



Data Visualization Connecting the Dots with SAS Graph NV[®] (Workshop 2.1)

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What is a Network? A Set of Dots and Lines...

From the free dictionary (<http://www.thefreedictionary.com/network>):

net-work (n t wûrk) *n.*

1. An openwork fabric or structure in which cords, threads, or wires cross at regular intervals.
2. **Something resembling an openwork fabric or structure in form or concept, especially:**
 - a. A **system of lines** or channels that cross or **interconnect**: *a network of railroads.*
 - b. A complex, **interconnected group** or system: *an espionage network.*
 - c. An extended group of people with similar interests or concerns who interact and remain in informal contact for mutual assistance or support.

...

In Network Analysis,

A Node (or vertex) is the unit in the network (people, companies, computer...)

A Tie (or edge) is the line linking two nodes

A Graph is a combination of nodes connected with ties

A Network would be a graph which additional info is attached to



Fields of Application

- Organisational Network Analysis / Social Network Analysis / Business Network Analysis
- Knowledge management
- Economics
- Terrorism
- Anti-Money Laundering
- Fraud
- Logistics
- Internet traffic
- ...

Useful Notions When Analyzing a Network

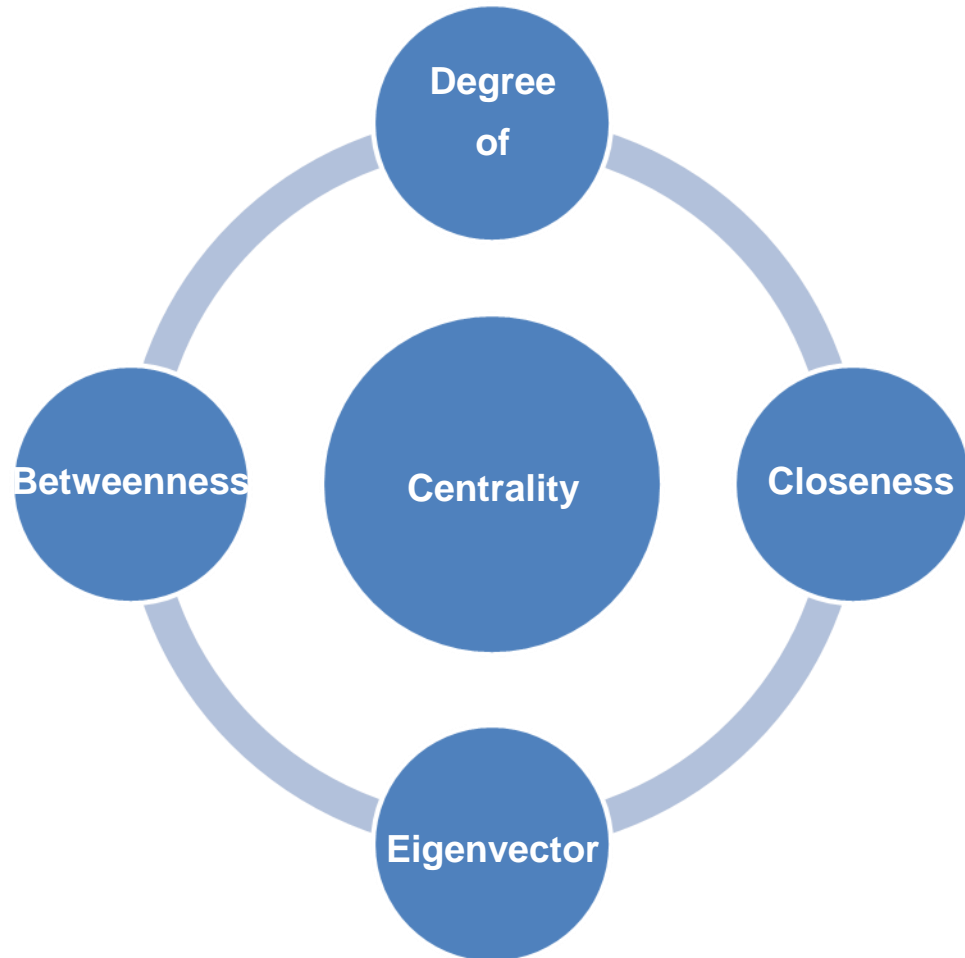
- **Tie Strength:**

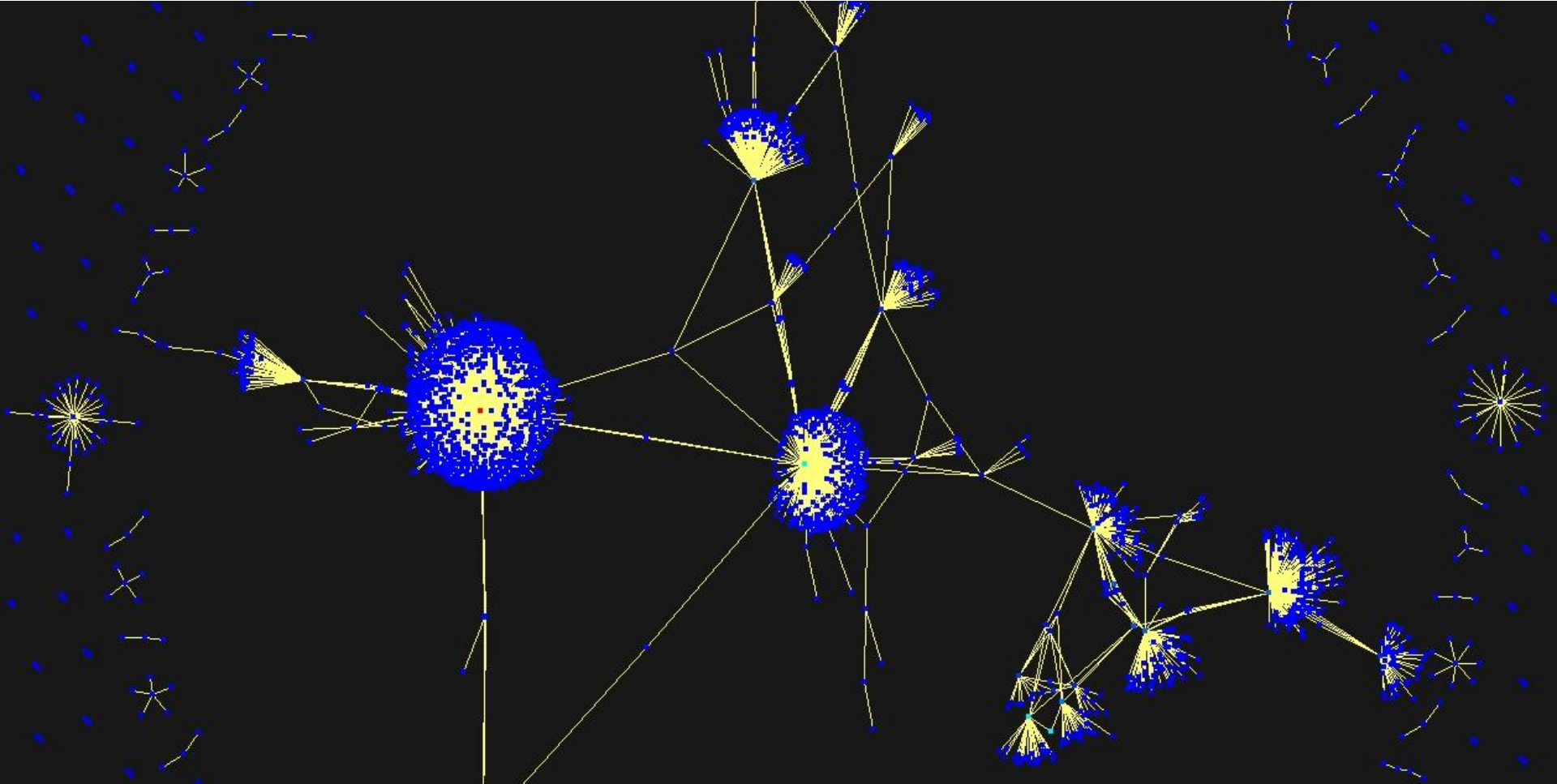
- weak/strong ties depend on their weight (number of interactions, \$ amount, a perception of the quality of relationship),
- transitivity,
- bridging between groups,
- homophily, heterophily

- **Key players** : central nodes, how many ties in or/and out
⇒A Matter of Centrality:

- **Cohesion:**

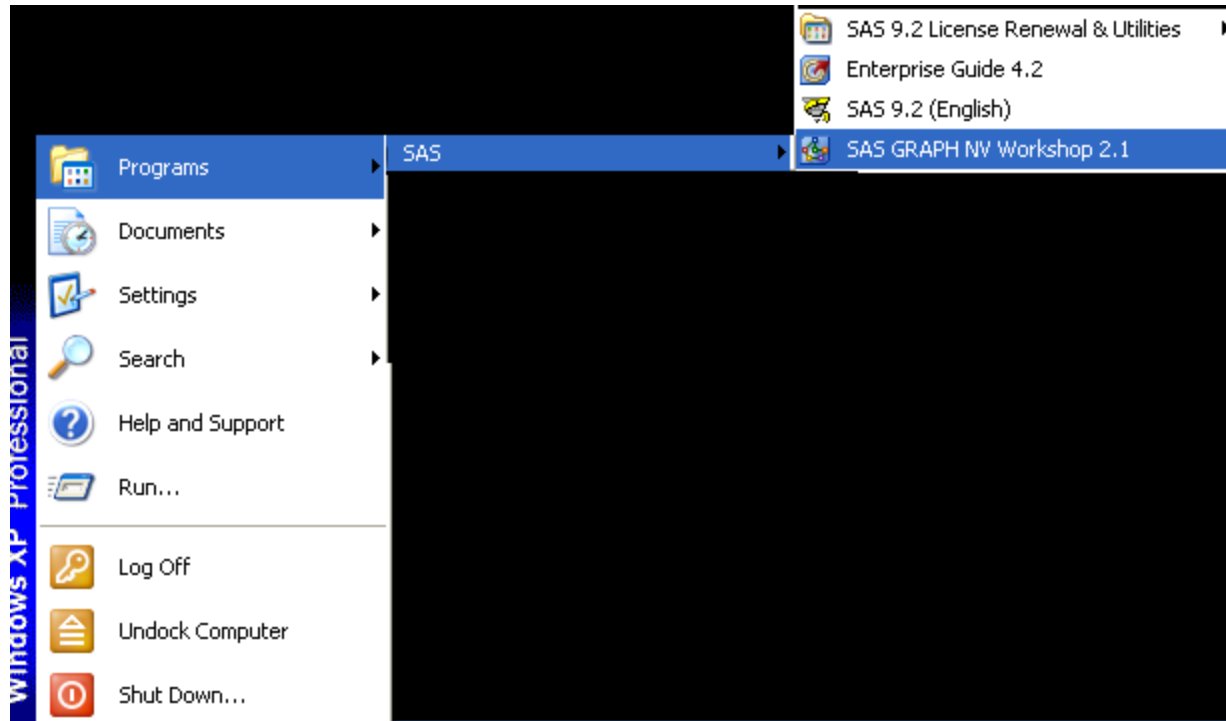
- degree of reciprocity,
- density,
- clustering,
- diameter
- ...





What is SAS GRAPH NV?

- Highly interactive graphics-oriented tool
- Explore, manipulate, filter at multiple levels
 - Charts
 - Network Maps
 - Raw Data
- Part of SAS/GRAPH
- How to access?





Demo



- Define your unit, links and attributes
- Don't forget to analyse and do not just stared at the piece of art!
- When too much is really too much? Filter on the main actors
- Don't show everything: Limit the information (names, attributes) displayed on the map
- Limit one map to one question



Some References

The following websites were of a great help preparing this paper. They themselves refer to other useful links.

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- Steve Borgatti : <https://sites.google.com/site/steveborgatti/research/publications>
- Hanneman, Robert A. and Mark Riddle. 2005. Introduction to social network methods. Riverside, CA: University of California, Riverside (published in digital form at <http://faculty.ucr.edu/~hanneman/>)
- Durant-Law, Graham <http://www.durantlaw.info>
- Cheliotis, Georgos, Social Network Analysis, National University of Singapore (published in digital form at <http://www.slideshare.net/gcheliotis/social-network-analysis-3273045>)
- http://en.wikipedia.org/wiki/Glossary_of_graph_theory
- http://reality.media.mit.edu/pdfs/bensatyendra_final_realitymining.pdf
- Cross Rob, University of Virginia, Some case studies: http://www.robcross.org/research_casestudies.htm
- Müller-Prothmann, Tobias, Social Network Analysis: A Practical Method to Improve Knowledge Sharing, Pumacy Technologies AG (published in digital form at http://www.knowledge-experts.com/files/kb_ebook02_social_network_analysis_knowledge_sharing.pdf)
- Blog of The Network Thinkers (<http://www.thenetworkthinkers.com/>)

On SAS/GRAPH®: Network Visualization Workshop 2.1

- SAS Institute Inc 2009. *SAS/GRAPH®: Network Visualization Workshop 2.1 User's Guide*. Cary, NC: SAS Institute Inc.
(<http://support.sas.com/documentation/cdl/en/grnvwug/62918/HTML/default/viewer.htm#titlepage.htm>)
- SUGI 31 Paper: SAS/OR: Making Sense of Network Data with NV Workshop, . Hughes, P. Meanor
<http://www2.sas.com/proceedings/sugi31/068-31.pdf>



Questions?