The Role of YouTube during the 2019 Canadian Federal Election: A Multi-Method Analysis of Online Discourse and Information Actors

Katrin Kania Galeano, LTC Rick Galeano, Esther Mead, Billy Spann, Joseph Kready and Nitin Agarwal

Abstract

The exchange of ideas across social media platforms has seen both positive and negative strengths for the past decade as growth in this field has expanded rapidly. This research examines the possible use of a hostile online media campaign orchestrated to influence the 2019 Canadian Federal election. A longitudinal study is conducted that focuses specifically on the popular videosharing platform YouTube and its relevance to the election. We analyzed data from YouTube in order to identify how inorganic behaviors attempt to shape perceptions of audiences in Canada. In order to gain insights of this evolving information environment, a comprehensive multi-method approach was used. The research combines multiple social media analysis techniques, social cyber forensic methods, content analysis, and mathematical-sociological constructs to determine whether online influence campaigns were executed via YouTube videos. What was revealed was that YouTube channels of both mainstream and online only media outlets resonated the most, despite the evidence that activists/social media influencers dominated the sphere of influence. An innovative technique was employed to address the collection of YouTube posts through the use of the developmental application called YouTubeTracker, which has incorporated YouTube's data APIs for data extraction. This resulted in a dataset collection of more than 6,000 videos and more than one million comments which was subsequently cleaned and analyzed to identify a complicated information campaign, intended to influence the election results.

Keywords

Cross-media influence campaigns, social network analysis, toxicity analysis, YouTube, political polarization, Canadian elections, social cyber forensics

Katrin Kania Galeano, LTC Rick Galeano, Esther Mead, Billy Spann, Joseph Kready and Nitin Agarwal, the Collaboratorium for Social Media and Online Behavioral Studies (COSMOS) University of Arkansas at Little Rock can be reached at kkaniagalea@ualr.edu, ragaleano@ualr.edu, elmead@ualr.edu, bxspann@ualr.edu, jkready@ualr.edu, and nxagarwal@ualr.edu.

INTRODUCTION

Influence operations have been used for more than a century to shape public opinion.ⁱ Documents leaked by Britain spread through the US media in 1917 reportedly swayed the public to support a war against Germany.ⁱⁱ As media platforms and methods for information dissemination have evolved, so have potential influence campaigns. With the help of the internet, information is now able to spread quickly with little effort and cost. A recent example is the well-documented interference in the 2016 US Presidential election. Numerous information actors used influence campaigns to gain the attention of the American public. Teenagers in Macedonia, for instance, published far-right fake news articles on their blogs, disseminated links through social media and earned money from the traffic that was being driven to their sites.ⁱⁱⁱ Fake news videos published by pro-Russian information actors on YouTube in 2017 aimed to create tension in the Ukraine.^{iv} Most recently, YouTube was used by Iran to influence US voters.^v

Influence campaigns are not only used by foreign actors in an attempt to achieve a desired election outcome. As social media has become a digital battleground accessible to the masses 24/7, a wide variety of information actors are attempting to influence voting behavior as recently as the Canadian federal election in 2019.^{vi} Political candidates and their parties are using social media and websites to increase followership and convince the public to cast their vote in their favor^{vii}. News outlets, social media influencers, and conspiracy theorists are also publishing content drawing large audiences and user engagement.^{viii} Some of these actors, though, are using online information operations for distortion and public opinion misconception.^{ix}

In this paper, we study online discourse related to the 2019 Canadian federal election to identify coordinated disinformation dissemination campaigns and computational crowd manipulation tactics on YouTube. The following are our key findings that are expanded upon in this paper:

- The data analysis revealed that non-state actors did not make up a large percentage of the channels, videos nor engagement metrics.
- Social network analysis exposed that communities with the most commenters played a prominent role in the overall messaging campaign.
- Social cyber forensics identified that the channel with the highest number of commenters (in the overall network) acted extremely evasively by hiding IP addresses and redirecting audiences once they clicked on a link.

For our research, we identified 75 unique channels on YouTube that published 6,019 videos about the Canadian federal election between January 1, 2019 through October 31, 2019. In addition, we examined the videos related to the video dataset. Related videos are videos that are queued to play automatically following the current selection. These recommendations are generated by YouTube's algorithms. In order to gain a better perspective of information actors, we assigned each channel to one of the following three categories: Media, activists/influencers, and party/politician.

We analyzed the content published, posting behavior of the publisher and commenters, as well as user engagement consisting of views, likes, dislikes and comments concurrently posted on YouTube. The inclusion of calculated metrics allows for a broader awareness and understanding of the online discourse conducted on YouTube. We focused on two research questions:

- 1. Can indicators of political interference campaigns be detected amongst the YouTube data?
- 2. Can we identify the primary actors involved in leading the influence campaigns, and, if so, are we able to identify state and non-state organizations connected to the Canadian elections and report on how these entities contribute to the information environment.

Additionally, we examined the novelty of the content through a combination of cyber forensic analysis (CFA) and open-source intelligence research. CFA identified information activity campaigns which led us to explore further public-facing web pages published by nefarious actors.

Lastly, through the use of calculated toxicity scores we are not only able to provide an overview of the original publisher's messaging, but we are also able to capture and analyze the response of the audience. The inclusion of comments with their content and toxicity scores enables us to have a broader understanding of the online discourse.

The rest of the article is organized as follows: after a literature review, we introduce our methodology and data collection along with its limitations. We then present our analysis and results. To gain an insight of the information maneuvers used on YouTube, we conducted different types of analyses. The article ends with a conclusion of our efforts.

LITERATURE REVIEW

Our research analyzes information related to the 2019 Canadian federal election spread through YouTube channels and videos. According to "The State of Social Media in Canada 2017", published by the Ryerson University Social Media Lab, 59% of Canadian adults are using YouTube, 48% of which are using it daily^x. Another report published by the lab in 2018 states that the majority of 18–34-year-old Canadians share their political opinions on social media. The percentage is slightly less for those aged 35-44 (49%) and 45-54 (42%).^{xi}

As the Canadian federal election coverage spread through the various online media platforms, Canadians were exposed to news coverage and targeted by foreign influence efforts. Russian trolls used the federal election hashtag #cdnpoli on Twitter to spread right-wing messages about Canadian hot topic issues to polarize public opinion.^{xii}

Twitter is not the only platform used for information operations. YouTube, with its two billion unique monthly user, has become one of the largest information platforms that incorporates videos from across the globe allowing for freedom of expression, freedom of information, freedom of opportunity and freedom to belong according to YouTube.^{xiii} In our previous studies, we identified

inorganic commenter mob behaviors to amplify anti-NATO narratives on YouTube that led to manipulation of YouTube's search and recommendation algorithms. ^{xiv} xv

YouTube videos can also function as a two-way communication stream. Users upload their videos with a description. Viewers have the ability to interact with the content and its publishers by commenting on videos and replying to comments posted by the channel and other viewers. Researchers have used comments on social media platforms to predict the political orientation of news stories with commenters' sentiment patterns.^{xvi} In addition, we applied topic analysis to the online discourse to identify information maneuvers, such as distortion of information or distraction to redirect an audience to something else. In this work, we show that information and network maneuvers attempting to influence the 2019 Canadian federal election can be observed on YouTube.

With the increased popularity of YouTube, researchers have conducted qualitative studies to identify behavioral patterns.^{xvii} As bot and troll accounts were using YouTube's comment sections to spread messaging, researchers have been studying comments to gain insights about information actors and the content they post.^{xviii} O'Callaghan et. al. identified spam bots by building a co-commenter network using comment similarity and applying network analysis techniques.^{xix} Galeano et al. created co-commenter networks to locate key commenters when assessing the information environment during the NATO exercise Trident Juncture 2018.^{xx} Through topic analysis they were able to identify narratives. Obadimu et al. introduced a methodology for identifying and scoring toxicity within the user-generated content posted on YouTube.^{xxi}. Researchers were able to detect toxicity changes as narratives shifted. Our work builds on the previous research. We have adapted and applied different analyses to our data set, allowing us to gain a deeper understanding of key information actors and their potential influence tactics within the Canadian election information environment. Next, we discuss the research methodology.

METHODOLOGY

This section describes the data collection and data structuring, data metrics and analysis that were identified during this research. As with most data sets, cleaning of the data was very time consuming. Prior to the data collection, we identified key issues, political actors, relevant hashtags and keywords via a crowdsourcing methodology. Once we generated a list of trending and relevant hashtags and keywords to ensure the collection of content relevant to the study, we began data collection from YouTube.

To identify potential information influence campaigns, we applied a combination of social media analysis techniques: (1) Social network analysis was used to identify influential commenters (2) Cyber forensics was used in an attempt to identify potential influence campaigns used by influential actors and their cross-media footprints, (3) Topic analysis allowed us to identify the primary narratives within text comments and posts to identify predominant topics based on frequency, (4) Trends in toxic behaviors in online discourse were identified through toxicity analysis. More details on these analyses will be provided in Section 4 with the findings. Next, we will discuss data collection process.

Data

YouTube data was collected utilizing YouTube's API.^{xxii} The following attributes of the videos were obtained: URL of the video, video ID, video publication time stamp, title of the video, description of the video, number of views, number of likes, number of dislikes, number of comments the video received at the time data was collected, comment text, comment time stamp, commenters' unique identifiers, title of the channel that published the video, and the date the channel was created. We identified 75 channels that posted videos related to the Canadian federal election. These channels included news outlets, political candidates and their parties, as well as activists and influencers. Since many of the identified channels actively posted about a variety of topics, we applied a relevancy check after extracting and cleaning the data. Using a predefined hashtag and keywords list, we filtered videos that included content about the Canadian federal elections published between January 1, 2019 and October 31, 2019. The data consisting of 75 channels that posted 6,019 relevant videos with 1,188,928 comments was stored in the YouTubeTracker database.^{xxiii} To investigate if YouTube's recommended video algorithm leads to an echo chamber, we analyzed videos that YouTube listed as related to the videos of our dataset. The 6,019 videos subsequently recommended an additional 16,400 videos across 3,919 channels as part of the YouTube recommendation algorithm.

The channels were divided into the following three information actor categories based upon their characteristics: 1) Politicians/parties (12 channels), 2) media (15 channels), and 3) activists/influencers (48 channels). Based on the review of the videos that used the hashtags and keywords we had specified; it was clear that politicians and political parties used them as well as the media reporting about the election. The remaining channels fitted into the category of activists/influencers as they were using YouTube as a platform to share their opinion or cause with the masses.

Channels	75
Videos	6,019
Views	87,967,962
Likes	2,779,624
Dislikes	281,488
Comments	1,188,928
Commenters	174,265
Related Videos	16,400

 Table 1: Descriptive statistics of the YouTube dataset analyzed.

Limitations of Data Collection

Online data sources have limitations. Improperly identified or missing data points can dramatically affect the results of the analysis. This could happen due to API limitations. Data cleaning could also introduce inadvertent mistakes that could possibly change the outcomes of the experiment. Given these limitations, the results of this study should be viewed as *preliminary rather than definitive*. With this, it provides opportunities for researchers to further study this topic. Next, we describe the various analyses that were conducted and discuss our findings.

ANALYSIS AND RESULTS

First, visual analytics were employed to conduct link analysis of the network (see figure 3). This created the first graphic representation of the network as a whole. At this point, we continued analysis using the following techniques: trend analysis, social network analysis, cyber forensics, topic analysis, and toxicity analysis. To summarize, we found that media channels resonated at a higher rate. Even though activists/influencers were higher in numbers (64% vs. 20%), media channels published almost twice as much content and received significantly higher views and engagement (likes, dislikes and comments). Detailed statistics are provided in tables 2 and 3. The following sections provide more clarity as to why.

	Chanı	nels	Vic	leos	Views	
Overall	75	100%	6019	100%	87,967,962	100%

Non-State	9	12%	74	1%	8,039,886	9%
State	66	88%	5,945	99%	79,928,076	91%
Activists/Influencers	48	64%	1,671	28%	16,645,051	19%
Media	15	20%	3,142	52%	64,057,994	73%
Politicians/Parties	12	16%	1,206	20%	7,264,917	8%

Table 2: Channels, videos and views breakdown into state and non-state actors as well as the categories of activists/influencers, media, and politicians/parties.

	Likes		Dis	likes	Comments	
Overall	2,779,624	100%	281,488	100%	1,188,928	100%
Non-State	410,520	15%	6,926	2%	79,526	7%
State	2,369,104	85%	274,562	98%	1,109,402	93%
Activists/Influencers	963,590	35%	26,141	9%	318,320	27%
Media	1,562,682	56%	241,233	86%	778,388	65%
Politicians/Parties	253,352	9%	14,114	5%	92,220	8%

 Table 3: Interaction metrics broken down into state and non-state actors as well as the categories of activists/influencers, media, and politicians/parties.

Since non-state actors did not make up a large percentage of the channels, videos nor engagement metrics, we do not believe that these channels significantly influenced the federal election. Non-state news actors RT, a Russian government-funded news agency and its subsidiary Ruptly, only made up 0.6% of overall views and 0.9% of all media views. Non-state activists and influencers made up 0.6% of overall views bringing the total overall non-state views to 1.2%. The influential information actors were state media making up 20% of the channels but publishing more than 50% of all videos and claiming 73% of total views, as well as the majority of the interaction metrics of likes, dislikes and comments.

Trend and Temporal Analysis

Trend analysis for the Canadian federal election YouTube dataset revealed that video posting frequency per month between January 1, 2019 and October 31, 2019 increased steadily from January through March as depicted in figure 1. Video posting frequency declined between April and July but increased sharply in September leading up to the election in October.



Figure 1: The monthly posting frequency shows an increase in video posting from January - March with a steady decrease from April through July and a sharp increase in postings from September through October.

Comparing the posting frequency to the major Canadian political events taking place between January and October 2019 revealed that the posting pattern coincided with events as shown in figure 2. The SNC-Lavalin scandal was the topic of many videos posted between February and May with a spike in March. The scandal was an attempted political interference with the justice system by Prime Minister Trudeau and his office (PMO).^{xxiv} The official beginning of the election campaign, paired with both the Leaders' debate and Prime Minister Justin Trudeau's blackface scandal, resulted in video postings spiking in September. Posting stayed at almost the same level leading up to the election in October.



Figure 2: Temporal analysis of major Canadian political events timeline ranging from January 2019 to October 2019.

Social Network and Analysis (SNA)

When conducting SNA, one of the first steps of analysis is to understand the network's topography, or its structure.^{xxv} The topography of the Canadian Federal election network is explained by the following metrics: size = 75, density = .047, and clustering coefficient = .72. Size refers to the number of nodes or agents located in the network. In this case, the network includes 75 YouTube channels (agents located in the network).

The second measure of topography is density, which is a measure of cohesion equal to the ratio of actual ties to the number of possible ties. [23]. This is important because it tells us right away the connectivity of the network. The more connected a network is, the higher the density score will be. This network has a density of .047. For example, if you measured a platoon-size military element and their level of knowledge of each person after being deployed for a year, the density of the network would most likely be close to 1 (or 100%), whereas if you conducted the same measurement upon them initially meeting, the density would likely be very low.

Clustering coefficient is the third measure used and is similar to density in that it provides insight on the degree of clustering, or tendency to form tight-knit groups amongst actors. A close, secretive network like Russian Spetsnaz, for example, would have a high clustering coefficient since the network is very cohesive.



Figure 3: Topography of the network with 75 different nodes (channels), a density of .047, a clustering coefficient of .72. The nodes colored in orange represent the three categories which the channels fell into. The gray nodes represent the differentiation between state and non-state actors.

The next actions were to conduct measures of centrality, this assisted in identifying the most important actors within the network. We extracted the comments for each relevant video within the 75-channel network. The commenters for each video and channel were collected using the YouTube API. We then constructed a commenter-to-channel matrix and graphed the communities using the Girvan-Newman community detection algorithm (see figure 4). This shows the communities of channels with the most commenters, hence supporting the notion that media played a prominent role in the overall messaging campaign.



Figure 4: Girvan-Newman communities of the commenter-video group communities with edge weight >50. Most nodes throughout this sociogram are media outlets.

Due to the size and complexity of the dataset, and to narrow our focus to the most prominent channels, we removed all commenters and channels with edge weights less than 50. In order to do this, we created an algorithm to identify the relationship between commenters. Commenters and co-commenters would have to comment on at least 50 of the same videos in order to have a connection as depicted in figure 5 below.

Steps to get to Co-Commenter Matrix:

- 1) Create Commenter-Video Matrix, CV
- 2) Transpose CV
- 3) Multiply CV x CV^T to get Co-Commenter Matrix, CC

$$CV = \begin{bmatrix} c_1 v_1 & c_1 v_2 \\ c_2 v_1 & c_2 v_{21} \end{bmatrix}$$
$$CV^T = \begin{bmatrix} c_1 v_1 & c_2 v_1 \\ c_1 v_2 & c_2 v_2 \end{bmatrix}^T$$
$$\begin{bmatrix} c_1 v_1 & c_1 v_2 \\ c_2 v_1 & c_2 v_{21} \end{bmatrix} x \begin{bmatrix} c_1 v_1 & c_2 v_1 \\ c_1 v_2 & c_2 v_2 \end{bmatrix}^T = \begin{bmatrix} c_1 c_1 & c_1 c_2 c_2 \\ c_2 c_1 & c_2 c_2 \end{bmatrix}$$



Figure 5: A co-commenter relation exists when two commenters commented on at least 50 of the same videos.

After identifying the influential channels, it was important to identify the influential commenters. What stood out were the brokers and bridges, shown in figure 3 and annotated with a black oval shape around these actors. Brokers are key nodes, or actors, within the network that are in a position to control the flow of information. Similarly, bridges are the ties that span the gaps in a network. It was theorized that these key nodes were driving the influence scores of channels through the roof. Therefore, we constructed a co-commenter matrix that showed the top three influential channels.

Visualized in figure 6 is this co-commenter network with these three channels. This sociogram displays cyber flash mobs' ability to have mass effects simply by commenting on channels.^{xxvi} These comment boosting tactics help achieve virality. This also has characteristics of an echo chamber. This potential echo chamber could lead to the spread of false information or polarization of target audiences, again supporting virality of the said channel. Ultimately, this could result in altering YouTube's recommendation algorithm once again, as identified in the Data section of this paper.



Figure 6: displays the co-commenter network between the True North media outlet and two prominent Activists. The red circle in the central part of this sociogram shows actors that commented on all three of these nodes.

Cyber Forensics

Social cyber forensics (SCF) was used to identify potential influence campaigns used by key actors and their cross-media footprints. We used Maltego and SpyOnWeb to identify and extract metadata and the entities associated with key actors that stood out in our dataset.^{xxvii} This metadata includes names under which the domains are registered, entity affiliations of the sites' ownership, geolocation information, Google Analytics ID (tracking code), IP address, and other digital presence.

For the purpose of brevity of this report we are providing our observations of the right-wing Canadian media news and commentary website, Rebel News, which as shown in figure 3, is the channel that has the highest number of commenters in the overall network. We determined that the website's owner employed information maneuvering tactics. The website increased their digital footprint by registering 291domain names and driving traffic back to their original website through redirections as shown in figure 7. The analysis revealed that the operations were located in the United States, but the registrant contact and location information was redacted for privacy and is not shown in the WhoIs database.^{xxviii}



Figure 7: Cyber forensic results revealing Rebel Media engaging in a redirection dissemination campaign.

Most of these Rebel Media domain names contain controversial subjects. Once users visit these website addresses, they are being redirected to a 'therebel.media' site with a "story" or entry about that same controversial subject.



Figure 8: Screen captures of RebelNews.com's home page campaign slider. Influence campaigns conducted by Rebel Media are associated with specific domain names that are redirected to subsections of the main Rebel Media website rebelnews.com.

The site also appears to be orchestrating cross-media campaigns evident through the use of hashtags across their social media accounts on YouTube and Twitter. The hashtags are accompanied with links that direct the audience to their website. The website pages are also featuring YouTube videos published by the channel embedded into their news articles. This actor, 'therebel.media' also appears to be frequently changing its IP address. Resolving the IP address three times within an hour showed three different IP addresses being used by this DNS name. Clearly, our social cyber forensics analyses reveal the tactics employed by this website have properties of a large-scale information maneuver.

YouTube Topic Analysis

Topic analysis provided quick visual takeaways. Although this seems rather simplistic, it allowed us to filter large amounts of data in an efficient manner. This analysis revealed that the majority of videos posted (as would be expected) revolve around Canadian Prime Minister Justin Trudeau. Trudeau's name was the most commonly used term in the video titles and video descriptions as shown in figure 9. Other topics include rival candidates Andrew Scheer, Maxime Bernier, and Jagmeet Singh as well as political scandals (SNC-Lavalin, blackface) and key issues (immigration, climate and carbon tax).



Figure 9. The video titles Word Cloud prominently displays Justin Trudeau as the most frequently used term. Words sizes are calculated according to word frequency and word color emphasis set at 70% allowing for higher trending terms to stand out and less frequent terms to be shaded.

YouTube Toxicity Analysis

Because the YouTube dataset consists of videos posted by channels and comments posted below these videos, we analyzed the toxicity of the video title and description as well as the comments section. As depicted in figure 10, the video posting frequency and average toxicity of video titles and description follow a similar pattern from February through August. While the posting frequency sharply increases in September and remains almost steady in October, the toxicity level decreases. The reason may be due to the increase of general election coverage and the decrease of scandal coverage, such as the SNC-Lavalin affair.



Figure 10: The video posting frequency and average toxicity of video titles and description follow a similar pattern from February through August. As the posting frequency sharply increases in September and remains almost steady in October, the toxicity level decreases.

The toxicity analysis within the Canada Election YouTube dataset revealed that the total monthly comments and total toxicity follow a similar pattern as displayed in figure 11. A shift in toxicity distribution takes place between March and April. The toxicity among comments was relatively low. An increase in toxicity from March through April can be observed, with a slight decrease in May. As comments frequency increases, the toxicity levels remain steady from June through August and then begin to decrease in September and through October. The decrease in toxicity levels during September indicates a shift despite the negative blackface narratives spread throughout several channels.



Figure 11: The comment posting frequency and average comment toxicity increase in March and May. As the posting frequency sharply increases in September and October, the average toxicity slightly decreases in September and sharply drops in October.

The average toxicity in the comments section is roughly twice as high as the toxicity in the video title and description. The toxicity score of comments placed under activists/influencers videos was generally much higher than those of media channels and political channels. In early September of 2019, however, YouTube reported that it had been actively removing comments that contained hate speech or otherwise toxic content, which may explain the decline in the average comment toxicity in our dataset beginning in September. This decline was noticeable in all three categories.



Figure 12: Monthly average comment toxicity score by category.

Related Videos

YouTube is utilizing an autoplay feature that automatically plays a set of videos referred to as related videos after the conclusion of another video. With the help of YouTube's API, we were able to collect the related video set for each of 6,019 videos within our dataset. Table 4 lists the top twenty channels whose videos appeared most frequently within the related video dataset.

Table 4: List of channels that published videos that most frequently appeared in the related video dataset.

1.	CBC News	5,745	11.	The Canadian Press	422
2.	CTV News	3,861	12.	Toronto Sun	407
3.	Global News	3,292	13.	Fox News	359
4.	CBC News: The National	2,451	14.	Adam Daniel Mezei	350
5.	Rebel News	1,877	15.	Radio-Canada Info	342
6.	cpac	1,147	16.	NBC News	340
7.	Andrew Scheer	901	17.	2 Average Dudes	315
8.	National Post	706	18.	Hamdard Media Group Canada	293
9.	CityNews Toronto	662	19.	Green Party of Canada	286
10.	The Agenda with Steve Paikin	507	20.	Conservative — Conservateur	256

The most frequently suggested videos were published by the media outlets, followed by politicians/parties and lastly activists/influencers. Future work will explore the related video dataset further to identify potential patterns between viewed videos and related videos.

CONCLUSION

Despite the high level of anti-Trudeau content that was published, Prime Minister Trudeau successfully navigated the Liberal Party to a win over the Conservatives. He was re-elected by a narrow victory over his rival Andrew Scheer with election polls at 39.47% and 31.89% [28] respectively.^{xxix} This research exhibits the complexity of today's election cycles that involves a robust media campaign via the digital information environment. With such close numbers at the polls, failure to incorporate YouTube (in addition to other social media outlets) to counter the online discourse could have surely led to an upset for the election.

With regard to the research questions, we observed indicators of interference being detected amongst YouTube data andwe displayed throughout the paper, several observations, such as significant increases of content along a longitudinal timeline seen in our temporal analysis. With that trend, we identified the three main categories in which the channels fell into, which further allowed us to analyze the data mathematically to identify the influential channels within those categories that appeared to be interfering with the overall campaign. Two communities of interest that were prominent in this domain were: the media and activists/influencers. We demonstrated how the media channels resonated amongst the target audiences at a higher rate because they posted twice as much content. Most notably was the social cyber forensics in which we observed information activities that were clearly evasive which drove web traffic to very controversial websites, with 291 different registration domains, and eventually drove web traffic back to the original website. We were also able to identify the primary actors that lead the collective actions. With specific examples mentioned of nodes able to create cyber flash mobs as well as echo chambers.

The coordinated disinformation campaigns were evident in the aforementioned sections. Whereas, these tactics of online manipulation can be used to sway public opinion or sow discord into the audience, this has been seen before with research conducted by Agarwal et al.^{xxx} [29]. This previous research investigated how Russian media campaigns attempted to undulate public opinion of Russia's annexation of the Crimean Peninsula.

We conclude that the evidence presented portrays that there was a robust influence campaign surrounding this campaign as annotated in our analysis section. Social media sites such as YouTube are merely a mechanism to steer the audience in the desired direction, other outlets such as Twitter and Facebook (not all inclusive) contribute as well. The goal is to bring attention to the propaganda to as many readers as possible by employing a surreptitious means as demonstrated in this study.

ACKNOWLEDGEMENTS

This research is funded in part by the US National Science Foundation (OIA-1946391, OIA-1920920, IIS-1636933, ACI-1429160, and IIS-1110868), US Office of Naval Research (N00014-10-1-0091, N00014-14-1-0489, N00014-15-P-1187, N00014-16-1-2016, N00014-16-1-2412, N00014-17-1-2675, N00014-17-1-2605, N68335-19-C-0359, N00014-19-1-2336, N68335-20-C-0540), US Air Force Research Lab, US Army Research Office (W911NF-17-S-0002, W911NF-16-1-0189), US Defense Advanced Research Projects Agency (W31P4Q-17-C-0059), Arkansas Research Alliance, the Jerry L. Maulden/Entergy Endowment at the University of Arkansas at Little Rock, and the Australian Department of Defense Strategic Policy Grants Program (SPGP) (award number: 2020-106-094). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the funding organizations. The researchers gratefully acknowledge the support.

NOTES

https://www.realcleardefense.com/articles/2018/11/14/information_warfare_past_present_and_future_113955.html.

^{iv} Andrei Soshnikov, "Inside a pro-Russia propaganda machine in Ukraine", BBC, 13 November 2017. https://www.bbc.com/ news/blogs-trending-41915295.

^v Jessica Guynn, "These Are The Liberal Memes Iran Used to Target Americans on Facebook", USA Today, 24 August 2018. https://www.usatoday.com/story/tech/news/2018/08/24/how-iran-targeted-u-s-facebook-youtube-and-twitter-liberalmemes/1079882002/.

^{vi} Jeff Semple, "Social Media Marks a New Battleground as Canada's Federal Election Looms", Global News, 16 September 2019. https://globalnews.ca/news/5902097/social-media-battleground-canada-federal-election/.

^{vii} Bryan McLaughlin/ Timothy Macafee, "Becoming a Presidential Candidate: Social Media Following and Politician Identification", Mass Communication and Society, vol. 22, no. 5, September 2019. pp. 584–603. https://www.tandfonline.com/doi/abs/10.1080/15205436.2019.1614196?journalCode=hmcs20.

^{viii} Yongkwang Kim, "How Conspiracy Theories Can Stimulate Political Engagement", *Journal of Elections, Public Opinion and Parties*, August 2019. pp. 1–21. https://www.tandfonline.com/doi/abs/10.1080/17457289.2019.1651321.

^{ix} T. Helmus/ E. Bodine-Baron/ A. Radin/ M. Magnuson/ J.Mendelsohn/ W. Marcellino/ A.Bega/ Z. Winkelman, "Russian Social Media Influence: Understanding Russian Propaganda in Eastern Europe", RAND Corporation, 2018.

https://www.rand.org/content/dam/rand/pubs/research_reports/RR2200/RR2237/RAND_RR2237.pdf.

^x Anatolly Gruzd/ Jenna Jacobson/ Philip Mai/ Elizabeth Dubois, "The State of Social Media in Canada 2017", Ryerson University Social Media Lab, February 2018. https://dataverse.scholarsportal.info/dataset.xhtml?persistent Id=doi: 10.5683/SP/AL8Z6R.

^{xi} Elizabeth Dubois/ Anatolly Gruzd/ Philip Mai/ Jenna Jacobson, "Social Media and Political Engagement in Canada", Ryerson University Social Media Lab, December 2018. https://dataverse.scholarsportal.info/dataset.xhtml?persistentId=doi: 10.5683/SP2/9MCJJH.

^{xii} Roberto Rocha, "Data sheds light on how Russian Twitter trolls targeted Canadians", CBC News, 3 August 2018. https://www.cbc.ca/news/canada/russian-twitter-trolls-canada-targeted-1.4772397.

xiii YouTube Website: https://www.youtube.com/yt/about/.

^{xiv} Mustafa Alassad/ Nitin Agarwal/ Muhammad N. Hussain, "Examining Intensive Groups in YouTube Commenter Networks", in *Social, Cultural, and Behavioral Modeling*, vol. 11549, R. Thomson, H. Bisgin, C. Dancy, and A. Hyder (eds.), Springer International Publishing, 2019. pp. 224–233. https://link.springer.com/chapter/10.1007%2F978-3-030-21741-9_23.
 ^{xv} Muhammad N. Hussain/ Serpil Tokdemir/ Nitin Agarwal/ Samer Al-Khateeb, "Analyzing Disinformation and Crowd Manipulation Tactics on YouTube", ASONAM 2018 Conference Proceedings, Vol. 1, 2018. pp. 1092-1095.

https://www.computer.org/csdl/proceedings-article/asonam/2018/08508766/14Fq0XqPE77.

^{xvi} Souneil Park/ Minsam Ko/ Jungwoo Kim/ Ying Liu/ Junehwa Song, "The politics of comments: predicting political orientation of news stories with commenters' sentiment patterns", ACM Conference on Computer Supported Cooperative Work, Conference Proceedings, CSCW 2011, March 2011. https://www.researchgate.net/ publication/220879624_The_

politics_of_comments_Predicting_political_orientation_of_news_stories_with_commenters'_sentiment_patterns. ^{xvii} Marcelo Maia/ Jussara Almeida/ Virgílio Almeida, "Identifying User Behavior in Online Social Networks", Conference Proceedings, SocialNets '08, April 2008. https://dl.acm.org/doi/10.1145/1435497.1435498.

^{xviii} Katrin Galeano/ Rick Galeano/ Nitin Agarwal/ Muhammad N. Hussain, "The Forgotten Network: YouTube Comments Used as an Amplifier for Messaging", International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction -Behavioral Representation in Modeling and Simulation (SBP-BRiMS) Conference Proceedings, July 2019. http://sbpbrims.org/2019/proceedings/.

^{xix} Derek O'Callaghan/ Martin Harrington/ Joe Carthy/ Pádraig Cunningham, "Network Analysis of Recurring YouTube Spam Campaigns", Proceedings of the Sixth International AAAI Conference on Weblogs and Social Media, AAAI.org, 2012. https://www.aaai.org/ocs/index.php/ICWSM/ICWSM12/paper/download/4579/5050.

^{xxi} Adewale Obadimu/ Esther Mead/ Muhammad N. Hussain/ Nitin Agarwal, "Identifying Toxicity Within YouTube Video Comment", in Social, Cultural, and Behavioral Modeling, vol. 11549, R. Thomson, H. Bisgin, C. Dancy, and A. Hyder (eds.), Springer International Publishing, 2019. pp. 214–223.

https://link.springer.com/chapter/10.1007/978-3-030-21741-9_22.

xxii YouTube API: https://developers.google.com/youtube/v3.

xxiii YouTubeTracker: http://cosmos.ualr.edu/tools/youtubetracker/.

ⁱ N. Brunetti-Lihach, "Information Warfare Past, Present, and Future.", RealClearDefense, November 2018.

ⁱⁱ Adam Chandler, "The Leak That Helped Push America Into World War I", The Atlantic, 1 March 2017. https://www.scribd. com/article/340671015/The-Leak-That-Helped-Push-America-Into-World-War-I.

ⁱⁱⁱDavid V. Gioe, "Cyber operations and useful fools: the approach of Russian hybrid intelligence", *Intelligence and National Security*, vol. 33, no. 7, November 2018. pp. 954–973. https://www.tandfonline.com/doi/abs/10.1080/02684527. 2018.1479345? journalCode=fint20.

^{xxiv} The Canadian Press, "A Timeline of Key Events in the SNC-Lavalin Political Controversy", The Canadian Press via National Post, 14 August 2019. https://nationalpost.com/pmn/news-pmn/canada-news-pmn/a-timeline-of-key-events-in-the-snc-lavalin-political-controversy.

^{xxvi} Nitin Agarwal/ K. K. Bandeli, "Blogs, Fake News, and Information Activities", in Digital Hydra: Security Implications of False Information Online, NATO Strategic Communications Center of Excellence (StratCom COE), 8 November 2017.

https://www.stratcomcoe.org/digital-hydra-security-implications-false-information-online.

xxvii Maltego: Maltego, https://www.paterva.com/. And see: SpyOnWeb: http://spyonweb.com/.

xxviii WHOis.net: https://www.whois.net/.

^{xxix} Elections Canada, October 21, 2019 Federal Election Results, Enr.Elections.ca, 2019. https://enr.elections.ca /National.aspx?lang=e.

^{xxx} Nitin Agarwal/ Samer Al-Khateeb/ Rick Galeano/ Rebecca Goolsby, "Examining the use of botnets and their evolution in propaganda dissemination", Defence Strategic Communications, vol. 2, Spring 2017. pp. 87–112.

https://www.stratcomcoe.org/nitin-agarwal-etal-examining-use-botnets-and-their-evolution-propaganda-dissemination.

^{xxv} Sean F. Everton, *Disrupting Dark Networks*, Cambridge University Press, New York, 2012.

BIBLIOGRAPHY

Agarwal, Nitin / Al-Khateeb, Samer/ Galeano, Rick/ Goolsby, Rebecca, "Examining the use of botnets and their evolution in propaganda dissemination", Defence Strategic Communications, vol. 2, Spring 2017. https://www.stratcomcoe.org/nitin-agarwal-etal-examining-use-botnets-and-their-evolution-propaganda-dissemination.

Agarwal, Nitin/ Bandeli, K.K., "Blogs, Fake News, and Information Activities", in Digital Hydra: Security Implications of False Information Online, NATO Strategic Communications Center of Excellence (StratCom COE), 8 November 2017. https://www.stratcomcoe.org/digital-hydra-security-implications-false-information-online.

Alassad, Mustafa / Agarwal, Nitin/ Hussain, Muhammad N., "Examining Intensive Groups in YouTube Commenter Networks", in Social, Cultural, and Behavioral Modeling, vol. 11549, R. Thomson, H. Bisgin, C. Dancy, and A. Hyder (eds.), Springer International Publishing, 2019. pp. 224–233. https://link.springer.com/chapter/10.1007%2F978-3-030-21741-9_23.

Brunetti-Lihach, N., "Information Warfare Past, Present, and Future.", RealClearDefense, November 2018. https://www.realcleardefense.com/articles/2018/11/14/information_warfare_past_present_and_future_113955.html.

Chandler, Adam, "The Leak That Helped Push America Into World War I", The Atlantic, Mar. 01, 2017. https://www.scribd.com/article/340671015/The-Leak-That-Helped-Push-America-Into-World-War-I.

Dubois, Elizabeth/ Gruzd, Anatolly/ Mai, Philip/ Jacobson, Jenna, "Social Media and Political Engagement in Canada", Ryerson University Social Media Lab, December 2018. https://dataverse.scholarsportal.info/dataset.xhtml?persistentId=doi:10.5683/SP2/9MCJJH.

Elections Canada, October 21, 2019 Federal Election Results, Enr.Elections.ca, 2019. https://enr.elections.ca/National.aspx?lang=e.

Everton, Sean F., Disrupting Dark Networks, Cambridge University Press, New York, 2012.

Galeano, Katrin/ Galeano, Rick/ Agarwal, Nitin/ Hussain, Muhammad N., "The Forgotten Network: YouTube Comments Used as an Amplifier for Messaging", International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction - Behavioral Representation in Modeling and Simulation (SBP-BRiMS) Conference Proceedings, July 2019. http://sbp-brims.org/2019/proceedings/.

Gioe, David V., "Cyber operations and useful fools: the approach of Russian hybrid intelligence", *Intelligence and National Security*, vol. 33, no. 7, November 2018. https://www.tandfonline.com/doi/abs/10.1080/02684527.2018.1479345?journalCode=fint20.

Gruzd, Anatolly / Jacobson, Jenna/ Mai, Philip/ Dubois, Elizabeth, "The State of Social Media in Canada 2017", Ryerson University Social Media Lab, February 2018. https://dataverse.

scholarsportal.info/dataset.xhtml?persistentId=doi:10.5683/SP/AL8Z6R.

Guynn, Jessica, "These Are the Liberal Memes Iran Used to Target Americans on Facebook", USA Today, 24 August 2018. https://www.usatoday.com/story/tech/news/2018/08/24/how-iran-targeted-u-s-facebook-youtube-and-twitter-liberal-memes/1079882002/.

Helmus, T.E. et al., "Russian Social Media Influence: Understanding Russian Propaganda in Eastern Europe", RAND Corporation, 2018. https://www.rand.org/content/dam/rand/pubs/research_reports/RR2200/RR2237/RAND_RR2237.pdf.

Hussain, Muhammad N./ Tokdemir, Serpil/ Agarwal, Nitin/ Al-Khateeb, Samer, "Analyzing Disinformation and Crowd Manipulation Tactics on YouTube", ASONAM 2018 Conference Proceedings, Vol. 1, 2018. pp. 1092-1095. https://www.computer.org/csdl/proceedings-article /asonam/2018/08508766/14Fq0XqPE77.

Kim, Yongkwang, "How Conspiracy Theories Can Stimulate Political Engagement", *Journal of Elections, Public Opinion and Parties*, August 2019. pp. 1–21. https://www.tandfonline.com/doi/abs/10.1080/17457289.2019.1651321.

Maia, Marcelo/ Almeida, Jussara/ Almeida, Virgílio, "Identifying User Behavior in Online Social Networks", Conference Proceedings, SocialNets '08, April 2008. https://dl.acm.org/ doi/10.1145/1435497.1435498.

Maltego: https://www.paterva.com/.

McLaughlin, Brian/ Macafee, Timothy, "Becoming a Presidential Candidate: Social Media Following and Politician Identification", Mass Communication and Society, vol. 22, no. 5, September 2019. pp. 584–603. https://www.tandfonline.com/doi/abs/10.1080/15205436.20 19.1614196?journalCode=hmcs20.

O'Callaghan, Derek/ Harrington, Martin/ Carthy, Joe/ Cunningham, Pádraig, "Network Analysis of Recurring YouTube Spam Campaigns", Proceedings of the Sixth International AAAI Conference on Weblogs and Social Media, AAAI.org, 2012. https://www.aaai.org/ocs/index.php/ICWSM/ICWSM12/paper/download/4579/5050.

Obadimu, Adewale/ Mead, Esther/ Hussain, Muhammad N./ Agarwal, Nitin, "Identifying Toxicity Within YouTube Video Comment", in Social, Cultural, and Behavioral Modeling, vol. 11549, R. Thomson, H. Bisgin, C. Dancy, and A. Hyder (eds.), Springer International Publishing, 2019. pp. 214–223. https://link.springer.com/chapter/10.1007/978-3-030-21741-9_22.

Park, Souneil/ Ko, Minsam / Kim, Jungwoo/ Liu, Ying, Song, Junehwa, "The politics of comments: predicting political orientation of news stories with commenters' sentiment patterns", ACM Conference on Computer Supported Cooperative Work, Conference Proceedings, CSCW 2011, March 2011. https://www.researchgate.net/publication/220879624_The_politics_of_comments_Predicting_political_orientation_of_news_stories_with_commenters'_sentiment_patt erns.

Rocha, Roberto, "Data sheds light on how Russian Twitter trolls targeted Canadians", CBC News, 3 August 2018. https://www.cbc.ca/news/canada/russian-twitter-trolls-canada-targeted-1.4772397.

Semple, Jeff, "Social Media Marks a New Battleground as Canada's Federal Election Looms", Global News, 16 September 2019. https://globalnews.ca/news/5902097/social-media-battleground-canada-federal-election/.

Soshnikov, Andrei, "Inside a pro-Russia propaganda machine in Ukraine", BBC, 13 November 2017. https://www.bbc.com/news/blogs-trending-41915295.

SpyOnWeb: http://spyonweb.com/.

The Canadian Press, "A Timeline of Key Events in the SNC-Lavalin Political Controversy", The Canadian Press via National Post, 14 August 2019. https://nationalpost.com/pmn/news-pmn/canada-news-pmn/a-timeline-of-key-events-in-the-snc-lavalin-political-controversy.

WHOis.net: https://www.whois.net/.

YouTube API: https://developers.google.com/youtube/v3.

YouTube Website: https://www.youtube.com/yt/about/.

YouTubeTracker: http://cosmos.ualr.edu/tools/youtubetracker/.