

Understanding & Enabling Networks in Digital Government

Noshir Contractor
Northwestern University
2145 Sheridan Road, TECH D-241
Evanston IL 60208
+1847-491-3669
nosh@northwestern.edu

ABSTRACT

This tutorial will provide an overview of how network theories and visual-analytic methods are used to understand and enable digital government

Categories and Subject Descriptors

J.4 [Social and Behavioral Sciences]

General Terms

Management, Measurement, Human Factors, Theory

Keywords

social network analysis, multidimensional networks, network visualization

1. INTRODUCTION

This tutorial will introduce theories and concepts of social network analysis. It will describe methods for (i) collecting network data (ii) computing network metrics (iii) visualizing network data, (iv) statistically modeling of network data. The tutorial will provide practical applications for the discovery, diagnosis, and design of digital government networks using UCINET and CIKNOV software.

2. NETWORKS IN DIGITAL GOVERNMENT

The first module will provide a historical overview of the motivations to view social and organizational systems from a networks perspective. It will illustrate the wide range of contexts in which network theories and methods have advanced our understandings. The session will conclude with a brief introduction to the concepts of social networks, cognitive social networks, knowledge networks, cognitive knowledge networks and their relevance to digital government.

3. NETWORK THEORY, DATA & VISUAL ANALYTICS

3.1 Network Theory

This module outlines a contextually based multi-theoretical multilevel (MTML) model to investigate the

dynamics for creating, maintaining, dissolving, and reconstituting social and knowledge networks in digital government communities. Using examples from research on communities involved in disaster response, environmental engineering, and public health, this module illustrates the potential of the MTML framework to understand and enable digital government communities [1, 2].

3.2 Network Data

Advances in digital technologies (e.g., Web 2.0) invite consideration of organizing within communities as a process that is accomplished by global, flexible, adaptive, and ad hoc networks that can be created, maintained, dissolved, and reconstituted with remarkable alacrity. Increasingly these networks are multidimensional including individuals as well as digital artifacts and concepts. This session will introduce the concept of “multidimensional” social networks where nodes can be people, organizations, documents, keywords/concepts, analytic tools, etc. The session will describe how the “relational metadata” harvested from individuals’ use of Cyberinfrastructure and Web 2.0 can help us understand and leverage these multidimensional networks. The session concludes with web-based demonstrations to illustrate these concepts.

3.3 Network Visual-Analytics

This module begins by defining various concepts used in network analysis: actors and attributes of actors, relations and properties of relations as well as two-mode networks and multi-dimensional networks. Next it describes how these concepts influence strategies for the collection of network data. The session then defines and describes how various common network metrics are computed at the actor, dyadic, triadic, sub-group, and component level. The session concludes with a demonstration of various tools that can be used to visualize [3,4] and enable [5] networks.

4. ACKNOWLEDGMENTS

The materials in this proposal were prepared based on research conducted by research funded by the National

Science Foundation OCI-0753047, IIS-0729505, IIS-0535214.

5. REFERENCES

- [1] Monge, P. R. & Contractor, N. S. (2003). Theories of communication networks. New York: Oxford University Press.
- [2] Contractor, N., Wasserman, S., & Faust, K. (2006). Testing multi-theoretical multilevel hypotheses about organizational networks: An analytic framework and empirical example. *Academy of Management Review*, 31, 681-703.
- [3] Provan, K., & Contractor, N. (2008). Understanding and managing stakeholder networks. In National Cancer Institute, *Greater than the Sum: Systems Thinking in Tobacco Control*. Tobacco Control Monograph No. 18. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute. NIH Pub. No.06-6085
- [4] Monge, P. R., & Contractor, N. S. (1988). Communication networks: Measurement techniques. In C. H. Tardy (Ed.), *A handbook for the study of human communication: Methods and instruments for observing, measuring, and assessing communication processes* (pp. 107-138). Norwood, NJ: Ablex.
- [5] Huang, Y., Contractor, N., & Yao, Y. (2008). CIKNOW: Recommendation based on social networks. Proceedings of the DG.O 2008 conference, Montreal, Canada.