Social Network Analysis

Academic Year: (2023 / 2024)   **Review date: 15/07/2023 14:07:26**

Department assigned to the subject: Mathematics Department

Coordinating teacher: SANCHEZ SANCHEZ, ANGEL

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Data Programming (19138)
Data Visualization (19139)
Data Harvesting (19145)
Statistics and Data Science I (19140)

OBJECTIVES

- Ability to explain basic concepts and theories of social networks and understand how these concepts and theories can explain behaviors of different actors, as well as aggregate outcomes of those behaviors.
- Ability to critically examine how networks can contribute to the explanation of social, political, economic and cultural phenomena.
- Ability to use statistical software to visualize networks and analyze their properties, connecting them to these concepts and theories.
- Ability to explain the principles underlying statistical models for social networks.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction, definitions and main concepts
1.1. "Linked" data. Social processes that can be represented as networks
1.2. Definition of network and random networks

2. Measures for relational analysis of social network data
2.1. Statistical analysis of social networks
2.2. Local measures: degree, transitivity, asortativity
2.3. Centrality in social networks
2.4. Structure of communities and small world phenomena
2.5. Importance of strong and weak links

3. Structure and behavior of networks
3.1. Social contagion processes. Homophilia vs. influence
3.2. Formation of links, network dynamics
3.3. Polarization and coordination in social networks
3.4. Resilience of social networks

4. Visualization of social networks
4.1. Introduction to social media display packages
4.2. Workshop on visualization of social networks on Twitter

5. Practical examples
5.1. Analysis of conversations in social networks
5.2. Models of epidemic propagation in networks
5.3. Marketing in social networks
5.4. Segregation in social networks and urban areas

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LEARNING ACTIVITIES AND METHODOLOGY

Training Activities:

- Theoretical-practical classes
- Laboratory practical sessions
- Tutorials
- Group work
- Partial and final examinations

Teaching Methods:

- Presentations in the professor's lecture room with computer and audiovisual support, in which the main concepts of the subject are developed and a bibliography is provided to complement the students' learning.
- Critical reading of texts recommended by the subject professor: Press articles, reports, manuals and/or academic articles, either for later discussion in class, or to expand and consolidate knowledge of the subject.
- Resolution of practical cases, problems, etc. raised by the professor, either individually or in a group.
- Presentation and discussion in class, under the moderation of the professor, of topics related to the content of the subject, as well as practical case studies.
- Developing pieces of work and reports, individually or in group.
- Seminars/lectures by national and international experts, in face-to-face or remote synchronous sessions.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

- Individual or group works done during the course (60%)
- Final exam (40%)

In the extraordinary call, the evaluation system will be as follows:
1) Exam: 100%

BASIC BIBLIOGRAPHY

- A.L. Barabási Network Science, Cambridge University Press, 2016

- Networks, Crowds and Markets D. Easley and J. Kleinberg, Cambridge Univ Press, 2010

- Networks: An Introduction (1st Edition) M.E.J. Newman, Oxford University Press, 2010

ADDITIONAL BIBLIOGRAPHY

- A. Barrat, M. Barthelemy and A. Vespignani Dynamical Processes on Complex Networks, Cambridge University Press, 2008

- Bit by Bit: Social Research in the Digital Age Matthew J. Salganik , Princeton University Press, 2017

- M.O. Jackson Social and economic networks, Princeton University Press, 2010

- The structure and function of complex networks SIAM Review 45, 167-256 (2003) M.E.J. Newman, SIAM, 2003

BASIC ELECTRONIC RESOURCES

- Networks, Crowds and Markets . D. Easley and J. Kleinberg: https://www.cs.cornell.edu/home/kleinber/networks-book/