

Social Network Analysis

ISSR Short Course

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Course Overview: A network is a data structure composed of units and the relationships connecting them. The study of networks in the social sciences and beyond has grown rapidly in recent years. This course is a comprehensive introduction to methods for analyzing network data. We will cover network data collection and management, the formulation of network theory and hypotheses, network visualization and description.

Computing: All computing will be conducted in the R statistical software. We will use add-on packages, mostly from the `statnet` suite - <http://csde.washington.edu/statnet/>. The course will include an introduction to R for those unfamiliar with the software and we will walk through applications during class. If students find they would like additional training in the use of R, the Institute for Social Science Research at UMass is an excellent resource. Their consultants offer support in R - <http://www.umass.edu/issr/research/consultation/>.

Readings:

1. **Section One:** Introduction to network data, network analysis and R

Introduction to Network terminology and Network Data

- Wasserman and Faust (1997) Chs. 1 – 2
- Lazer (2011)

Introduction to R and Network Analysis

- Free from UMass library website – Dalgaard (2008) Ch. 1
- Complete this tutorial – <http://www.cyclismo.org/tutorial/R/input.html>
- Butts (2008a)

Network theory and hypotheses

- Carpenter, Esterling and Lazer (2004)
- Mutz (2002)
- Ward, Stovel and Sacks (2011)

2. Section Two: Description and exploration of networks

Network Descriptive Statistics

- Newman (2010), Ch. 7
- Butts (2008*b*)
- Fowler (2006)

Network Visualization

- Freeman (2000)
- Read through the following documentation and run all of the examples at the end - <http://igraph.sourceforge.net/doc/R/plot.common.html>
- Bommarito, Katz and Zelner (2009)
- See <http://vimeo.com/12543669>

Community Detection

- Zhang, Friend, Traud, Porter, Fowler and Mucha (2008)
- Macon, Mucha and Porter (2012)
- Read through the following documentation and run the example at the end - <http://igraph.sourceforge.net/doc/R/communities.html>

References

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- Carpenter, Daniel P., Kevin M. Esterling and David M. J. Lazer. 2004. “Friends, Brokers, and Transitivity: Who Informs Whom in Washington Politics?” *The Journal of Politics* 66:224–246.

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- Fowler, James H. 2006. “Connecting the Congress: A Study of Cosponsorship Networks.” *Political Analysis* 14(4):pp. 456–487.
- Freeman, Linton. 2000. “Visualizing Social Networks.” *Journal of Social Structure* 1(1).
- Lazer, David. 2011. “Networks in Political Science: Back to the Future.” *PS: Political Science & Politics* 44:61–68.
- Macon, Kevin T., Peter J. Mucha and Mason A. Porter. 2012. “Community structure in the United Nations General Assembly.” *Physica A: Statistical Mechanics and its Applications* 391(1):343 – 361.
- Mutz, Diana C. 2002. “Cross-Cutting Social Networks: Testing Democratic Theory in Practice.” *The American Political Science Review* 96(1):pp. 111–126.
- Newman, M.E.J. 2010. *Networks*. New York, NY: Oxford University Press.
- Ward, Michael D., Katherine Stovel and Audrey Sacks. 2011. “Network Analysis and Political Science.” *Annual Review of Political Science* 14(1):245–264.
- Wasserman, Stanley and Katherine Faust. 1997. *Social Network Analysis*. New York, NY: Cambridge University Press.
- Zhang, Yan, A.J. Friend, Amanda L. Traud, Mason A. Porter, James H. Fowler and Peter J. Mucha. 2008. “Community Structure in Congressional Cosponsorship Networks.” *Physica A* 387(7):pp. 1705 – 1712.