Machine learning I

Academic Year: (2018 / 2019) **Review date: 10/05/2018 18:08:01**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: FERNANDEZ REBOLLO, FERNANDO

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Programming
Probability and Data Analysis

OBJECTIVES

CB1: The students must demonstrate to understand knowledge in an area of study which origin is the secondary education, and will be in a level that, supported with books and other bibliographic references, includes aspects in the frontiers of knowledge.
CB2: The students know to apply their knowledge to their work in a professional way and own the competences usually required to solve problems in its area of study
CB3: The students own the capacity to interpret relevant data to elaborate claims that include an analysis in social, scientific and ethics topics
CB4: The student can transmit information, ideas, problems and solutions to both specialized and non-specialized audience.
CB5: Students have developed the learning capabilities to begin new studies with a high degree of autonomy
CE13: Capacity to apply and design machine learning methods in classification, regression and clustering for tasks in supervised, unsupervised and reinforcement learning
CE2: Capacity to correctly identify predictive problems for a given data and goals, and use the basic results of the regression analysis as a fundamental predictive method.
CE3: Capacity to correctly identify classification problems associated to specific goals and data, and to use the results of multivariate analysis as a basics of the classification, clustering and dimensionality reduction methods
CG1: Knowledge and abilities to analyze and synthesize basic problems related with engineering and data science, and to solve them and report the results
CG2: Knowledge of basic scientific and technical topics that enable for learning new methods and technologies
CG3: Capability to solve problems with initiative, decision making, creativity, and communication skills, understanding the ethical, social and professional responsabilities of the data management. Leading, innovation and entrepreneurship capabilities.
CG4: Capability to solve technological, computing, mathmatical and statistic problems which can arise in engineering and data science.
CG5: Capability to solve problems formalized mathematically and applied to different topics, using numeric algorithms and computational methods.
CG6: Capability to synthesize conclusions obtained from performed analysis, and to report in a clear and convincing way, both orally and written.

RA1: Advanced knowledge and comprehensiono of the theoreticat and practical aspects of the working methodology in the area of data science with a depth that close to the frontier of knowledge
RA2: Capability to apply knowledge in complex working environments and specialized areas which require the use of creative and innovative ideas.
RA3: To have the capability to collect and understand data and information over which to create conclusions including, when needed, a reflection about social, ethic or scientific issues.
RA4: To be able to manage complex situations which require the development of new solutions both in

academic and professional environments in its area of study
RA5: To know how communicate to different audiences knowledge, methodologies, ideas, problems and solutions in a clear and precise way
RA6: Be able to identify his/her own formative requirements in is area of study or professional environment, and to organize its own learning process with a high degree of autonomy in different contexts.

DESCRIPTION OF CONTENTS: PROGRAMME

· Introduction to machine learning
· Learning decision trees and rules
· Learning regression trees and rules
· Frequent itemsets and association rules
· Methodological aspects
· Reinforcement learning
· Relational learning
· Ensembles of learning methods
· Analysis of streaming data

LEARNING ACTIVITIES AND METHODOLOGY

AF1: Presential classes, with theoretical and practical contents
AF2:
AF3: Student work
AF8: Practical labs.
AF9: Final exam. En el que se valorarán de forma global los conocimientos, destrezas y capacidades adquiridas a lo largo del curso.
MD1: Classes with theoretical contents
MD2: Practices, with cases and problems
MD3: Individual and group tutories
MD6: Lab practices with support of assistant

ASSESSMENT SYSTEM

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

- Formative assessment will be done through continuous feedback that would allow the student to assess what s/he knows and is expected from her/him
- Final grade will be composed of 50% of individual work and 50% of team work . Among the individual activities, assessment of activities performed during the course will be a 70% of each student grade, and a final exam will be a 30% of the grade, although mechanisms to pass the course only with the final exam will be provided. A minimum qualification in each part will be required.

BASIC BIBLIOGRAPHY

- E. Rich y K. Knight Artificial Intelligence, McGraw-Hill.

- S. Russel y P. Norving Artificial Intelligence: a modern approach, Prentice Hall, 2003

- T.M. Mitchell Machine Learning, McGraw Hill.

ADDITIONAL BIBLIOGRAPHY

- J. W. Shavlik y T. G. Dietterich (eds.) Readings in Machine Learning, Morgan Kaufmann.

- P. W. Langley Elements of Machine Learning, Morgan Kaufmann.

- R. Sutton and A Barto Reinforcement Learning: an Introduction, Kluwer Academic Publishers.

- Saso Dzeroski y Nada Lavrac Relational Data Mining, Springer Verlag.