Exploratory Analysis of Cosponsorships in the 115th Congress

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Introduction

Washington D.C. is marking the end of the 115th Congress (2017-2018) and the halfway point of President Donald Trump's first term.

Inspired by James Fowler's work on Congressional Cosponsorship Data, we set out to determine how divided Congress really is.

- How much cosponsorship goes on between or within parties?
- Do gender and race play significant roles in determining cosponsorship behavior?
- What can we determine from a topological analysis of some of these networks?

Data

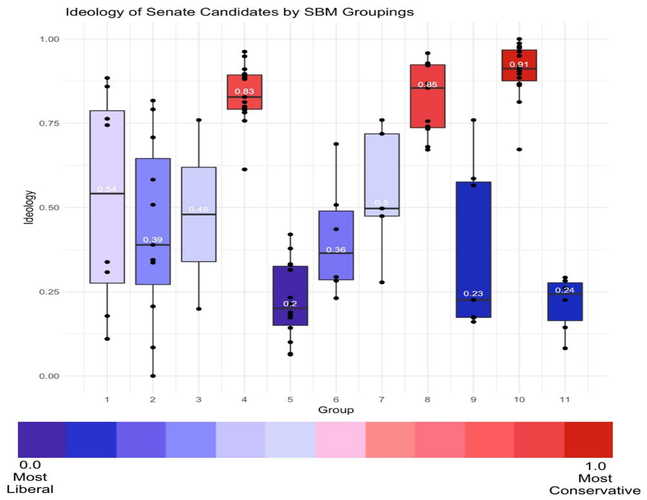
- Legiscan.com
  - Information on each bill from 115th Congress (name, ID, topic, committee, etc.) and cosponsor (name, ID, etc.).
- Congress.gov
  - Senator/node attributes (age, party, state represented, number of bills sponsored and cosponsored)
- Govtrack.us
  - Ideology score based upon cosponsorship

Methods

Primarily exploratory in nature; this data is novel and has not been used for network analysis prior to this project.

- Stochastic Block Model
- Expoential Random Graph Model
- Network topology analysis

Results



Stochastic Block Model:

In order to see any potential legislative groupings, we created an SBM with 11 groups. Each Senator then was matched with an ideology score from Govtrack.us. These scores take into account cosponsorship. It is evident that there are three explicitly conservative and three explicitly liberal groups and five primarily bipartisan groups.

ERGM:

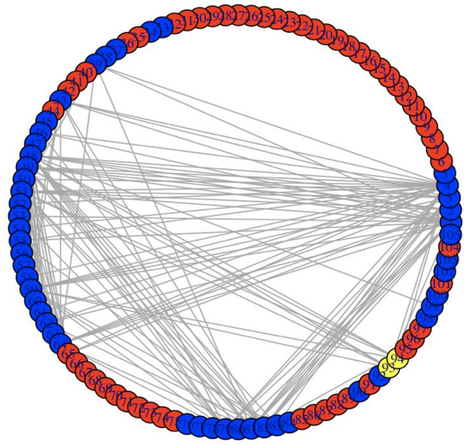
Equivalent to logistic regression for social network modeling

Terms used

Nodefactor: Gender*, Race
Nodecov: Age*
Nodematch: Gender, Race
Nodemix: Party
Absdiff: Age*

* Rated significant

GOF: Degree GOF deteriorates for degree > 100, edgewise shared partner deteriorates > 89, minimum geodesic distance not significant



Graph 1. Circle matrix of each senators, edges represent cosponsoring of over 150 bills.

Discussion

- SBM shows that the most conservative groups are more conservative than the most liberal groups are liberal. This can mean:
  - Democratic senators more willing to cosponsor across party lines.
  - A byproduct of having a Republican dominated Senate

- ERGM shows male senators more likely to cosponsor, period.
  - Difference in age is a significant predictor of two senators cosponsoring together.
  - Higher age is significantly associated with an increase in the log-odds of cosponsorship.

Future Work

- Devise strategy to visualize the entirety of dense networks
- Further exploration of the groupings in the SBM to gain meaning (geography, committee assignments, specific issue voting, etc.)
- Extend project to House of Representatives
- Create link prediction models for new members of Congress, especially given the significance of age in cosponsorship