Machine Learning

Academic Year: (2021 / 2022)   **Review date: 04-06-2021**

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: GOMEZ VERDEJO, VANESSA

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Linear algebra.
Multivariable calculus.
Statistics.

OBJECTIVES

Basic competences
CB6 Having and understanding the knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context.
CB7 Students know how to apply their acquired knowledge and problem-solving skills in new or unfamiliar settings within broader (or multidisciplinary) contexts related to their field of study.
CB9 Students know how to communicate their conclusions and the knowledge and ultimate reasons behind them to specialised and non-specialised audiences in a clear and unambiguous way.
General competences
CG1 Collect and interpret data of a mathematical nature which can be applied to other domains of scientific knowledge.
CG2 Apply acquired knowledge and possess the ability to solve novel problems related with Mathematics.
CG3 Being able to develop new scientific/technological approaches in a corporate environment.
CG6 Being able to autonomously study and do research.
Specific competences
CE12 Being able to know the peculiarities of data acquisition and information management.
CE13 Ability to design and implement automatic learning systems for supervised and unsupervised problem solving.
CE14 Acquire an innovative attitude and approach.

DESCRIPTION OF CONTENTS: PROGRAMME

1.   Introduction to machine learning.
2.   Linear methods: linear and logistic regression.
3.   Kernel methods: SVMs and GPs.
4.   Clustering: K-means and spectral clustering.
5.   Dimensionality reduction: PCA, PLS, feature selection.

LEARNING ACTIVITIES AND METHODOLOGY

AF3 Theoretical practical classes
AF4 Laboratory practices
AF5 Tutorials
AF6 Team work
AF7 Student individual work
AF8 Partial and final exams

Activity code total hours number presencial hours number % Student Presence
AF3 100 100 100%
AF4 32 32 100%
AF5 18 0 0%
AF6 90 0 0%
AF7 186 0 0%
AF8 12 12 100%

ASSESSMENT SYSTEM

The assessment of the students' performance will be done continuously over the semester. The assessment will be based on the individual problem and practical projects.

SE1 Participation in class and SE2 Individual or team works made during the course 90%
SE3 Final test 10%

% end-of-term-examination:	10
% of continuous assessment (assigments, laboratory, practicals…):	90

BASIC BIBLIOGRAPHY

 - C. E. Rasmussen Gaussian Processes for Machine Learning, MIT Press, 2006

 - C. M. Bishop Pattern Recognition and Machine Learning, Springer, 2006

 - R. O. Duda, P. E. Hart, D. G. Stork Pattern Classification (2nd ed.), Wiley Interscience, 2001

 - T. Hastie, R. Tibshirani, J. Friedman The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2009