

Concepts and Methods of Social Network Analysis

Parts 5-7 (Methods and Software)

Berlin-Brandenburgische Akademie der Wissenschaften

Berlin, Oct. 9-11, 2017

Sorry for mixing English and
German slides ...

Content

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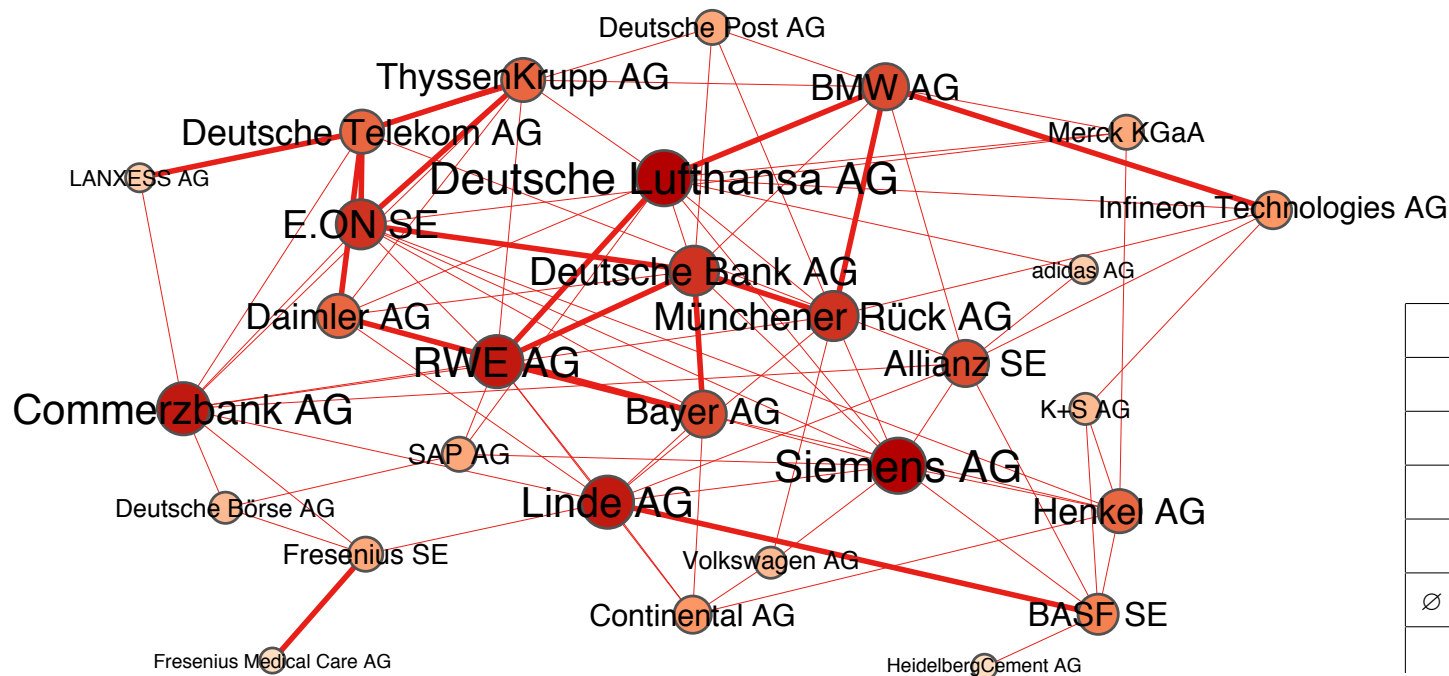
3. Power games at Volkswagen 2015

(In-)Degree = Spaltensumme

NrmDeg = Degree / (n-1)

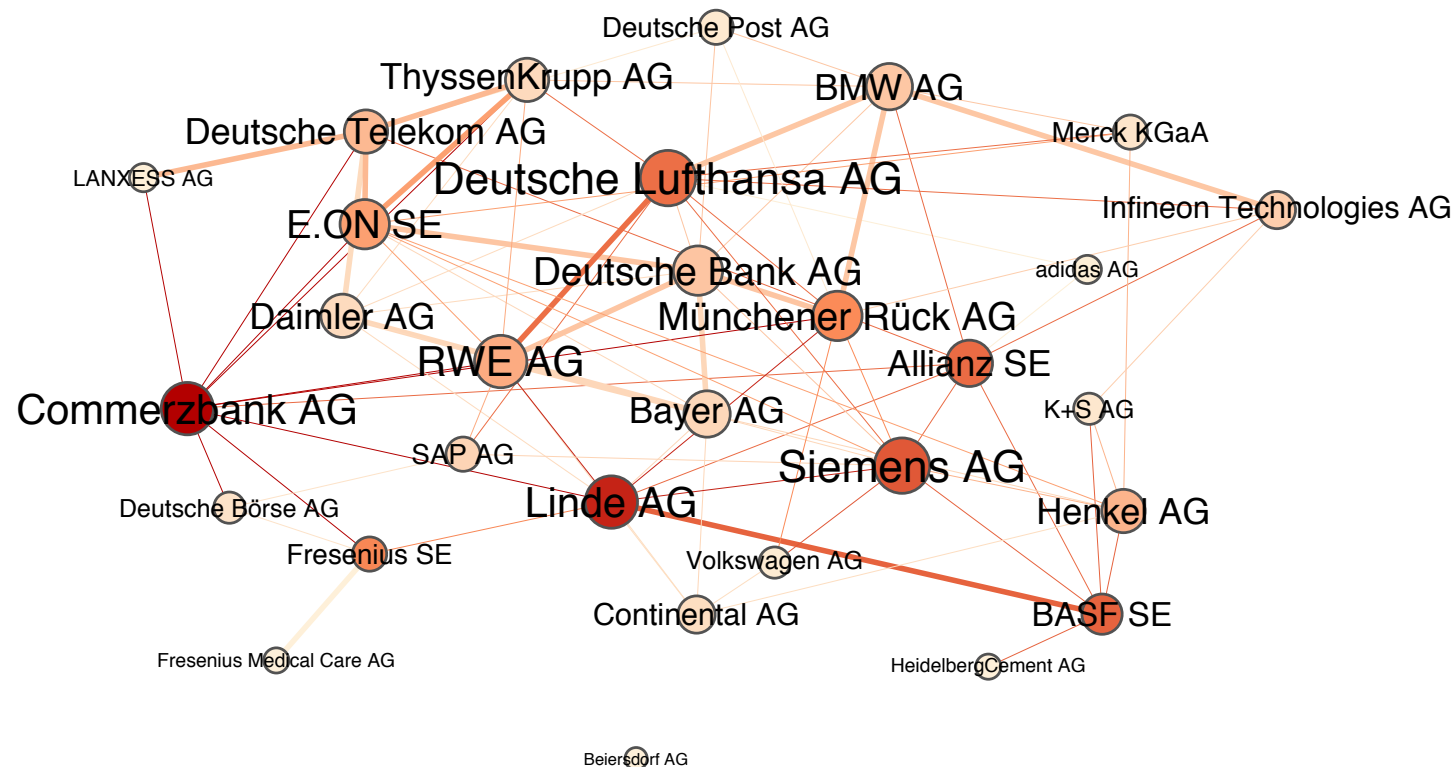
	Winterkorn	F. Piëch	Huber	Osterloh	Weil	Fam. Porsche	Fam. Piëch
<i>Funktion</i>	<i>VV VW</i>	<i>ARV VW</i>	<i>Ex-IGM (AR)</i>	<i>BRV VW (AR)</i>	<i>MP Nieders. (AR)</i>	<i>Inhaber (AR)</i>	<i>Inhaber (AR)</i>
Winterkorn		1		1	1	1	1
F. Piëch	1			1	1	1	1
Huber							
Osterloh	1	1			1		
Weil	1	1		1			
Fam. Porsche	1	1					1
Fam. Piëch	1	1				1	
Degree	5	5		3	3	3	3
NrmDegree	1,000	1,000		0,600	0,600	0,600	0,600

3. Network of DAX-30-Firms

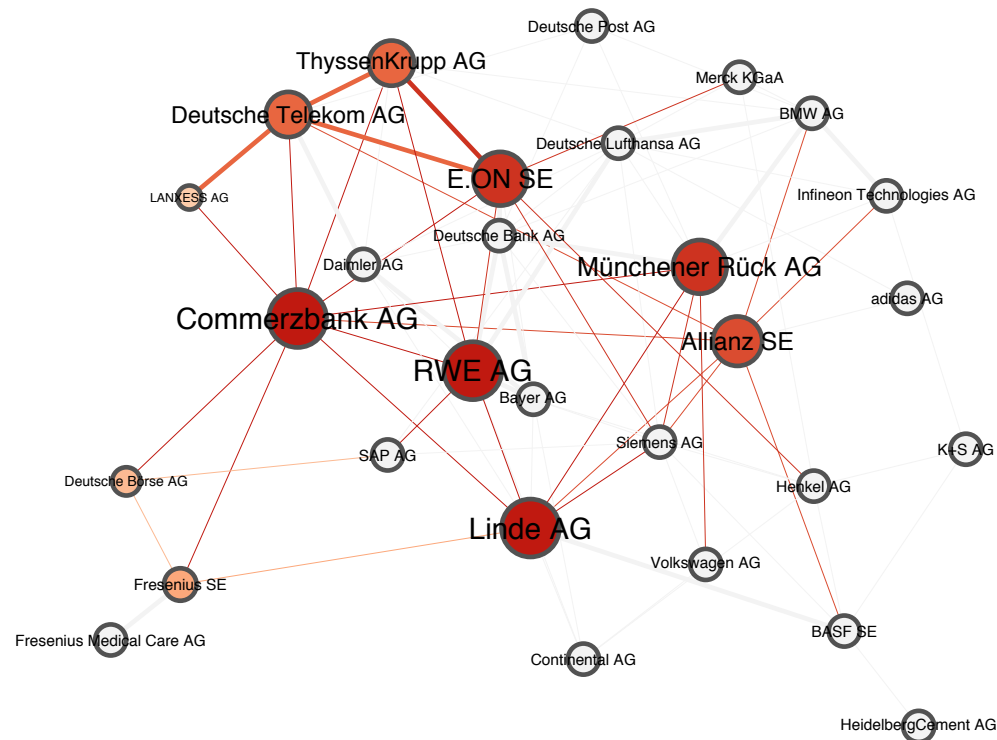


Ø Degree	5,933
Ø Weighted Degree	7,067
Diameter	4
Density	0,205
Modularity	0,295
Ø Clustering Coefficient	0,371
Ø Path Length	2,103

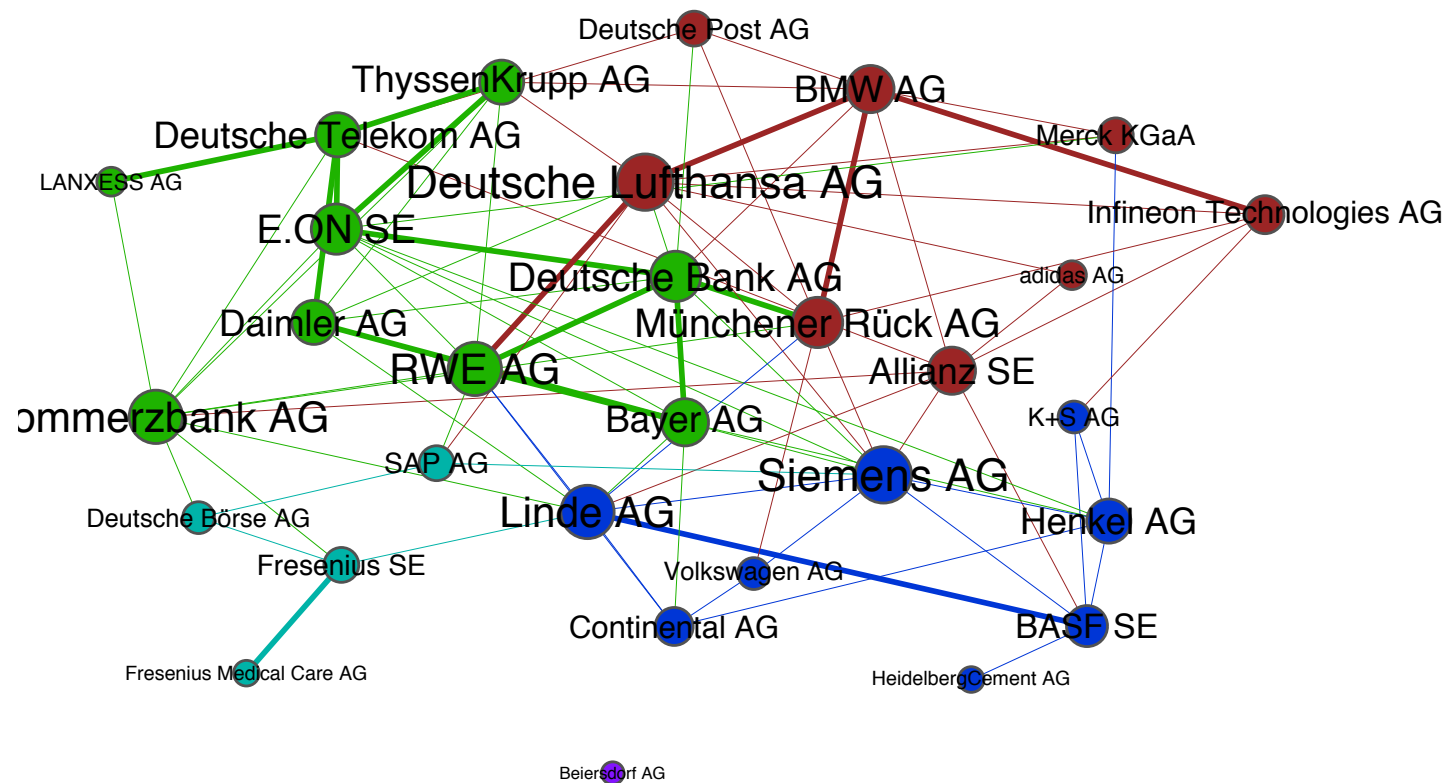
Betweenness Centrality



Ego network of Commerzbank



Modularity 1.3 (networks within networks)



5. Software for SNA

- SIENA
 - www.stats.ox.ac.uk/~snijders/siena
- UCINET
 - www.analytictech.com/ucinet
 - Windows only (?)
- PAJEK
 - <http://vlado.fmf.uni-lj.si/pub/networks/pajek>

5. Software for SNA (cont.)

- Gephi
 - www.gephi.org
 - Please download Gephi to your computer and check system requirements, especially concerning Java (Windows and Linux only).
- NetLogo
 - <http://ccl.northwestern.edu/netlogo>
 - Network Extension
 - <http://ccl.northwestern.edu/netlogo/docs/nw.html>
- Sources: Borgatti et al. 2002, Hanneman/Riddle 2005, Weyer et al. 2014 and many more

5. Gephi 0.9.2

- Main feature: Visualization
 - Some bugs remain ...
- Tutorial
 - <https://gephi.org/users/quick-start/>
 - <https://gephi.org/users/>
- Data import from Excel (.csv)
 - <https://github.com/gephi/gephi/wiki/Import-CSV-Data>

5. Data preparation

- Exampel scientific cooperation
 - DFG-Transregions-181212-final.xlsx

Project	Discipline	Institution	City
A	Physics	Univ.	Berlin
A	Biology	MPI	Munich
B	Biology	Univ.	Hamb ru g
B	Sociology	Univ. v._(Blank!)	Berlin
C	Sociology	Univ.	Berlin
C	Physics	Univ.	Berlin
C	Biolog ie	Univ.	Hamburg

5. Data preparation (cont.)

- Generate
 1. Nodes table
 - Assign IDs and types
 - Eliminate double entries
 2. Edges table
 - Next slide

ID	Type
A	Project
A	
B	
B	Project
C	Project
C	
C	
Biology	Discipline
Sociology	Discipline
Physics	Discipline
Berlin	City
Munich	City
Hamburg	City

Nodes	Discipline	Institution	City
A	Physics	Univ.	Berlin
A	Biology	MPI	Munich
B	Biology	Univ.	Hamburg
...	...		

Edges table

→ convert into .csv

Source	Target	Type
A	Physics	Undirected
A	Univ.	Undirected
A	Berlin	Undirected
A	Biology	Undirected
A	MPI	Undirected
A	Munich	Undirected
B	Biology	Undirected
B	Univ.	Undirected
B	Hamburg	Undirected
...	...	
...		
...		

5. Data import into Gephi

- Data Laboratory
 - Import Spreadsheet
 - Choose file
 - Separator: Semicolon
- As Table
 - Edge or Node

5. Multimode Networks Projection

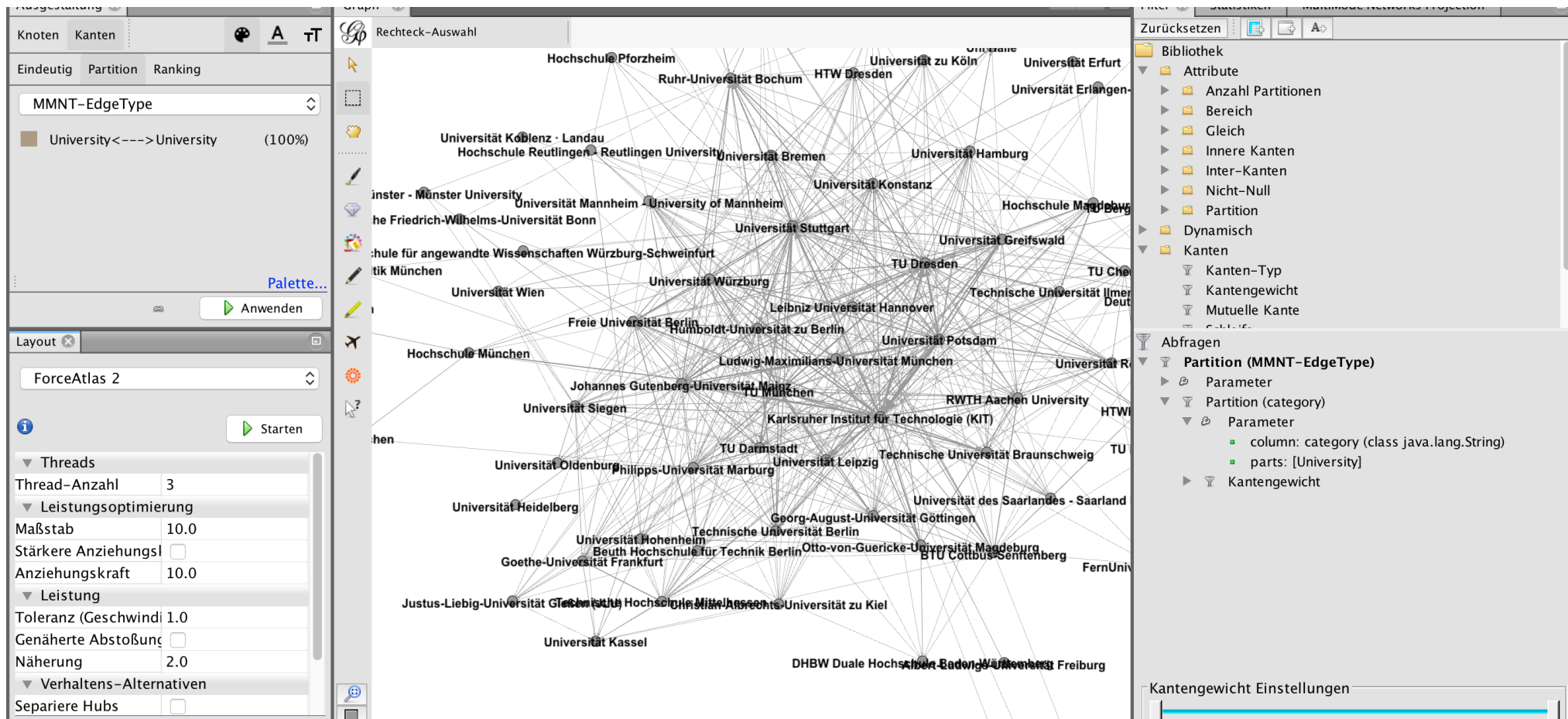
- Download and install MMNT Plug-in
 - Tools > Plug-ins
- Open MMNT
 - Load attributes
 - Type category
 - Left: University-other
 - Right: other-University
- MMNT transforms bimodal into unimodal networks
 - Creates a new type of edge (→ data laboratory)

5. Filtering

- Data laboratory: still all kinds of nodes
 - Confusing picture ...
- First step (little bug)
 - Appearance → edges → partition
 - Choose an attribute: MMNT-EdgeType
 - Color → apply

5. Filtering (cont.)

- Second step: Filters
 - Draw MMNT-Edge-Type into the lower screen (main filter)
 - Install partition attribute (node) as subfilter
 - Activate University/University in main filter
 - Choose setting in partition attribute (subfilter)
 - Choose different parameters (e.g. edge weight) for better visualization



5. Visualization

- Layout
 - ForceAtlas 2
 - Play with
 - Repulsion rate
 - Size
 - etc.
 - to get a smarter picture
 - Adjust font size, node size, node color etc.
 - Try mouse over to see ego networks ...

5. Calculation of networks indices

- Statistics tab
 - Click „run“
- Use results for additional filtering
 - Or adjusting colour of edges or size of nodes
 - Partition (right side)
 - Ranking (left side)
- In case of errors
 - reload your data ...

6. Reflection

- Usefulness of SNA software?
 - Visualization
 - Calculation of indices

- Limits of Gephi?
 - Some bugs ...
 - Static picture

- Alternatives?
 - NetLogo

6. NetLogo

- Network Import.nlogo
 - Simple tool
- Page rank
- Preferential attachment
- Network extension