Complex Networks (CN)

A3: Project on complex networks

Objective

Development of a Project in which you put into practice some of the knowledge acquired during this course on Complex Networks.

Description

1. **Definition of the project**
    - *Kinds of projects*
        - **Analysis**: Obtain real data which can be put in terms of network(s), and analyze the network(s) to answer any question or hypothesis about them. It is not enough to calculate descriptors or communities, you must try to answer relevant questions about the system's functioning.
        - **Models**: Develop a model of a dynamic on (or of) complex networks, perform Monte Carlo simulations, obtain analytical results (if possible), and extract some conclusions.
        - **Algorithms**: Develop new computational algorithms for the analysis of the structure or function of complex networks.
    - *Topic*: It is not necessary to restrict the analysis to biomedical networks, we accept for this assignment any other topic. Thus, your project could be about biomedical networks, but also about social networks, transportation networks, ecological networks, trade networks, etc. The only exception is that it should not be about *epidemics*, since they are covered in the subject Computational Epidemiology of MHDS.

2. **Description of the project**
    - Prepare a short description of your idea for the project, including: title, objectives, research question to be answered, methodology or approach, and data to be used (if any).

3. **Approval**
    - The project is of free choice but must be previously approved by the professors.

4. **Discussion**
    - Summarize your findings and insights gained from this exercise.
    - Analyze the assumptions and limitations of your work.
    - Consider possible directions of future work.
    - Comment on your view of analyzing data in the form of networks.

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Delivery

- This is an assignment to be done in groups of three students.

- The delivery must consist of a **single zip file** that contains a **report** (in **pdf**), the **source code**, and the **data** (if any). The report should contain all the information to understand and evaluate the project (e.g., the plots and analysis of results must be in the report, not only in a separated notebook). The name of the file must be of the form:
    - `A3-Name1_Surname1-Name2_Surname2.zip`

- Ensure your code can be run irrespective of the folder in which it is located in our system, and that all necessary files are included. Use the solution you prefer: using relative paths to the data; checking the path in which the notebook is to set the right path to the data; using the data from a URL; downloading the data within the code; etc. In any case, please test it before the delivery.

- In the **report**, include:
    - Description of topic and objectives.
    - Methodology.
    - Results.
    - Discussion.
    - Bibliography.