

# Analyzing the evolution of the European Parliament Social Network

Á. Bernát, M. Marits

2023-11-10

# Introduction

## The European Parliament



# Introduction

## The European Parliament



We are analyzing a dataset of European Parliament members.

# Introduction

## The European Parliament



We are analyzing a dataset of European Parliament members.

Our dataset is a list of amendments to laws that includes information on the MEPs who contributed to each law

# Introduction

## The European Parliament



We are analyzing a dataset of European Parliament members.

Our dataset is a list of amendments to laws that includes information on the MEPs who contributed to each law

We transformed this into a 'social network' graph, where MEPs are nodes and co-sponsorship of amendments is represented by edges

# Analysis topic

We want to analyze the changes in the social network of the EP over time.

# Analysis topic

We want to analyze the changes in the social network of the EP over time.

For this, we picked two important properties of the network to investigate

# Analysis topic

We want to analyze the changes in the social network of the EP over time.

For this, we picked two important properties of the network to investigate

- ▶ Centrality of groups/MEPs



# Analysis topic

We want to analyze the changes in the social network of the EP over time.

For this, we picked two important properties of the network to investigate

- ▶ Centrality of groups/MEPs
- ▶ Cohesion of the network

# Analyzing centrality in the network

Centralities: in a similar manner to node centralities, the centrality of a group can be calculated.

# Analyzing centrality in the network

Centralities: in a similar manner to node centralities, the centrality of a group can be calculated.

We will measure the centralities of certain groups in the MEP social network graph.

# Analyzing centrality in the network

Centralities: in a similar manner to node centralities, the centrality of a group can be calculated.

We will measure the centralities of certain groups in the MEP social network graph.

Closeness centrality, Betweenness centrality

e.g:  $S \subset V$  is a set of nodes

# Analyzing centrality in the network

Centralities: in a similar manner to node centralities, the centrality of a group can be calculated.

We will measure the centralities of certain groups in the MEP social network graph.

Closeness centrality, Betweenness centrality

e.g:  $S \subset V$  is a set of nodes

$$\text{closeness}(S) = \frac{|V - S|}{\sum_{u \in |V - S|} d_{S,u}}$$

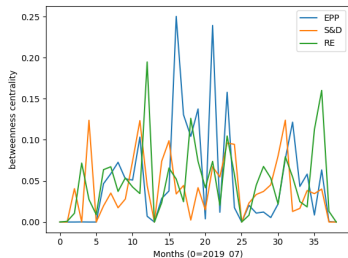
# Analyzing centrality in the network

Further Improvements: Choosing a more telling subgraph (committees).

# Analyzing centrality in the network

Further Improvements: Choosing a more telling subgraph (committees).

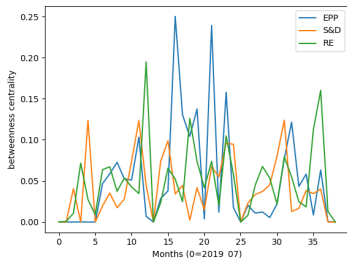
Betweenness centrality of parties:



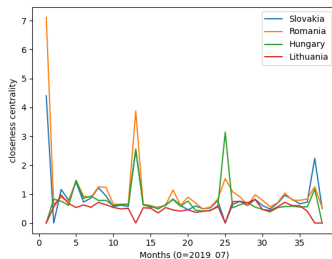
# Analyzing centrality in the network

Further Improvements: Choosing a more telling subgraph (committees).

Betweenness centrality of parties:



Closeness centrality of countries:





# Analyzing the cohesion of the network

Cohesion: a measure of how well-connected a network is

# Analyzing the cohesion of the network

Cohesion: a measure of how well-connected a network is

We will measure the cohesion of certain subgraphs of the MEP social network

# Analyzing the cohesion of the network

Cohesion: a measure of how well-connected a network is

We will measure the cohesion of certain subgraphs of the MEP social network

Our measure of cohesion is that we find the proportion of edges that are present – i.e. the proportion of MEP-pairs that worked together

# Analyzing the cohesion of the network

Cohesion: a measure of how well-connected a network is

We will measure the cohesion of certain subgraphs of the MEP social network

Our measure of cohesion is that we find the proportion of edges that are present – i.e. the proportion of MEP-pairs that worked together

$$\text{cohesion} = \frac{\# \text{edges}}{\binom{n}{2}}$$

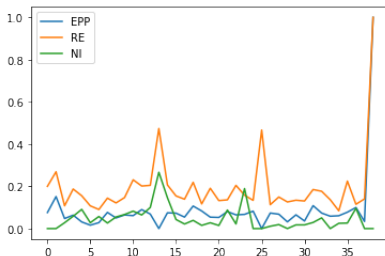
# Analyzing the cohesion of the network

# Analyzing the cohesion of the network

We want to analyze the changes in cohesion over time: for example the cohesion of specific parties

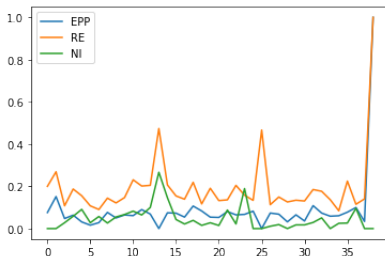
# Analyzing the cohesion of the network

We want to analyze the changes in cohesion over time: for example the cohesion of specific parties



# Analyzing the cohesion of the network

We want to analyze the changes in cohesion over time: for example the cohesion of specific parties

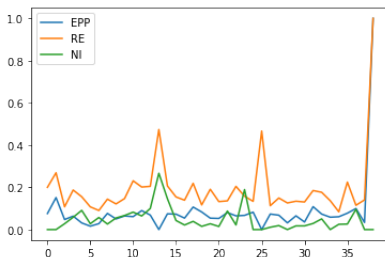


We make use of the 'committee' system of the EP to achieve this:



# Analyzing the cohesion of the network

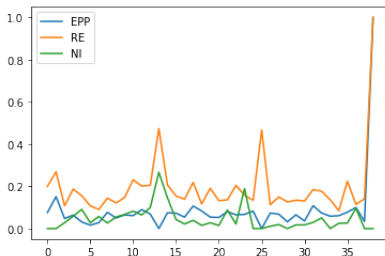
We want to analyze the changes in cohesion over time: for example the cohesion of specific parties



We make use of the 'committee' system of the EP to achieve this:  
Committee members work together on a specific set of law changes

# Analyzing the cohesion of the network

We want to analyze the changes in cohesion over time: for example the cohesion of specific parties



We make use of the 'committee' system of the EP to achieve this:

Committee members work together on a specific set of law changes

We will analyze the changes in cohesion based on the committees

Thanks for watching