Title: Network Analysis
Name of professor: Prof. Silvia Rita Sedita

Objective
The course will provide an overview of basic analytical tools available in order to investigate the network structure of a phenomenon. Inter-organizational and interpersonal relationships can be mapped through social network analysis tools and network and individual properties might be explored. Discussion on fundamentals and more recent works in the field of management will be complemented by exercises with R, which offers routines for simple graphs and network analysis. It can handle large graphs very well and provides functions for generating random and regular graphs, graph visualization, centrality methods and much more. R (https://cran.r-project.org/) and RStudio (https://rstudio.com/) can be downloaded and used for free. Remember to download R and RStudio before in order to successfully start the course!

Topics and exercises

1. Social Network Analysis: what, how, why?

Central questions in this session:
- What is social network analysis? Why do we need social network analysis?
- How does a social network approach differ from "classic/standard" research?
- How can we visualize networks? What programs are available?

Exercises with R:
- Reading network data from files
  - One-mode vs. two mode networks
- Turning networks into igraph objects
- Plotting networks with igraph

2. Network and node descriptives

Central questions in this session:
- How cohesive is my network? What is network density?
- Who is most central in my network? What is degree centrality?
- When is a network centralized, and why is it important? How can we measure it?

Exercises with R:
- Density
- Degree centrality
- Freeman's centralization

3. Centrality measures: an overview

Central questions in this session:
- What types of centrality measures are there? What is the difference between degree, closeness and betweenness centrality?
- When do we use which central measure (closeness, betweenness, …)? How are they different?

Exercises with R:
- Different centrality measures: closeness, betweenness, etc.

3. Subgroups and communities

Central questions in this session:
- How can I identify subgroups in my network? What types of subgroups are there? How many components does my network have? What is a clique?

Exercises with R:
- Identification of cliques, community detection, K -core decomposition

4. Assortativity and Homophily

- Why do friends tend to be similar to ourselves (e.g. smoking, music taste)? What is homophily? How can we measure it?

Exercises with R:
- Measuring homophily

Course Evaluation

The final evaluation will be based on the active participation in the course and on the capacity of problem solving using R.

References

Required Texts & Software
Hanneman, R. A. and Riddle M. 2005. Introduction to social network methods. Riverside, CA: University of California, Riverside (published in digital form at http://faculty.ucr.edu/~hanneman/)
Get started with igraph: https://igraph.org/r/

Readings
Padgett, J. F., & Ansell, C. K. (1993). Robust Action and the Rise of the Medici, 1400-1434. *American journal of sociology*, 1259-1319.
Lazzeretti, L., Sedita, S. R., & Caloffi, A. (2014). Founders and disseminators of cluster research. *Journal of Economic Geography*, 14(1), 21-43.
Sedita, S. R., & Apa, R. (2015). The impact of inter-organizational relationships on contractors' success in winning public procurement projects: The case of the construction industry in the Veneto region. *International Journal of Project Management*, *33*(7), 1548-1562.

Additional Material
Wasserman, S., Faust, K. 1994. *Social Network Analysis: Methods and Applications.* Cambridge University Press.
Kilduff, M., Tsai, W. 2003. *Social Networks and Organizations*. Sage.
Scott, J. 2000. *Social Network Analysis*. Newbury Park CA, Sage.
Borgatti, S.P., Everett, M.G., Johnson, J.C. 2013. *Analyzing Social Networks*. London, Sage.