MAKING COMPUTERS UNDERSTAND COALITION AND OPPOSITION IN PARLIAMENTARY DEMOCRACY

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TALK OUTLINE

- Introduction and Motivation
- Temporal Graph Models and Related Work
- System Design
- PoC Prototype
- Observations
- Conclusions

OPEN DATA INITIATIVES

- Open Data initiatives bring **more transparency** for citizens
- Legislative bodies have traditionally employed **transparent decision making processes**
  - Sessions of parliament are recorded in **textual transcripts**
  - … are open to be visited by a general public audience
  - … are broadcast via national television stations

- General public audience does **not** have the resources to **directly process** this information (transcripts) thus needs to rely on **secondary information** sources such as news broadcasts and papers

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SO HOW OPEN IS THIS DATA?

- Session **transcripts** to a large extend are only **processed** by **professionals** (journalists, scientists, analysts, etc.)
- Even for professionals the **interlinks** between political actors might **not** be fully **transparent**
- The textual form obstructs the view on the political / decisions making **network hidden in the data**

- New means of interpreting this Open Data will improve means of making informed decisions

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INTERPRETATION PROCESS

- Continuous retrieval of transcripts
- Automated text analysis to extract **relationships** in political **discourse**
- Outcome is a **temporal graph** model
- Visualising the result

- Allows for direct interpretation and analysis of the data for a broader audience
- Provides metrics for professionals

TEMPORAL GRAPHS

Graph G is a pair (V, E)
where V denotes the set of vertices and E denotes the set of edges between any $v, e \in V$

A **temporal graph** T can be given as a set of graphs $T = \{G_1, G_2, G_3, \ldots, G_t\}$ where each $G_x = (V_x, E_x)$
G_x is called a **static snapshot** at **time** x
And $G_{tm..tn}$ as a selection of multiple G_x from T is a static snapshot for a **timespan**

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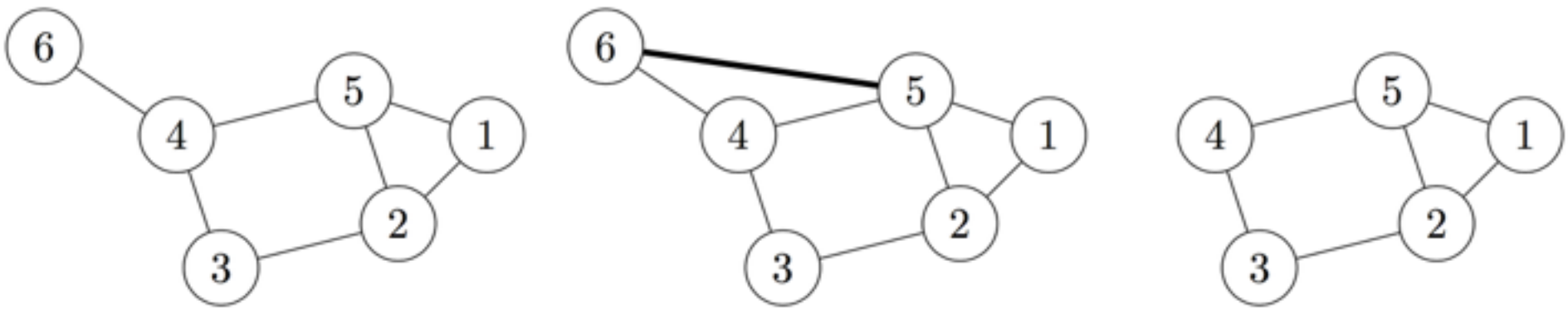
F. Harary and G. Gupta. Dynamic Graph Models. Mathl. Comput. Modelling, 25(7):79–87, 1997.

Real-world networks are dynamic



(a) Original Graph (b) Edge 5:6 Inserted (c) Vertex 6 Removed

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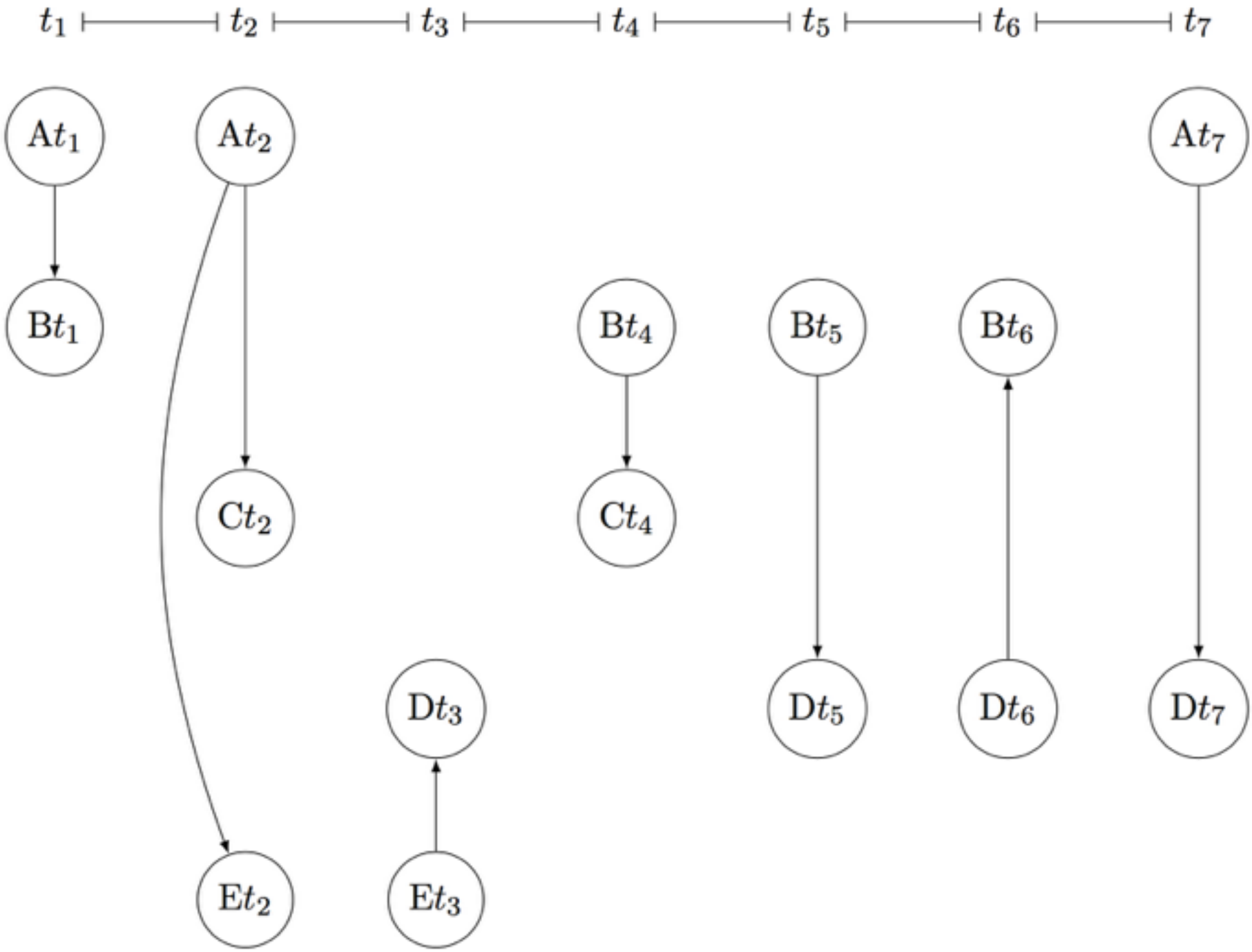
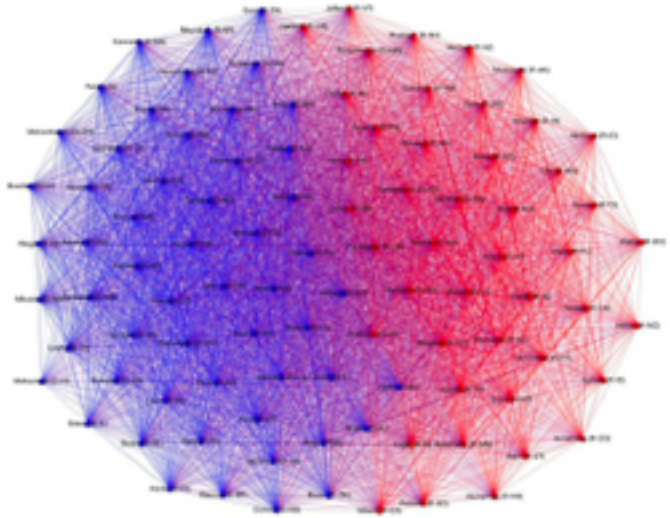

t_1
t_2
t_3
t_4
t_5
t_6
t_7
At_1
At_2
At_7
Bt_1
Bt_4
Bt_5
Bt_6
Ct_2
Ct_4
Dt_3
Dt_5
Dt_6
Dt_7
Et_2
Et_3

RELATED WORK

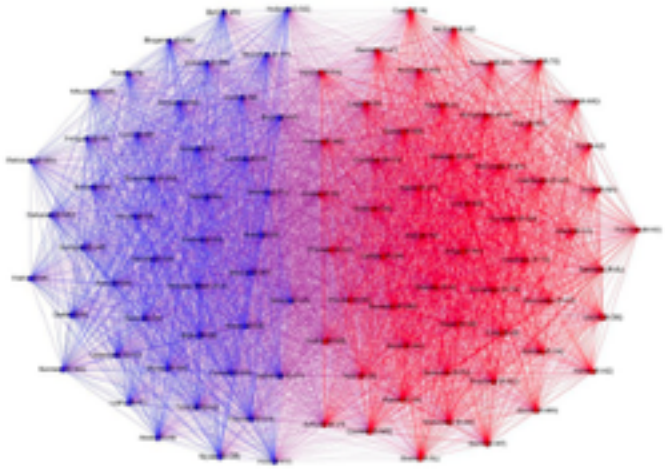
- Open Data
  - This work addresses political Open Data
  - OD initiatives on the rise around the world
  - First studies (Shadbolt 2012) show positive influence
- Social Web
  - … can be an additional source for political analysis
  - Facebook, Twitter etc. are used to analyse political trends (Kushin 2009, Hsu 2013)
- Structural Analysis
  - Ground breaking visualisation by (Luicioni 2013)
  - Political Networks served as data for research in network analysis (Porter 2005) and in depth studies interpret party cohesion in parliament (Amelio 2012)

Voting Relationships in U.S. Senate, 1989–2013

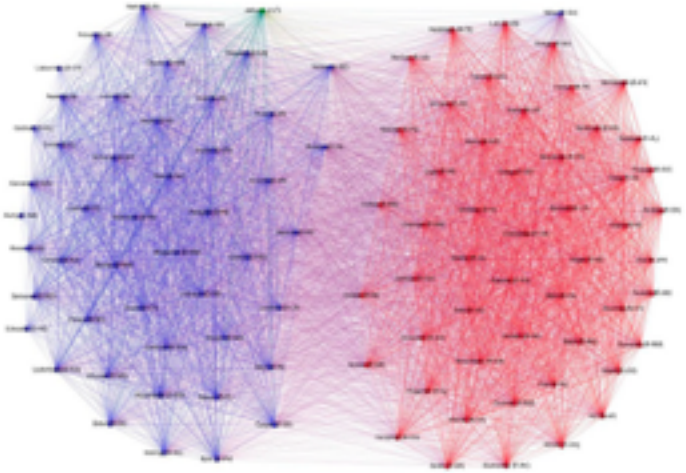
101st Congress, 1989 Session



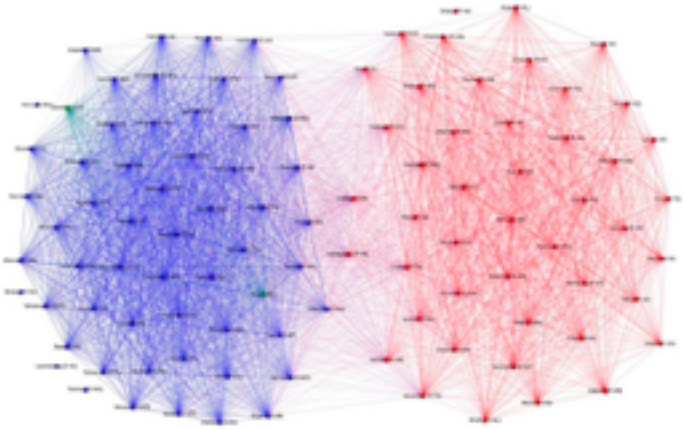
105th Congress, 1997 Session

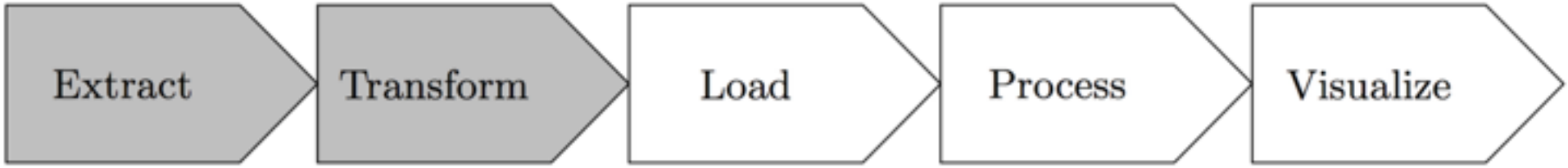


108th Congress, 2003 Session



113th Congress, 2013 Session





- **Extract** data from a transcript body (HTML, PDF, …; might involve OCR)
- **Transform** the data to a generic actor - interaction model

- **Load** data to a temporal graph model
- **Process** the graph data
  - Simple metrics (attendance, discussion frequency, speech time)
  - Community detection
  - Network metrics (centrality measures, cluster cohesion)
- **Visualize** the data
  - .. as graphs
  - .. in easy to interpret charts

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PROOF-OF-CONCEPT OPEN SOURCE IMPLEMENTATION

- Provides an Open Source implementation over the transcripts available from the Austrian Parliament
  - Stenotypists provide extensive annotation (politician's profile are linked with names, discussions carry pro-/contra marks)
- Transcripts are parsed fully automatic and visualised in a Web-Frontend
- https://github.com/hias234/AustrianParliamentAnalyzer

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Austrian Parliament Analyzer

Here you can find all the stats you need to know about the Austrian parliament :)

General Analysis

Legislative Period Analysis

Here you can find general statistics of the different legislative periods.

Data from the 25. Period:

GO TO PERIOD ANALYSIS

Politician Analysis

Here you can see statistics for politicians of the Austrian Parliament like absences in sessions, activity in the parliament, and politicians with similar or completely different attitudes.

GO TO POLITICIAN ANALYSIS

Network Analysis

Parliament Club Network Analysis

The speeches of politicians to all topics were analyzed and the relations of parliament clubs were computed. These relations are shown in a network graph and you can see per period which clubs have the same attitudes.

Example:

GO TO CLUB NETWORK ANALYSIS

Politician Network Analysis

The speeches of politicians to all topics were analyzed and the relations of politicians were computed. These relations are shown in a network graph and you can see per period which politicians have the same attitudes and course you can see to which clubs they belong.

GO TO POLITICIAN NETWORK ANALYSIS

Austrian Parliament Analyzer - Politician Analysis

Here you can see all the national council members of the Austrian Parliament

Show politicians for period

25

Politician	Sessionabsence	Speeches
Nikolaus Alm	2.2 %	47
Werner Amon	3.3 %	29
Erwin Angerer	3.5 %	12
Konrad Antoni	5.6 %	9
Aygül Berivan Aslan	14.4 %	13
Gertrude Aubauer	0.0 %	30
Jakob Auer	4.4 %	33
Walter Bacher	0.0 %	16
Petra Bayr	15.6 %	19
Ruth Becher	1.1 %	26
Dagmar Belakowitsch-Jenewein	4.4 %	63
Nikolaus Berlakovich	0.0 %	27

MORE DETAILS

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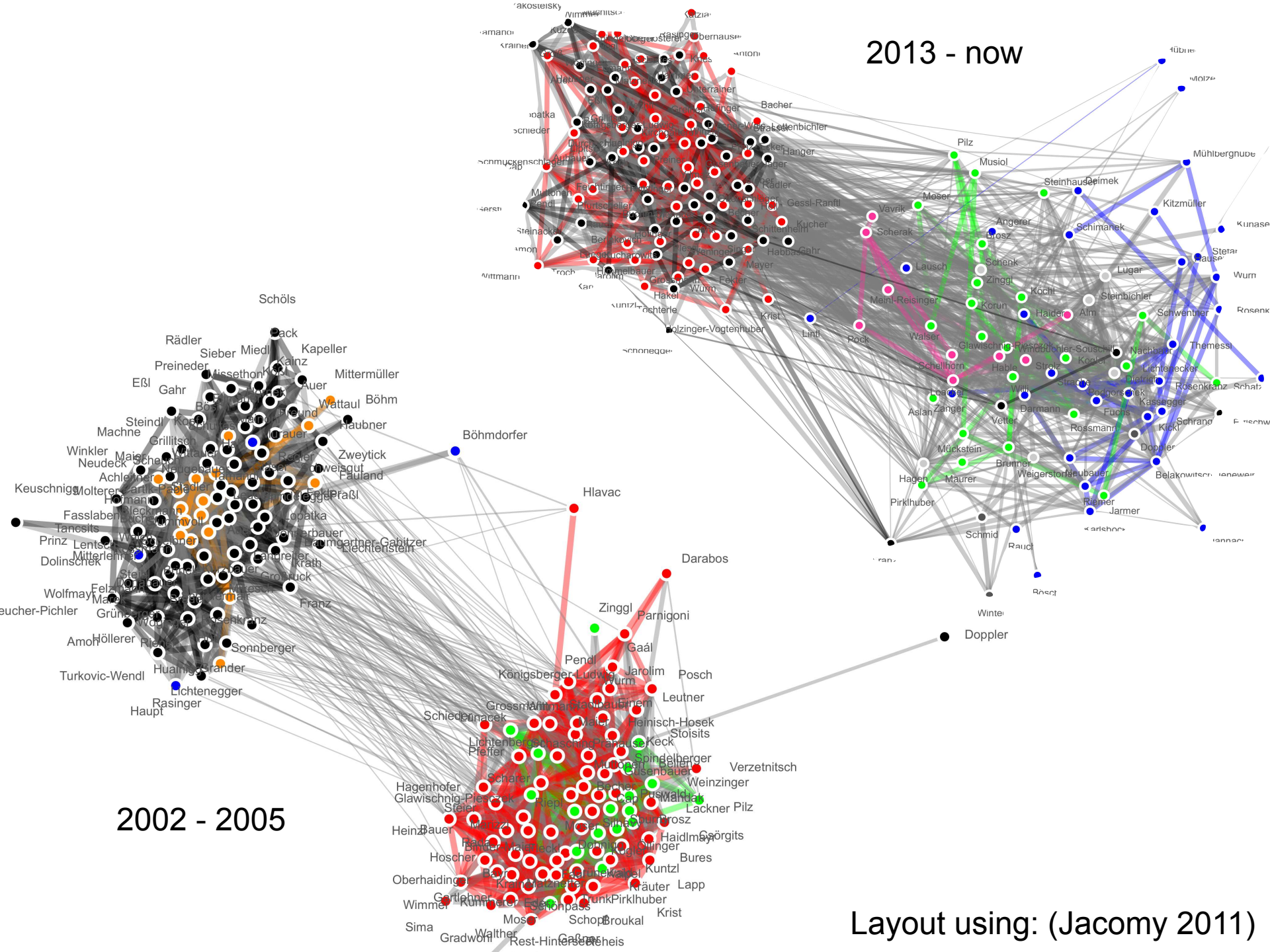
2013 - now
2002 - 2005
Layout using: (Jacomy 2011)
Schöls
Rädler
Sieber
Miedl
Kapeller
Preineder
Kainz
Mittermüller
Eßl
Gahr
Auer
Wattaul
Böhm
Steindl
Haubner
Machne
Grillitsch
Winkler
Neudeck
Zweytick
Fauland
Keuschnigg
Praßl
Fasslabend
Lopatka
Prinz
Liechtenstein
Dolinschek
Wolfmayr
Franz
Amon
Höllerer
Sonnberger
Turkovic-Wendl
Lichtenegger
Rasinger
Haupt
Böhmdorfer
Hlavac
Darabos
Zinggl
Parnigoni
Gaál
Pendl
Jarolim
Posch
Leutner
Heinisch-Hosek
Stoisits
Keck
Spindelberger
Verzetnitsch
Weinzinger
Lackner
Pilz
Hagenhofer
Heinz
Bauer
Haidlmayr
Görgits
Bures
Hoscher
Kuntzl
Oberhaidinger
Lapp
Wimmer
Pirklhuber
Krist
Sima
Gradwohl
Walther
Broukal
Musiol
Steinhauser
Jeimek
Mühlbergnuber
Kitzmüller
Moser
Vavrik
Scherak
Angerer
Schimanek
Lausch
Zinggl
Schenk
Lugar
Köchl
Steinbichler
Meinl-Reisinger
Korun
Haider
Alm
Schwentner
Themessl
Walser
Glawischnig-Piesczek
Schellhorn
Hable
Strolz
Willi
Aslan
Zanger
Darmann
Vetter
Fuchs
Rossmann
Kickl
Doppler
Mückstein
Brunner
Weigerstorfer
Neubauer
Hagen
Maurer
Pirklhuber
Riemer
Jarmer
Schmid
Rauch
Doppler

Austrian Parliament Analyzer - Politician Network Analysis

Here you can see the relations of the politicians

Show Politician-graph for period

25

Minimum Count of mutual Discussions spoken in

4

Filter by Discussion Topic (optional)

- [ ] Show Negative Links
- [ ] Show Computed Communities By Color

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COMMUNITY DETECTION ALGORITHM

(Raghavan 2007), $\theta = 4$

FUTURE WORK

- We also computed other metrics: **cohesion** > **clout**
  - Requires input from other disciplines to verify correctness
  - Machine learning can be used to predict political "performance"
  - Hypothesis: high cohesion and clout in coalition lead to better performance and higher probability to be re-elected
- Simple graph metrics: **centrality**, **betweenness** centrality etc.
- Importers for other political bodies required to make systems comparable
  - Other governments
  - Local legislative bodies of Austria

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CONCLUSIONS

- The work shows that **Open Data** allows for **novel views** on the decision making process of legislative bodies
- High quality data makes it easy for other disciplines to work with the data
- PoC prototype implementation shows first analysis results for transcripts of the Austrian parliament
- **Machines** to a certain extent are able to interpret and "**understand**" **transcripts**
- Results make us keen to experiment with other metrics in future work

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slides available at
http://steinbauer.org/

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