

# *Measures of Topic Centrality for Online Political Engagement*

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## **Abstract**

The advent of social media has enabled political parties to engage with the broader populous in new and unforeseen ways – and the ability to bypass the traditional mediating forces of mass media allows for an unfiltered promotion of policy, ideology and party stances. Drawing on Twitter data leading up to the 2019 Canadian Federal Election, this paper develops two novel, graph-based methods that capture how different categories of messages drive different patterns of political engagement. Through the two proposed variations of topic centrality – on which measures how central a topic was to the general discourse, and one which measures how central a topic was to a particular voting bloc – statistically significant variations in topic centrality are then shown and discussed.

**Keywords:** *centrality, political communication, social media, topic modeling*

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## **Contents**

<b>1</b>	<b>Introduction</b>	1
1.1	Social Media in the Canadian Context	2
<b>2</b>	<b>Methods</b>	3
2.1	Data	3
2.2	Topic Modeling	6
2.3	Topic Centrality	6
<b>3</b>	<b>Results</b>	6
3.1	Topic Saliency	6
3.2	Total Network Topic Centrality	6
3.3	Party Leader Topic Centrality	6
<b>4</b>	<b>Discussion</b>	6
<b>References</b>		6

## **1 Introduction**

The way information is distributed and received has changed significantly over the past decade. As Cogburn and Espinoza-Vasquez argue, Barrack Obama's 2008 presidential campaign was a watershed moment in social media campaigning – and in the subsequent

decade, from Macron to Brexit to the Five Star Movement, social media has played an increasing role in how politics is conducted (Cogburn & Espinoza-Vasquez, 2011). The same holds true for Canada, between 2013 and 2018 the share of Canadian federal media expenditure spent on digital advertising rose from 27% to 65%, a 140% increase, making the study of new media critical from a social science perspective (ann, 2018). Over the past 12 years, political elites have subverted traditional models of political communication by using social media to directly promote various policies, topics and issues to the electorate<sup>1</sup>(McNair, 2017).

Additionally, it is important to note that not all messages promoted by political elites are likely to serve the same purpose. Some topics may be logistical in nature, informing party affiliates of campaign events; other topics may be promoted in an attempt to rally that party's core voting bloc; others, finally, may be an attempt to attract engagement from new, untapped demographics. The latter two categories are in many ways analogous to Robert Putnam's conception of social capital (Putnam, 2001). Here, Putnam draws the distinction between two forms of social capital: bonding social capital, which occurs within a group – and bridging social capital, which unites different demographics (Putnam, 2001). Therefore, the research question being proposed is: are their data to support the notion that some political messages are bonding in nature, rallying members within a group, while other political messages are bridging in nature? This question will be answered within the context of the 2019 Canadian Federal Election with the Tweets of Canada's five major, english speaking party leaders: Andrew Scheer, Elizabeth May, Jagmeet Singh, Justin Trudeau, and Maxime Bernier.

In order to answer this question, a justification of Canadian politics and social media data in this context will be given. Then an overview of the data collected and a formal definition of the political engagement graph used will allow for the exploration of two measures of topic centrality: total network topic centrality, and party leader topic centrality. Finally, results from this process and a discussion of their implications will highlight possibilities for future research.

### ***1.1 Social Media in the Canadian Context***

While it is clear that technology is changing how information is received, and thus also changing how politics is conducted, it may not be clear the role of Canadian politics in this context. However, Canada's political system is a fertile environment to test the importance of political messaging, because relative to most liberal democracies, it is dominated by party politicians. As Carty put it:

*No obvious simple geographic reality, no common linguistic or religious homogeneity, no common revolutionary experience or unique historical moment animated [Canada] or gave it life. Canada was created when a coalition of party politicians deemed it to be in their interest to do so, and it has been continuously grown, reshaped and defended by its politicians.(Carty & Cross, 2010)*

<sup>1</sup> The terms policy, issue and topic will be used interchangeably to refer to categories of messages.

Thus, it is not surprising that Canada's electoral system encourages electoral pragmatism – and developed large, “big tent” parties that are among the most organizationally weak and decentralized of established democracies (Carty & Cross, 2010). This system defines political parties as brokers of the often conflicting, weakly integrated electorate — as opposed to mobilizers of distinct communities, articulating claims rooted in their pre-existing interests. In this way, parties act as the “principal instruments of national accommodation, rather than democratic division” (Carty & Cross, 2010).

The dominance of parties in Canadian politics, their amorphous ideological stances, and the many intersectional geographic, linguistic and religious cleavages have given birth to what's been coined the brokerage party system (Carty & Cross, 2010). The need to capture pluralities in a diverse range of electoral districts means that most parties have to take stances on most issues, and thus when a user engages with a specific issue, it doesn't necessarily invoke a specific party or vice versa.

Given the utility of Canadian politics in answering questions about different axes of political engagement, the question then is: how do we observe these phenomena? Social media data, culled from platforms like Twitter, are inherently relational – and thus lend themselves well to being represented as graphs. An empirical analysis that observes and measures how users behave and engage with political parties online privileges this relational aspect of social media. Social network analysis helps avoid the pitfalls of survey data, famously described by Allen Barton as “a sociological meat grinder, tearing the individual from [their] social context” (Freeman, 2004).

## 2 Methods

### 2.1 Data

The novel dataset used was collected via Twitter's historical search application programming interface (API), which allows user's to programmatically access any publicly available Tweet. The API was used to collect all of the English<sup>2</sup> tweets from Canada's five, english speaking party leaders: Andrew Scheer, Elizabeth May, Jagmeet Singh, Justin Trudeau, and Maxime Bernier. The timeframe of collection ranges from October 21, 2018 to October 21, 2019 – the eve of Canada's federal election. While the Tweets from each Federal party's official Twitter accounts were also collected, they predominantly acted as logistical tools – informing party affiliates of events and rallies. The personal accounts for party leaders were generally more pertinent to their beliefs, platforms and style of rhetoric, and thus are better suited do analyze the bridging versus bonding nature of various topics. In this spirit, only Tweets of the party leader were used, excluding Retweets. Figure 1 visualizes the daily and cumulative number of Tweets over time, in aggregate and by party leader, resulting in 7,978 total Tweets. Additionally, for each tweet collected from a party leader, all of the available Retweets by general users<sup>3</sup> were collected for a total of 113,293 Retweets by 36,450 general users. This is, again, visualized in aggregate and by party leader in Figure 2.

<sup>2</sup> Denoted by a language marker in the historical search API.

<sup>3</sup> The term general users will denote those active on Twitter who are not party leaders.

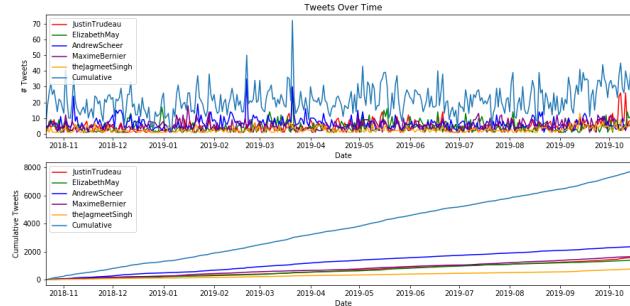


Fig. 1. Daily and Cumulative Tweets over Time

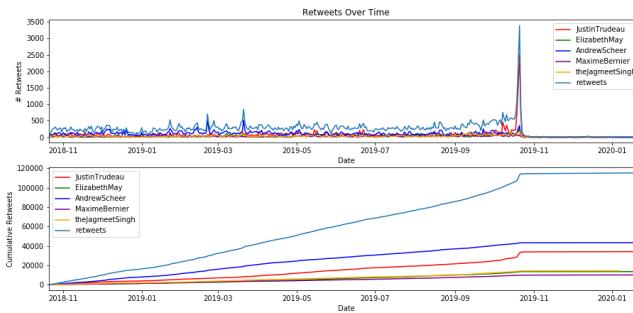


Fig. 2. Daily and Cumulative Retweets over Time

### 2.1.1 Engagement Graph

The networks considered in this paper are assumed to be connected, unweighted, and undirected. Let  $(V, E)$  be a network, where  $V$  is the set of vertices and  $E$  is the set of edges. If vertex  $v_1$  is connected to vertex  $v_2$ , it is denoted by  $(v_1, v_2) \in E$ . What we define as the engagement graph has additional constraints that define certain vertices as those that *produce objects* (Tweets, songs, goods, services, etc...), certain vertices that represent those objects, and a third set of vertices that chooses to engage with the various objects in the network. In this context the engagement graph represents the Tweets that party leaders produce, and the general users who choose which Tweets to Retweet. An example of this type of political engagement graph is shown in figure 3. More formally the political engagement graph is defined below:

- **Vertices:** Let  $V_1 = \{v_1, v_2, \dots, v_n\}$  be the set of party leaders;  $V_2 = \{v_1, v_2, \dots, v_m\}$  be the set of Tweets by the party leaders; and let  $V_3 = \{v_1, v_2, \dots, v_k\}$  be the set of “general users” who Retweet Tweets. Let the total set of vertices  $V = V_1 \cup V_2 \cup V_3$ .
- **Edges:** Let  $E$  be the set of edges. Allow the edge  $(v_1, v_2) \in E$  if and only if  $v_1 \in V_1, v_2 \in V_2$  or  $v_1 \in V_3, v_2 \in V_2$ . By this definition, we will only allow edges from a party leader vertex to a tweet vertex, or from a generic user vertex to a tweet vertex.

Further nuances can be added to distinguish between different types of objects, which in this context would refer to Tweets of different topics. Figure FIG visualizes the full political

*Measures of Topic Centrality for Online Political Engagement*

5

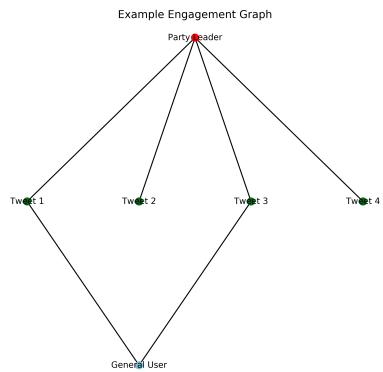


Fig. 3. Example Engagement Graph

engagement graph collected with all 5 party leaders, 7,978 Tweets, 36,450 general users, and 113,293 Retweets<sup>4</sup>.

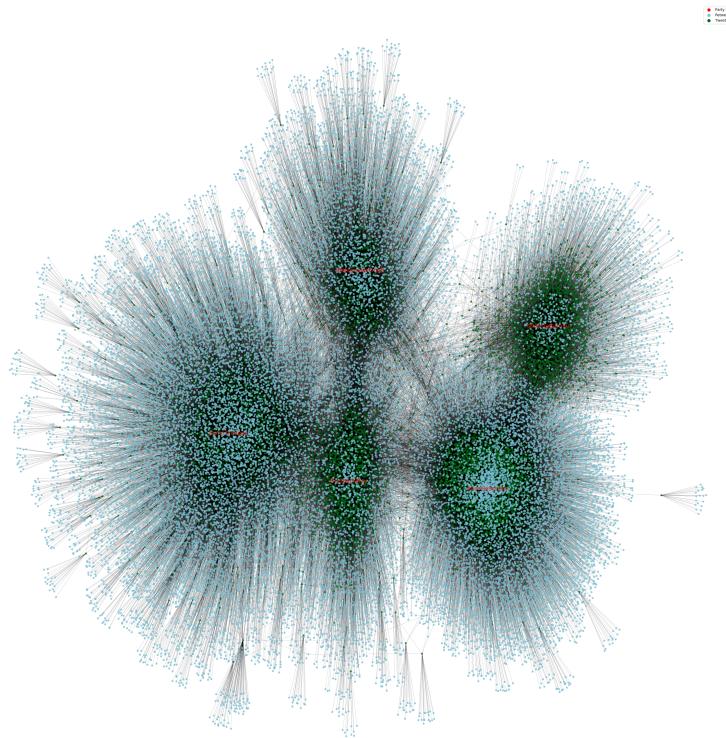


Fig. 4. Full Engagement Graph

<sup>4</sup> The number of retweets is equivalent to the number of edges from Tweet vertices to general user vertices.

## **2.2 Topic Modeling**

### **2.3 Topic Centrality**

#### *2.3.1 Eigenvector Centrality*

#### *2.3.2 Total Network Topic Centrality*

#### *2.3.3 Party Leader Topic Centrality*

## **3 Results**

### **3.1 Topic Saliency**

### **3.2 Total Network Topic Centrality**

### **3.3 Party Leader Topic Centrality**

## **4 Discussion**

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