

CLAD COURSES

Introduction to the Analysis and Visualisation of Complex Networks

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Abstract. The course is organized by CLAD (Portuguese Association for Classification and Data Analysis) and proposes an introduction to the Analysis and Visualization of Complex Networks. In recent years, Network Science has emerged as a powerful and very important academic area that studies complex networks of various origins, such as telecommunications networks, biological networks, social networks, semantic networks or computer networks. It has a multidisciplinary vision that aggregates theory and methods from areas such as graph theory, statistics, computer science, sociology or data visualization. An introduction to Network Science will be given, together with a historical perspective, and the fundamental concepts and most used methods will be addressed, complemented with examples and practical activities of analysis and visualisation.

Recipients. All potential users of data (teachers, researchers, students and professionals from other areas) who wish to represent, analyse and visualise networks for a better characterisation and understanding of the underlying phenomena.

Duration and Schedule. The course will have a duration of 6 hours, from 09:45 to 17:45. The detailed programme is attached.

Conditions: The course will operate remotely, through the Zoom platform (the link will be sent later) with a minimum and maximum number of participants of 10 and 50, respectively.

Investment and Registration Deadline. The course is free for CLAD members with the 2022 membership fee paid; the investment for non-CLAD members is 60€. CLAD will issue a certificate of participation. The deadline for registration is 10 November 2022.

Registration and Contact. If you are interested in attending this course, you should fill in the registration form [here](#). For any other clarifications, please write to mail@clad.pt.

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Course programme

Introduction to the Analysis and Visualisation of Complex Networks

09:45 - 11:15: Introduction to the course

Motivation and the "small world" phenomenon

Emergence of Network Science

Brief introduction to Graph Theory and its terminology

11:30 - 13:00: Measuring Real Networks and their typical properties

Graph generation models (Erdős-Rényi, Watts-Strogatz, Barabasi-Albert)

Node Centrality (e.g. closeness, betweenness, eigenvector, PageRank)

14:30 - 16:00: Community Structure and Modularity

Activity: visualisation and analysis of networks using a graphic platform: Gephi

16:15 - 17:45: Network construction

Activity: visualization and analysis of networks programmatically: igraph (and R)

Brief introduction to other topics (e.g. propagation, sub-graphs, link prediction, GNNs)