Social and Economic Networks

Summer School

July 2017

Time and Location: Cagliari, July 10-13
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Overview

The course provides an introduction to the fast growing literature on networks in economics. Social and economic networks are ubiquitous and affect individual and aggregate socioeconomic outcomes. The structure and quality of social links have been shown to affect education performance, health outcomes, information diffusion, pricing of goods, labor choices and trust. In the first part of the course, students will be introduced to social network analysis using real-world social network data and hands-on statistical analysis. In the second part, we will review the economic approach to the theory of network formation, highlighting the intricacies and challenges of estimation of game theoretical models. The statistical and econometrics analysis of networks presents unique challenges related to identification and computation: we will briefly review these issues and estimate alternative models. Finally, we will review the literature on the effects of networks on socioeconomic outcomes.

Prerequisites. Students are assumed to be familiar with standard economics and econometrics (at the level of a master program or 1st year PhD). We will use the statistical software R for all the empirical applications. Students are assumed to be familiar with basic syntax, data structures and programming in R. I will provide code and notes for all the examples shown in class.

Lecture 1: Examples and Social Network Analysis

We will study traditional indicators of position and summary statistics of networks. The students will be introduced to several network concepts and summaries: degree, degree distribution, clustering, centrality, homophily, structural holes, community structure. The theoretical exposition will be complemented with the application of the concepts to a real dataset using R.

References

- Jackson, Matthew O. (2014), "Networks in the Understanding of Economic Behaviors." Journal of Economic Perspectives, 28(4): 3-22.
- Jackson, Matthew O., Brian Rogers and Yves Zenou (2016), "The Economic Consequences of Social Network Structure", Journal of Economic Literature, forthcoming.
- Mele, Angelo (2016), Notes on Social Network Analysis.

Lecture 2: Models of network formation, random vs strategic

We will review the most common models of random network formation: Erdos-Renyi, preferential attachment, small world, ERGM, stochastic block models. We will compare the random network approach to the strategic-economic approach, and study the connection model of strategic network formation as an example.

References

- Jackson, Matthew O. and Asher Wolinsky (1996), "A Strategic Model of Social and Economic Networks", Journal of Economic Theory, 71: 44–74.
- Goldenberg, Anna, Alice X Zheng, Stephen E Fienberg, Edoardo M Airoldi, "A survey of statistical network models" (available at https://arxiv.org/abs/0912.5410).
- Robins G, Pattison P, Kalish Y, Lusher D (2007), "An introduction to exponential random graphs (p*) models for social networks", Social Networks 29:173–191.
- Currarini, Sergio, Matthew O. Jackson, and Paolo Pin (2009), "An Economic Model of Friendship: Homophily, Minorities and Segregation", Econometrica 77 (4), 1003-1045.

Lecture 3: Estimation of network models: econometrics and computational challenges

We will show how to estimate several models of network formation, using real world datasets. We will briefly review the econometrics and the computational challenges involved in estimation.

References

- Currarini, Sergio, Matthew O. Jackson, and Paolo Pin (2009), "An Economic Model of Friendship: Homophily, Minorities and Segregation", Econometrica 77 (4), 1003-1045.
- Robins G, Pattison P, Kalish Y, Lusher D (2007), "An introduction to exponential random graphs (p*) models for social networks", Social Networks 29:173–191.

Code and notes

- Mele, Angelo (2016), "Notes and code for estimation of several network formation models".

Further readings

- Mele, Angelo (2016), "A Structural Model of Dense Network Formation", Econometrica, forthcoming.

Lecture 4: Estimating the effect of networks

We will review the standard approaches to the analysis of social interactions, and the identification problems in this literature.

References

- Bramoulle, Yann, Habiba Djebbari and Bernard Fortin (2009), "Identification of Peer Effects through Social Networks", Journal of Econometrics, 150 (1): 41-55.
- Badev, Anton (2013), "Discrete Games in Endogenous Networks: Theory and Policy", manuscript.
- Boucher, Vincent and Bernard Fortin (2016), "Some Challenges in the Empirics of the Effects of Networks", (Book Chapter) The Oxford Handbook on the Economics of Networks. Eds. Yann Bramoullé, Andrea Galeotti and Brian W. Rogers (available here).

Recommended further readings

The introductory nature of this course prevents me to cover many interesting topics in detail. The student interested in deepening his/her knowledge beyond the scope of this short course, is encouraged to read the following list of (selected) books.

- Aureo de Paula (2016), "Econometrics of Network Models", Advances in Economics and Econometrics: Theory and Applications, Eleventh World Congress, forthcoming.
- Matthew O. Jackson (2008), Social and Economic Networks, Princeton University Press.
- Wasserman, Stanley and Katherine Faust (1994), Social Network Analysis: Methods and Applications, Cambridge University Press.
- Bramoulle, Yann, Andrea Galeotti and Brian W. Rogers (2016), The Oxford Handbook of the Economics of Networks, Oxford University Press.
- Kolaczyk Eric D. and Csardi, Gabor (2014), Statistical Analysis of Network Data with R, Springer.