Network Analysis of SCOTUS Hearings through Twitter Data Streaming

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I. INTRODUCTION

The appointment of a Supreme Court justice of the United States is arguably the most important decision aside from the election of the President of the United States. The Judiciary Act of 1789, signed by George Washington, delegated six Supreme Court Justices, two from each geographical region of Eastern, Middle, and Southern, to oversee heavily debated legal disputes [1]. At the time of signing, there were no quibbles regarding a 3-3 split decision because "all the judges were Federalists and they didn't foresee great disagreement [1]." Further evidence that the Founding Fathers of the United States believed that Supreme Court nominations were apolitical derives from the framework of Justice's lifetime appointment, mentioned in Article III of the Constitution, which remains atypical in any publicly held position of authority (i.e. Presidential term limits, Senate term limits, etc.).

Two-hundred thirty-one years later, today, the Supreme Court of the United States consists of nine Justices overseeing a magnitude of cases in both scale and scope that were not present in 1789. The passing of Justice Ruth Bader Ginsburg, who had been unanimously approved by the Senate in 1993 with a 96% YEAs [2], has opened up a new position in the Supreme Court. Despite apolitical outlooks from the Founding Fathers, lifetime-long appointments of Supreme Court Justices, and unanimity of prior SCOTUS nominations, the 2020 SCOTUS hearings of Amy Coney Barrett, a Republican-led nomination, has reached a contentious debate. Majority of the contention is a result of a 2016 failed nomination of Merrick Garland, appointed by former-President Obama and rejected by Republican-led Senate, to replace the late Justice of Antonin Scalia.

The precedent set in 2016 was "given that we are in the midst of the presidential election process, we believe that the American people should seize the opportunity to weigh in on whom they trust to nominate the next person for a lifetime appointment to the Supreme Court," Mitch McConnell (R-KY), Senate Majority Leader [3]. The presidential election process Mitch McConnell refers to was 237 days prior to the 2016 election – a stark difference in the 38 days of Amy Coney Barrett nomination prior to the 2020 election. Many consider the current eight Supreme Court Justices to fall into two categories: (5) conservative and (3) liberal. Consequently, the nomination of the ninth Justice, Amy Coney Barrett, from a conservative President and majority-controlled Senate would result in a 6:3 conservative to liberal justices' ratio and therefore could impact social justice issues, healthcare provisions, and other aspects that will govern its citizens.

The purpose of this analysis is to examine the relationship of social data concepts linked to the SCOTUS appointment hearings in efforts to identify the public opinion through a network analysis. Social data concepts refer to the activity and interactions in metadata tags, i.e. *#hashtag*, to identify messages on a specific topic. The social data is obtained from Twitter via data streaming from users within the United States that interact with SCOTUS-related tweets with a hashtag. This analysis does not intend to editorialize hot-key or neutral political issues involved in the network of hashtags relating to the SCOTUS topic, but rather to serve as a foundation for further analysis on social data streaming in the context of public opinion.

The future sections of this report describe the dataset, the methodology, results along with a discussion, and a conclusion. Section II contains a description of the dataset used for this analysis. The methodology for analysis is presented in section III. In section IV, I report and discuss the results. Finally, section V provides conclusions.

II. DATA DESCRIPTION

The variables under investigations are listed in the table below. The data was derived from data streaming Twitter during SCOTUS hearings in efforts to gain informational insights into the public opinion. The data streaming was restricted to only include users inside the United States' 48-continental longitude and latitude coordinates so that the results reflected Americans' opinions as opposed to worldwide opinions.

TABLE I. DATA ATTRIBUTES: NODES

Attribute	Type	Example Value	Description
Source	String	#amyconeybarrett	Hashtag
Target	String	#ruleoflaw	Hashtag
Type	String	Undirected	Link type
Id	Numeric (Integer)	0	Sequential identification number for instances
Weight	Numeric (Integer)	18	Degree of strength

III. METHODOLOGY

Gephi, a visualization and exploration software for networks, was used to examine the structure of nodes and corresponding links. The nodes represent Twitter hashtags, tweets, and users while the links represent the social data connection. That is, a hashtag used from one user interacts with hashtags and replies of other users.

After a Twitter developer app has been created, Twitter credentials (API Key, API Secret, Access Token, and Access Token Secret) are obtained. The credentials allow for Twitter data streaming directly the to Gephi data laboratory that acts as data storage similar to Microsoft Excel. Both datasets had network settings applied so that visual references of social data concepts could be analyzed. The flowchart below is a visual understanding of the methodology.

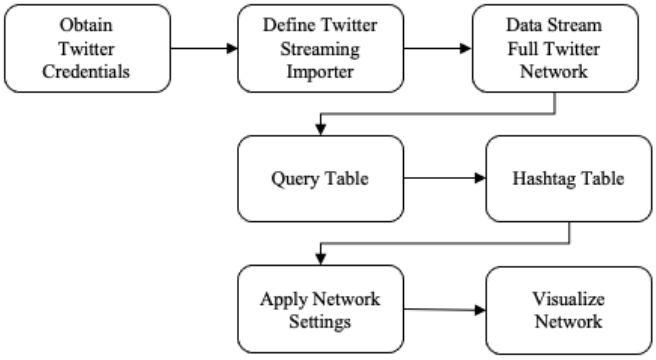
Network Overview
- Network Diameter: Undirected links
- Modularity: applied to identify communities

Filters
- Giant Component applied to reduce the amount of less important nodes that cause fanning
- Degree Range of 2 applied so that nodes with 1 degree are restricted from view

Partition of Nodes
- Identify node communities by color through their respective Modularity Class

Ranking Nodes
- Larger nodes are ranked higher and smaller nodes are ranked lower

Network Visualization Algorithm:
- Frutcherman Reingold



IV. RESULTS AND DISCUSSION

Assessing the network of Twitter hashtags relating the tweets that relate to "SCOTUS" was achieved through graphs and network visualizations. Because of the textual nature of analyzing social concepts, graphs served as the best way to convey numerical understandings of relations, like the number of communities in Fig 6 or betweenness centralities in Fig 7. On the other hand, tables do not serve purposeful demonstrations for inter-community relations and therefore network visualizations, see Fig 8, are used to illustrate inter-community relationships as well as intra-community relationships.

TABLE II. MAJORITY COMMUNITIES IDENTIFIED

ID	Color	Description
1	Pink	Amy Coney Barrett
2	Red	Healthcare and Social Justice issues
3	Green/Teal	Pro 2nd Amendment and Law & Order (Blue Lives Matter)
4	Grey	Pro Trump supporters
5	Blue	Anti-Trump supporters

Fig 1 displays the size of the community (number of nodes) to the modularity class. Nodes that had less than a degree of 5 were restricted because the analysis is concerned with hashtags that were widely used on Twitter. Altogether, the network analysis finds 11 communities that relate to SCOTUS nomination of Amy Coney Barrett. Fig 2 measure the betweenness centrality of the nodes and communities and calculates an average path length of about 2.94, which denotes the shortest average distance between any two nodes (hashtags) in the network. Table II displays the top communities by color and briefly describes the notion of the hashtag network.

Community 1 (Pink)

- The main hashtag, #amyconeybarrett, had the majority of links relating to hashtags that describe her personality. Fig Pink zooms in on the network analysis of Fig X.
- Notion: Amy Coney Barrett will be a compassionate leader for the future SCOTUS opening and is supported by Republicans.

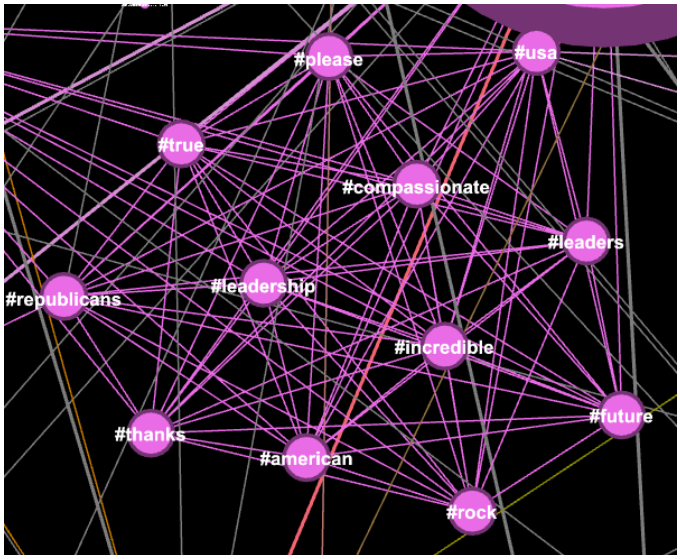


Fig. 1. Partition Community 1: Amy Coney Barrett

Community 2 (Red)

- Concerned about healthcare rights: #aca, #covid19, #affordablecareact, #roevwade, #prochoice
- Concerned about progressive social justice issues: #blm, #lgbtq, #roevwade

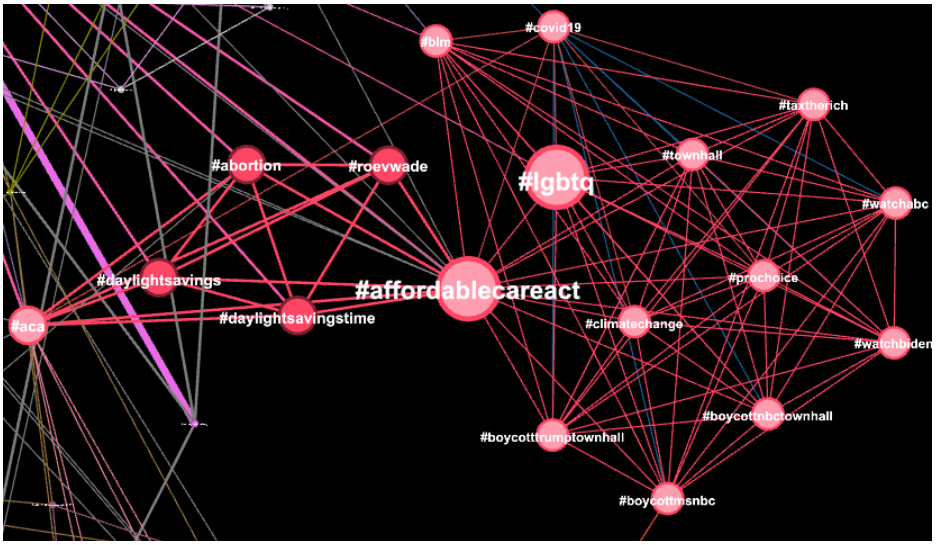


Fig. 2. Partition Community 2: Healthcare and Social Justice issues

Community 3 (Green & Teal)

- Anti-Democrat, Pro-Republican notions: #slowjoe, #voteredtosaveamerica, #nevervotedemocratagain, #fourmoreuears, #maga

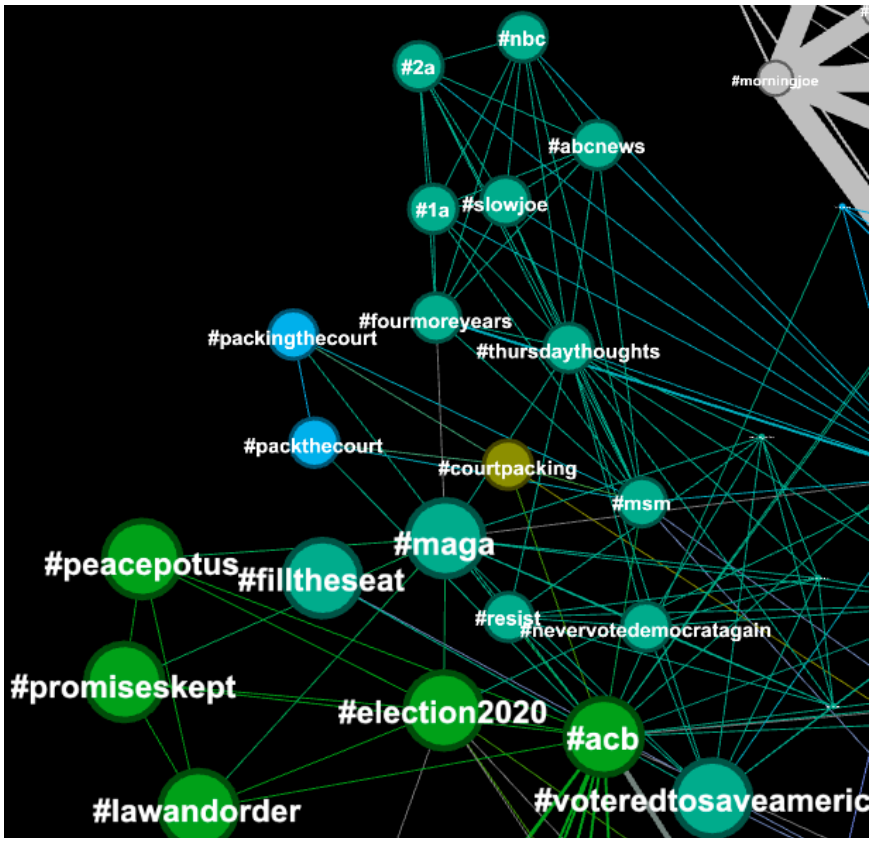


Fig. 3. Partition Community 3: Conservative political views on Pro 2nd Amendment and Law & Order

Community 4 (Grey)

- Pro-Trump notions: #foxandfriends, #bigredwavenow, #californiafortrump, #trumprally, #kag

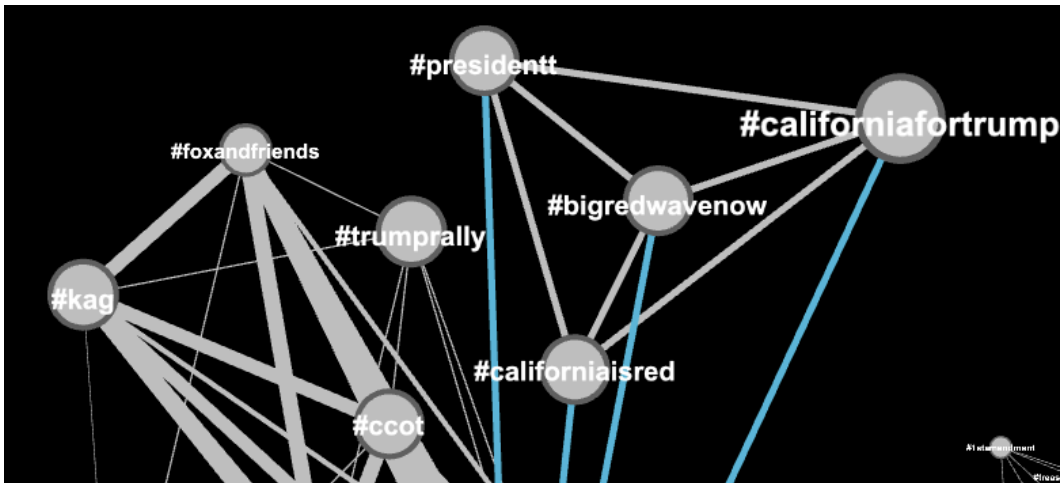


Fig. 4. Partition Community 4: Pro Trump supporters

Community 5 (Blue)

- Anti-Trump notions: #dictatortrump, #trumpfraud, #donthecon, #racisttrump

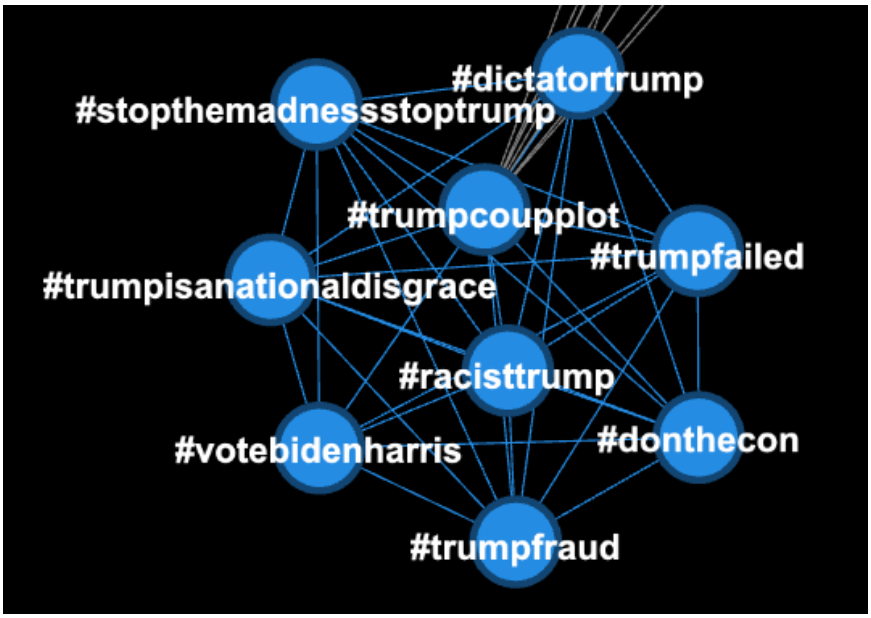


Fig. 5. Partition Community 5: Anti-Trump supporters

V. CONCLUSIONS

Data streaming Twitter hashtags related to SCOTUS nomination of Amy Coney Barrett provided a visual map of communities that shared common themes as seen in the different community maps in SECTION IV. While hashtags do not necessarily indicate a direct sentiment of the tweet or user, it does provide contextual clues. That is

for example, pro-conservative Twitter users are more likely to tweet, retweet, or reply with hashtags that agree with their political, cultural, and societal views. The reason why hashtags were used instead of full tweets is because the semantics of sentences is visually impossible to analyze on a network analysis and hashtags, in return, generalize the sentiment of the tweet to a large degree.

The network analysis of SCOTUS-related hashtags has shown that American Twitter users during the appointment hearings were very split on the nomination of Amy Coney Barrett for several reasons. From the conservative viewpoints, it appears that the appointment of Amy Coney Barrett for Supreme Court Justice will equate to more Police support through hashtags like #lawandorder in Fig 3, less restrictions on gun ownership by rigidly protecting the 2nd Amendment as seen in hashtags like #2A in Fig 3, and that conservative-led nominations will lead to a safer America with hashtags like #voteredtosaveamerica in Fig 3.

Fig 3 and Fig 4 represent communities with strong ties to conservative-leaning hashtags. Both communities are located next to one another in the top left quadrant of Fig 9, which shows the total network analysis of all communities. Contradistinctively, liberal-leaning hashtags appear in the lower left and lower right quadrant of Fig 9.

Fig 2 and Fig 5 both consist of liberal-leaning notions that are concerned with healthcare rights, social justice issues, and a general sense that Republican President Trump is not well-liked in those communities. For liberals, it appears that the appointment of Amy Coney Barrett will negate the recent push for universal healthcare even amidst a COVID-19 pandemic. These communities also suggest that liberal-leaning Twitter users also feel the threat of social justice issues like LGBTQ rights and women's healthcare rights by the possible elimination of Planned Parenthood, which offers a wide scope of services specifically help women with safe abortions, contraceptives (birth control), breast cancer screenings, and diagnostic testing for healthy births.

While this analysis does not give a complete collection of public opinion over the highly contentious SCOTUS appointment because natural language processing was not performed to get the most accurate sentiment of tweets, hashtags ultimately reduce the sentiment to a single phrase for interpretation. Future applications should include a semantic web with real-time data storage so that public opinion over large issues, like a lifetime appointment to the Supreme Court, can be assessed rather than interpreted by elected Senators that may have political incentives to go against the will of the people. Despite the controversial timing and current conservative to liberal justice ration, it remains clear that America's opinion over appointing Amy Coney Barrett to the Supreme Court is at best highly debated and at worst completely divided.

FIGURES

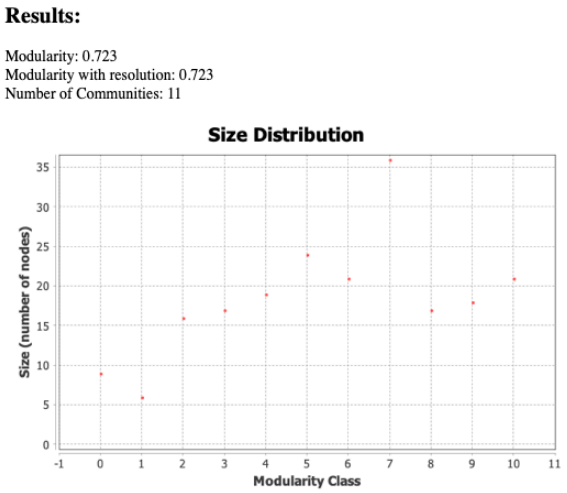


Fig. 6. Modularity Report: Number of communities in the Hashtag network relating to "SCOTUS" tweets

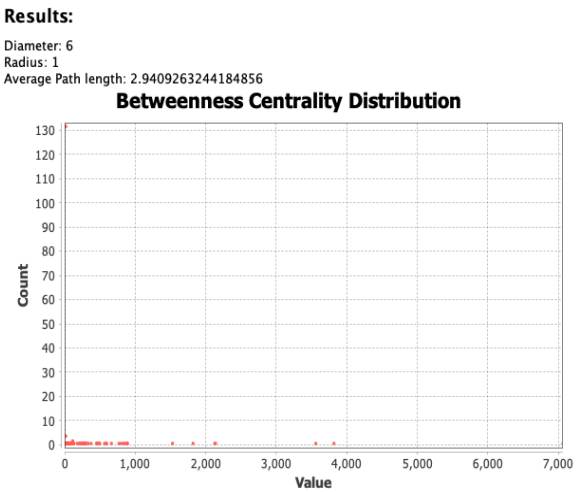


Fig. 7. Betweenness Centrality Distribution: Measure of Centrality based on Shortest Paths

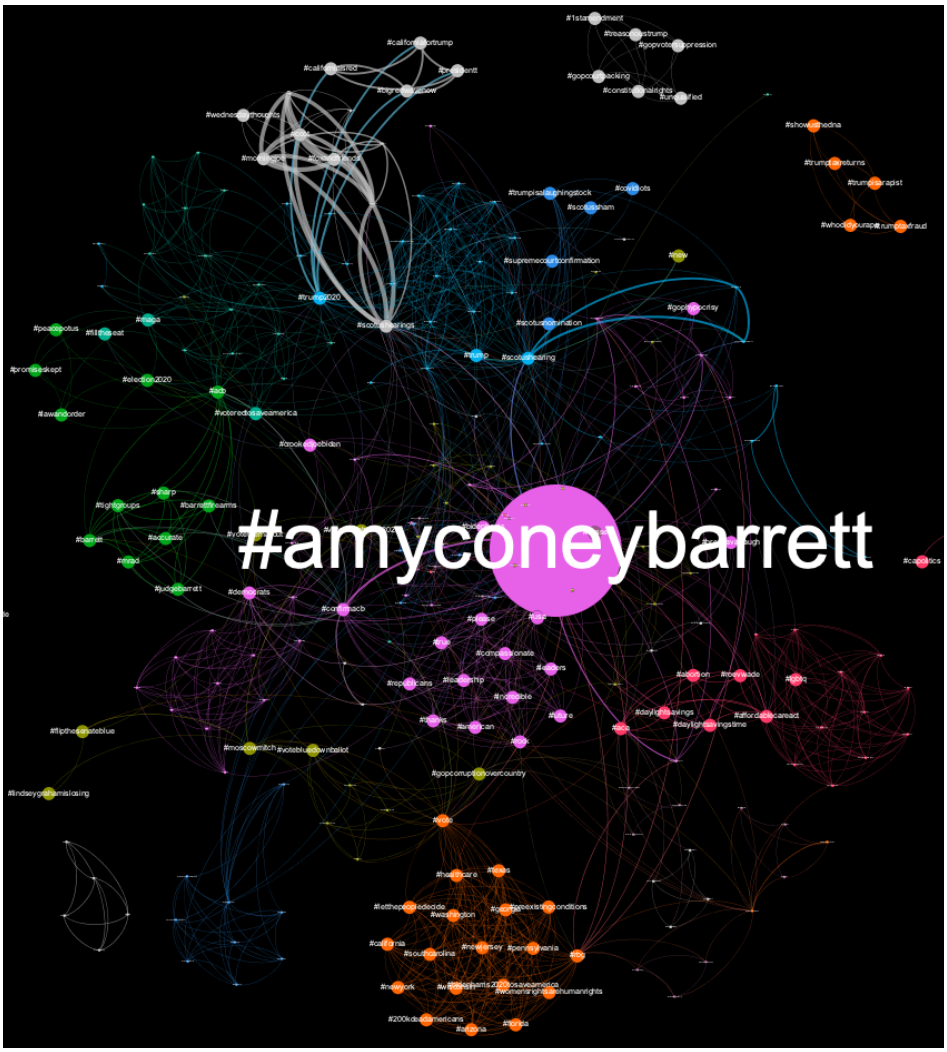


Fig. 8. Network Analysis: Twitter hashtags that relate to "SCOTUS"

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