COURSE DATA

Data Subject

Code	44657
Name	Advanced visualisation of data
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2221 - M.U. en Ciencia de Datos	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
2221 - M.U. en Ciencia de Datos	9 - Advanced visualisation of data	Obligatory

Coordination

Name	Department
GOMEZ SANCHIS, JUAN	242 - Electronic Engineering
LOZANO IBAÑEZ, MIGUEL	240 - Computer Science
MARTINEZ SOBER, MARCELINO	242 - Electronic Engineering

SUMMARY

This subject review data visualisation topics such as how to display the information. To do this an introduction will be made to display simple graphics. In addition, it will be tackled the main elements of a graphic and topics related to the color theory. Design and visualisation of temporal data will be studied. Moreover, the main techniques for spatial data visualisation or display spatiotemporal data will be presented. Furthermore, graph representation and distance will be addressed to assess the proximity of the data. In this course a review of the techniques will also be made to display categorical and textual data. Finally, how to implement interactive graphics, will be studied.

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PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Basic knowledge about R and Python

OUTCOMES

2221 - M.U. en Ciencia de Datos

- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.

- Students should demonstrate self-directed learning skills for continued academic growth.

- Students should possess and understand foundational knowledge that enables original thinking and research in the field.

- Be able to assess the need to complete their technical, scientific, language, computer, literary, ethical, social and human education, and to organise their own learning with a high degree of autonomy.

- Be able to defend criteria with rigor and arguments and to present them properly and accurately.

- Ability to access and manage information in different formats for subsequent analysis in order to obtain knowledge from data.

- Ser capaces de acceder a herramientas de información (bibliográficas y de empleo) y utilizarlas apropiadamente.

- Ser capaces de asumir la responsabilidad de su propio desarrollo profesional y de su especialización en uno o más campos de estudio, aplicando los conocimientos adquiridos en la identificación de salidas profesionales y yacimientos de empleo.

- Extraer conocimiento de conjuntos de datos en diferentes formatos.

- Capacidad para visualizar de forma óptima conjuntos de datos para la extracción de conocimiento.

LEARNING OUTCOMES

Know what characteristics lead to good visualization .
Use statistical graphs (representative and diagnostic) used to characterise data.
Implement methods of visualization of multidimensional data.
Apply data visualization techniques with temporal and spatial dependence.
Implementing procedures for an interactive visualization.

DESCRIPTION OF CONTENTS

1. Introduction to data visualization

In this block an introduction showing the main aspects of data visualization will be done in ordert to get a correct data visualization.

2. Time series visualization

In this block visualization methods of time series will be presented.

3. Spatial and spatio-temporal data visualization

In this block the particular case of spatial and spatio-temporal data will be described.

4. Graphs visualization

In this block the most important graph visualization techniques will be presented.

5. Categorical and textual data visualization

In this block the main visualization techniques about categorical variables will be studied.

6. Interactive data visualization

Basic concepts on interactive data visualization.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theoretical and practical classes	30,00	100
Development of individual work	10,00	0
Study and independent work	6,00	0
Readings supplementary material	1,50	0
Preparation of evaluation activities	6,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	6,50	0
Resolution of case studies	5,00	0
TOTAL	75,00	

TEACHING METHODOLOGY

The course will combine the theoretical and the practical part, without separating sessions devoted to theory from those devoted to practice. The lessons will be taught in a computer equipped classroom.

In the theoretical part of the classes, the teacher will introduce the concepts and methods Statistics and Optimization, with examples and exercises to be solved by the students.

The practical sessions will be synchronized with the theory. In these sessions, the students will learn by solving problems, exercises and case studies, in order to acquire the skills of this course.

EVALUATION

The educational evaluation of knowledge and skills achieved by the students will be made continuously throughout the course, and will consist on the following blocks of evaluation:

1. Exercises and the class work submitted during the course and / or partial exams: 80% of the final grade.

2. Objective test consisting of one or more tests that consist of both theoretical and practical issues and problems: 20% of the final grade

Grades earned in paragraph 1 shall be kept in the two examination sittings of the academic year in which they were made, since their evaluation is only possible in the teaching period.

REFERENCES

Basic

- Meyer, M., Fisher, D ., (2016). Making Sense of Data. Designing visualizations for exploratory data analysis. Ed. OReilly.

- Hofman, M., Chisholm, A. , (2016). Text Mining and Visualization,. Case Studies Using Open-Source Tools, Ed. CRC Press.

- Ward, M.O, Grinstein, G., Keim, D. (2015). Interactive Data Visualization, Ed. CRC Press.

- Yau, N. (2014). Visualize This. The FlowingData Guide to Design, Visualization, and Statistics Ed. Wiley Publishing, Inc.

- Brath, R., Jonker, D., (2015) Graph Analysis and Visualization. Discovery Business Opportunity in Linked Data. Ed. Wiley.

- Steele, J. (2010) Beautiful Visualization. Loking at Data Through the Eyes of Experts. Ed. OReilly

- Knaflic, C.N., (2015) Storytelling with data. A data visualization guide for business professionals. Ed. Wiley

- Chen, C., Härdle, W., Unwin, A. (2008) Handbook of Data Visualization. Ed. Springer

- Milovanovic, M. (2015) Python Data Visualization Cookbook. Ed. Packt Publishing

- Tufte, E.(2001) Visual Display of Quantitative information. Ed. Graphics Press

- Munzner, T. (2015). Visualization Analysis and Design. Ed. CRC Press

Additional

- Jones, B. (2014). Communicating Data with Tableau. Ed. OReilly.

- Wickham, H. , (2009). ggplot2, Ed. Springer

- Heydt, M. (2015) D3.js By Example. Ed. Pack Publishing

- Adams, C. (2014) Learning Python Data Visualization. Ed. Packt Publishing