Machine Learning for Business Decision Making

Academic Year: (2023 / 2024) **Review date: 01/06/2023 10:06:04**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: ALER MUR, RICARDO

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Big data and business analitics

OBJECTIVES

1.) OF KNOWLEDGE:
- Know the different tasks that can be solved with machine learning
- Know machine learning techniques and their typology
- Know the methodology of machine learning and the phases it entails
- Know tools available for machine learning

2.) UNDERSTANDING:
- Understand the fundamentals and motivations of machine learning
- Understand the work methodology and the different phases of machine learning
- Understand the usefulness of different machine learning techniques
- Understand the relationship between model complexity, amount of data, problem characteristics and overlearning

3.) APPLICATION:
- Analyze the domains and design knowledge extraction processes according to the problem.
- Evaluate the performance and efficiency of the different machine learning methods
- Work on specific domains and contrast different techniques to check their performance in machine learning

4.) CRITICISM OR ASSESSMENT
- Selection of algorithms, selection of models and adjustment of parameters.
- Consider the relationship between computational cost and marginal improvement of different solutions
- Assessment of whether the results obtained are adequate, compared with chance or basic algorithms

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Machine Learning
2. Data Extraction and Exploration
3. Basic models for classification and regression
   3.1. Nearest neighbor (KNN)
   3.2. Trees and rules
4. Methodology: training, hyper-parameter tuning, model evaluation, pre-processing
5. Feature Selection / Generation
6. Advanced models for classification and regression
   6.1. Bagging, Random Forest
   6.2. Boosting
   6.3. Stacking
   6.4. Support Vector Machines
7. Unsupervised learning:
   7.1. Data clustering
   7.2. Associative Learning

LEARNING ACTIVITIES AND METHODOLOGY

AF1. THEORETICAL-PRACTICAL CLASSES. They will present the knowledge that students should acquire. They will receive the class notes and will have reference texts to facilitate the follow-up of the classes and the development of the subsequent work. Exercises, practical problems on the part of the student will be solved and workshops and evaluation tests will be carried out to acquire the necessary skills.
AF2. TUTORING. Individual or group.
AF3. INDIVIDUAL OR GROUP STUDENT WORK.
MD1 THEORY CLASS. Lectures with support of computer and audiovisual media, in which the main concepts of the subject are taught and the materials and bibliography are provided to complement the students' learning.
MD2. PRACTICES. Resolution of practical cases individually or in group.
MD3. TUTORING. Individual or group. For 6 credit courses, 4 hours with 100% attendance.

ASSESSMENT SYSTEM

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

SE1. FINAL EXAM. In which the knowledge, skills and abilities acquired throughout the course will be assessed globally.
SE2. CONTINUOUS ASSESSMENT. exercises, assignments and tutorials will be evaluated.

Extraordinary Call:
Students who do not pass the course in the ordinary call can make use of the extraordinary call:

If the student followed continuous assessment: the grade will be as established in the course program for the ordinary call. However, they will have the right to be graded only with the score obtained in the final exam if it is more favorable. If the student did not follow continuous assessment: the grade will be the one obtained in the final exam. Nevertheless, the teacher may authorize the submission of the continuous assessment exercises in the extraordinary call, in which case they will be evaluated in the same way as in the ordinary call.

BASIC BIBLIOGRAPHY

- Aurélien Géron Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media, 2019

- Ian H. Witten, Eibe Frank, Mark A. Hall, Christopher J. Pal Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann, 2016

ADDITIONAL BIBLIOGRAPHY

- Max Kuhn Applied Predictive Modeling, Springer, 2013

BASIC ELECTRONIC RESOURCES

- Aurélien Géron . Github for Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems: https://github.com/ageron/handson-ml2

- Scikit-learn team . Scikit-learn webpage (library and tutorials): https://scikit-learn.org/stable/