WORKSHOP

SOCIAL NETWORK ANALYSIS USING STATA

The field of Social Network Analysis is one of the most rapidly growing fields of the social sciences. Social network analysis focuses on the relationships that exist between individuals (or other units of analysis) such as friendship, advice, trust, or trade relationships. As such, network analysis is concerned with the visualization and analysis of network structures, as well as with the importance of networks for individuals' propensities to adopt different kinds of behaviors.

Up until now, researchers wishing to implement this type of analysis have been force to use specialized software for network analysis. A new set of user written commands (developed by Thomas Grund, co-author of the forthcoming Stata Press title "An Introduction to Social Network Analysis and Agent-Based Modeling Using Stata") are however, now available for Stata.

This workshop introduces the so-called *nwcommands suite* of over 90 Stata commands for social network analysis. The suite includes commands for importing, exporting, loading, saving, handling, manipulating, replacing, generating, visualizing, and animating networks. It also includes commands for measuring various properties of the networks and the individual nodes, for detecting network patterns and measuring the similarity of different networks, as well as advanced statistical techniques for network analysis including MR-QAP and ERGM.

In common with TStat's workshop philosophy, each individual session, is composed of both a theoretical component (in which the techniques and underlying principles behind them are explained), and an applied (hands-on) segment, during which participants have the opportunity to implement the techniques using real data under the watchful eye of the course tutor. Throughout the workshop, theoretical sessions are reinforced by case study examples, in which the course tutor discusses current research issues, highlighting potential pitfalls and the advantages of individual techniques. The intuition behind the choice and implementation of a specific technique is of the utmost importance. In this manner, course leaders are able to bridge the "often difficult" gap between abstract theoretical methodologies, and the practical issues one encounters when dealing with real data.

At the end of the course, participants are expected to be able to autonomously implement the theories and methodologies discussed during the workshop.

WORKSHOP CODE

I-WS15

COURSE REQUISITES

Working knowledge of Stata.

TARGET AUDIENCE

The workshop provides an interdisciplinary opportunity for social scientists, mathematicians, computer scientists, ethnologists, epidemiologists, organizational theorists to acquire the necessary statistical tools required to analyse social networks in Stata.

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PROGRAM

SESSION I: **INSTALLING** **NETWORK COMMANDS**	1. Theoretical motivation 2. Networks and node attributes 3. Finding help: *help* 4. Managing variables 5. Return vector: *return, ereturn* 6. User written commands: *adopath* 7. Installation of *nwcommands* 8. Dialog boxes for network commands
SESSION II: **GETTING STARTED** **WITH NETWORKS**	1. Setting networks: *nwset* 2. Listing networks: *nwds* 3. Current network: *nwcurrent* 4. Using and saving networks: *nwuse, nwsave* 5. Importing and exporting networks: *nwexport, nwimport* 6. Dropping and keeping networks: *nwdrop, nwkeep, nwclear* 7. Network transformation: *nwtoedge, nwfromedge*
SESSION III: **NETWORK VISUALIZATION**	1. Schemes 2. Network visualization: *nwplot, nwplotmatrix, nwplotjs* 3. Animation of networks: *nwmovie*
SESSION IV: **NETWORK EXAMINATION**	1. Summarize networks: nwsummarize 2. Tabulate networks: *nwtabulate* 3. Dyads, triads: *nwdyads, nwtriads* 4. Simmelian ties: *nwsimmelian* 5. Components: *nwcomponents*
SESSION V: **DISTANCE AND PATHS**	1. Distance and paths: nwgeodesic, nwpath 2. Distance distribution 3. Shortest paths 4. Local and global bridges: *nwbridge*
SESSION VI: **NEIGHBOURS AND CONTEXT**	1. Network neighbours: nwneighbor 2. Attributes of neighbours: *nwcontext* 3. Attributes of neighbours at certain distance
SESSION VII: **CENTRALITY AND** **CENTRALIZATION**	1. Importance in networks 2. Degree centrality: *nwdegree* 3. Betweenness centrality: *nwbetween* 4. Katz centrality: *nwkatz* 5. Closeness centrality: *nwcloseness* 6. Centralization in networks
SESSION VIII: **CHANGING NETWORKS**	1. Extract tie values 2. Change networks: *nwreplace, nwreplacemat, nwrecode* 3. Symmetrize: *nwsym*
SESSION IX: **CALCULATING WITH NETWORKS**	1. Multiplying networks 2. Adding networks 3. Network generators: *nwgen* 4. Network expressions

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SESSION X:
NETWORK SIMULATION

1. Random networks
2. Lattice networks
3. Small-world networks
4. Preferential attachment networks
5. Homophily networks
6. Commands: *nwrandom, nwsmall, nwhomophily, nwdyadprob, nwpref, nwring, nwlattice*

SESSION XI:
HYPOTHESIS TESTING 1

1. Correlation of networks
2. Conditional uniform graphs
3. Permutation tests: *nwpermute*

SESSION XII:
REGRESSION BASED HYPOTHESIS TESTING

1. Logistic regression: logit
2. Dyad-level regression
3. Network transformation: *nwtoedge, nwfromedge*
4. Quadratic assignment procedure: *nwqap*
5. Short introduction to P2 models and their estimation in Stata

USEFUL TEXTS

- Grund, T. and Hedström, P. (forthcoming) An Introduction to Social Network Analysis and Agent-Based Modeling Using Stata. Stata Press.
- Grund, T. and Tatum, T. (forthcoming) Some Friends Matter More than Others: BMI Clustering Among Adolescents in Four European Countries. Network Science.
- Helbing, D. and Grund, T. (2013) (eds.) Special Issue: Agent-Based Modeling and Techno-Social Systems. Advances in Complex Systems, Vol. 16, Issue 4 & 5.
- Kron, T. and Grund, T. (2010) (eds.) Analytische Soziologie in der Diskussion. VS Verlag.

Journal Articles
- Grund, T. and Morselli, C. (2017) Overlapping Crime: Stability and Specialization of Co-offending Relationships. Social Networks. 51, 14-22
- Grund, T. and Densley, J. (2015) Ethnic Homophily and Triad Closure: Mapping Internal Gang Structure Using Exponential Random Graph Models. Journal of Contemporary Criminal Justice, Vol. 31, Issue, 3, pp. 354-370.
- Block, P. and Grund, T. (2014) Multidimensional Similarities in Friendship Networks. Network Science, Vol. 2, Issue 2, pp. 189-212.

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