Intelligent data processing tools

Academic Year: (2023 / 2024)   **Review date: 30-03-2023**

Department assigned to the subject: Telematic Engineering Department

Coordinating teacher: MUÑOZ ORGANERO, MARIO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

This subject is based on the knowledge given in the previous subject of the same Masters' programme:

- Data analytics in IC4.0

OBJECTIVES

BASIC COMPETENCES
CB6   Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context
CB7   That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study
CB10 That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous

GENERAL COMPETENCES
CG3   Capacity to develop basic distributed applications for the transport, storage and management of information.
CG5 Capacity for basic analysis of the requirements for information management and treatment of large volumes of data.
CG6   Capacity to adapt to changes in requirements associated with new products, new specifications and environments.

SPECIFIC COMPETENCES
CE10   Programmatic data processing capabilities in solving particular problems of the connected industry

LEARNING RESULTS
As a result of the learning the student will be able to:
- Collect and store data including the cloud as support.
- Perform advanced statistical processing.

DESCRIPTION OF CONTENTS: PROGRAMME

- Pre-processing of data: Techniques, methods, tools and applications for detection of outliers
- Programming and tools for data analysis
- Analysis of data in the cloud
- Advanced classification methods with SVM and shallow neural networks
- Advanced classification and regression with deep learning methods. Restricted Boltzmann machines and Autoencoders.
- Advanced classification and regression with deep learning methods. Deep recurrent and convolutional neural networks.
- Data management in the cloud. Tools and architectures.

LEARNING ACTIVITIES AND METHODOLOGY

LEARNING ACTIVITIES
AF1 Theoretical class
AF2 Practical classes
AF4 Laboratory practices

AF5 Tutorials
AF6 Group work
AF7 Individual student work
AF8 Partial and final exams

Code No. No. Activity	Total hours	Face to face hours	% Presence Student
AF1	12	12	100
AF2	6	6	100
AF4	3	3	100
AF5	2	2	100
AF6	25	0	0
AF7	25	0	0
AF8	2	2	100
TOTAL	75	25	33%

EDUCATIONAL TRAINING METHODOLOGIES

MD1 Exhibitions in the teacher's class with support of computer and audiovisual media, in which the main concepts of the subject are developed and the bibliography is provided to complement the students' learning.
MD2 Critical reading of texts recommended by the teacher of the subject: articles, reports, manuals and / or academic articles, either for further discussion in class, or to expand and consolidate the knowledge of the subject.
MD3 Resolution of practical cases, problems, etc. raised by the teacher individually or in groups
MD4 Exhibition and discussion in class, under the teacher's moderation of topics related to the content of the subject, as well as case studies

ASSESSMENT SYSTEM

ASSESSMENT SYSTEMS
SE1 Participation in class
SE2 Individual or group work carried out during the course
SE3 Final exam for the extraordinary call

ORDINARY CALL:

System of Evaluation	Minimum weight (%)	Maximum weight (%)
SE1	0	20
SE2	80	100

Students are allowed the optional delivery of tasks proposed in class to improve the final grade for the subject.

EXTRAORDINARY CALL:
The extraordinary call will be evaluated allowing the re-submission of the continuous evaluation works or through a final exam, which in this case would be worth 100% of the grade.

% end-of-term-examination: 0

% of continuous assessment (assigments, laboratory, practicals…): 100

BASIC BIBLIOGRAPHY

- Aurelien Geron Hands-On Machine Learning with Scikit-Learn and TensorFlow, O'Reilly, 2017

- Aurelien Geron Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent , O'Reilly, 2019
- Charu C. Aggarwal Neural Networks and Deep Learning: A Textbook, Springer, 2018

- Sebastian Raschka y Vahid Mirjalili Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow, 2nd Edition, Packt, 2017

ADDITIONAL BIBLIOGRAPHY

- Francois Chollet Deep Learning with Python, Manning, 2017

- Andrew Ng . Machine learning: https://es.coursera.org/learn/machine-learning

- EdX . Machine learning courses: http://Machine learning courses

BASIC ELECTRONIC RESOURCES

- Andrew Ng . Machine learning: https://es.coursera.org/learn/machine-learning

- EdX . Machine learning courses: http://Machine learning courses