points)
B)Assignments, to be carried out during the semester: 70% (7 points)

The final course grade is calculated by adding the marks obtained in A and B. The final exam has no cutoff grade. A+B>=5 implies passing this course.

BASIC BIBLIOGRAPHY

- Aston Zhang Dive into Deep Learning, Cambridge University Press, 2023

- Sebastian Raschka Machine Learning with PyTorch and Scikit-Learn: Develop machine learning and deep learning models with Python, Packt Publishing, 2022

BASIC ELECTRONIC RESOURCES

- Aston Zhang . Dive into Deep Learning: https://d2l.ai/index.html