An Investigation of Two Political Misinformation Campaigns from Canada and Iran

Mert Ozer
School of Computing, Informatics & Decision Systems Engineering
mozer@asu.edu
Social Media & Politics

• Getting a lot of mainstream attention recently,
  – Social bots, foreign interference, polarization
Social Media & Politics

• Getting a lot of mainstream attention recently,
  – Social bots, foreign interference, polarization
• Many studies published,
  – Political polarization on social media
  – Social bots’ impact on users; sentiment, information flow, misinformation
Social Media & Politics

• Getting a lot of mainstream attention recently,
  – Social bots, foreign interference, polarization
• Many studies published,
  – Political polarization on social media
  – Social bots’ impact on users; sentiment, information flow, misinformation
• I study the foreign accounts’ & bot accounts’ impact on polarization among groups on Twitter
Social Media & Politics

Iran Protests

Jagmeet Singh election as the head of the NDP in Canada
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups
Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups

Community Detection by Louvain Algorithm
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups
Quantifying Polarization on Social Media

- Given a two-sided graph;
  - Traverse the graph with random walks.
- Difference in the probability of
  - crossing to the opposite group
  - staying in the same group

Quantifying **Polarization** on Social Media

- Difference in the probability of
  - crossing to the opposite group
  - staying in the same group
Quantifying **Polarization** on Social Media

- Difference in the probability of
  - crossing to the opposite group
  - staying in the same group

Polarization Score: 0.8393
Quantifying **Polarization** on Social Media

- Difference in the probability of
  - crossing to the opposite group
  - staying in the same group

**Polarization Score:** 0.9142
Quantifying Polarization on Social Media

- Difference in the probability of
  - crossing to the opposite group
  - staying in the same group

Polarization Score: 1.0
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups
• Given a set of nodes under study and a baseline graph;
  – Calculate the polarization on the baseline graph
  – And on the baseline + new set of nodes graph
Quantifying Polarization Impact

• Given a set of nodes under study and a baseline graph;
  – Calculate the polarization on the baseline graph
  – And on the baseline + new set of nodes graph
Quantifying Polarization Impact

- Given a set of nodes under study and a baseline graph;
  - Calculate the polarization on the baseline graph
  - And on the baseline + new set of nodes graph
Quantifying Polarization Impact

- Given a set of nodes under study and a baseline graph;
  - Calculate the polarization on the baseline graph
  - And on the baseline + new set of nodes graph

Quantifying Polarization Impact

- Given a set of nodes under study and a baseline graph;
  - Calculate the polarization on the baseline graph
  - And on the baseline + new set of nodes graph
Quantifying Polarization Impact

- Given a set of nodes under study and a baseline graph;
  - Calculate the polarization on the baseline graph
  - And on the baseline + new set of nodes graph

Quantifying Polarization Impact

Tweet by a user under study

- Reply by a user of group 1
  - Retweet
  - Polarization Increase

- Reply by a user of group 2
  - Retweet
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups

Botometer
An OSoMe project (bot-o-meter)
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups

Botometer®
An OSOn project (bot-o-meter)
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups

Botometer®
An OSoMe project (bot-o-meter)

Tweets by day of week

<table>
<thead>
<tr>
<th>Day GMT-0400 (EDT)</th>
<th>Tweets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>50</td>
</tr>
<tr>
<td>Mon</td>
<td>0</td>
</tr>
<tr>
<td>Tue</td>
<td>0</td>
</tr>
<tr>
<td>Wed</td>
<td>0</td>
</tr>
<tr>
<td>Thu</td>
<td>0</td>
</tr>
<tr>
<td>Fri</td>
<td>0</td>
</tr>
<tr>
<td>Sat</td>
<td>119</td>
</tr>
</tbody>
</table>

Tweets by hour of day

<table>
<thead>
<tr>
<th>Hour GMT-0400 (EDT)</th>
<th>Tweets</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 am</td>
<td>0</td>
</tr>
<tr>
<td>5:00 am</td>
<td>0</td>
</tr>
<tr>
<td>10:00 am</td>
<td>95</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>0</td>
</tr>
<tr>
<td>8:00 pm</td>
<td>0</td>
</tr>
</tbody>
</table>
Problem Definition

Foreign Accounts’ & Bot Accounts’ Impact on Polarization among Groups
An account which discloses its location
• in their profile
• or GPS signal
as anywhere outside of the country of study
Social Media & Politics

Iran Protests

Jagmeet Singh election as the head of NDP in Canada
Data Collection

• Purchased Twitter data from GNIP spanning **October 1, 2017 and January 15, 2018**
  – political leaders, governmental organizations, nuclear deal and December protests
Data Description

- 6,123,230 tweets, 185,732 accounts
Data Description

- 6,123,230 tweets, 185,732 accounts
Community Detection

- Built a community exploration tool showing each community’s;
Community Detection

• Built a community exploration tool showing each community’s;
  – Central users (indegree over retweet network)
  – Most popular images, hashtags, URLs
  – Most retweeted and replied tweets
• Characterized each community by their political standing using the tool at:
http://www.public.asu.edu/~mozer/cipslab/Sankey.html
Community Exploration Tool

Popular Hashtags: No Hashtags

Central Users: No Users

Popular Images: No Media Links

Most Replied Tweets: No Replies

Most Retweeted Tweets: No Retweets

Popular URLs: No Hashtags
Communities Over 4 Months

- Reformists/Rouhani supporters
- Other leftist factions & Pahlavi supporters
- Sufis
- Saudi/Bahrain/UAE & supporters
- Right Wing/Conservative/Hardliners
- People's Mujahedin of Iran
Profile Locations

Islamic Republic of Iran: 2955
Tehran: 1780
Iran: 843
Tehran: 526
Islamic Republic of Iran: 507
Profile Locations

Islamic Republic of Iran: 763
Tehran: 387
Iran: 380
Islamic Republic of Iran: 187
Iran: 63
Profile Locations

Saudi Arabia: 1004
Riyadh, Saudi Arabia: 261
Riyadh: 240
Jeddah, Saudi Arabia: 186
Kingdom of Saudi Arabia: 141
Profile Locations

Islamic Republic of Iran: 1249
Islamic Republic of Iran: 970
Tehran: 262
Tehran: 184
Iran: 176
Profile Locations

London, England: 150
Kingdom of Saudi Arabia: 129
Islamic Republic of Iran: 75
England, United Kingdom: 48
Islamic Republic of Iran: 46
GPS Signals

IR: 83, AU: 2, AT: 1, AZ: 1, DE: 1

IR: 14, GB: 4, US: 4, CA: 2, DE: 1

SA: 1, BH: 1

IR: 27

IR: 2, SA: 1
Bursty Activity by Saudi Community

Daily Tweet Volumes

- Other Communities
- Saudi Community
Polarization Effect of Saudi Accounts
Polarization Effect of Saudi Accounts
### Polarization Effect of Saudi Accounts

<table>
<thead>
<tr>
<th></th>
<th>Reformist</th>
<th>Pahlavi</th>
<th>Hardliner</th>
<th>Mujahedin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reformist</td>
<td></td>
<td></td>
<td>0.89</td>
<td>0.95</td>
</tr>
<tr>
<td>Pahlavi</td>
<td>0.70</td>
<td></td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>Hardliner</td>
<td>0.89</td>
<td>0.98</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Mujahedin</td>
<td>0.95</td>
<td>0.85</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Polarization Effect of Saudi Accounts

<table>
<thead>
<tr>
<th></th>
<th>Reformist</th>
<th>Pahlavi</th>
<th>Hardliner</th>
<th>Mujahedin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reformist</strong></td>
<td>0.70</td>
<td>0.89</td>
<td>0.93 (-.02)</td>
<td>0.85</td>
</tr>
<tr>
<td><strong>Pahlavi</strong></td>
<td>0.70</td>
<td>0.98</td>
<td>0.85</td>
<td>1</td>
</tr>
<tr>
<td><strong>Hardliner</strong></td>
<td>0.89</td>
<td>0.98</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Mujahedin</strong></td>
<td>0.93 (-.02)</td>
<td>0.85</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- Polarization between Mujahedin and Reformist communities decrease due to Saudi accounts.
Polarization Effect of Bot Accounts
Polarization Effect of Bot Accounts
## Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Reformist</th>
<th>Pahlavi</th>
<th>Hardliner</th>
<th>Mujahedin</th>
<th>Saudi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reformist</td>
<td>0.66</td>
<td>0.86</td>
<td>0.95</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Pahlavi</td>
<td>0.66</td>
<td>0.98</td>
<td>0.86</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Hardliner</td>
<td>0.86</td>
<td>0.98</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mujahedin</td>
<td>0.95</td>
<td>0.86</td>
<td>1</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Saudi</td>
<td>0.99</td>
<td>0.94</td>
<td>1</td>
<td>0.88</td>
<td></td>
</tr>
</tbody>
</table>
## Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Reformist</th>
<th>Pahlavi</th>
<th>Hardliner</th>
<th>Mujahedin</th>
<th>Saudi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reformist</td>
<td>0.66</td>
<td>0.86</td>
<td>0.93 (-.02)</td>
<td>0.98 (-.01)</td>
<td></td>
</tr>
<tr>
<td>Pahlavi</td>
<td>0.66</td>
<td>0.98</td>
<td>0.83 (-.03)</td>
<td>0.93 (-.01)</td>
<td></td>
</tr>
<tr>
<td>Hardliner</td>
<td>0.86</td>
<td>0.98</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mujahedin</td>
<td>0.93 (-.02)</td>
<td>0.83 (-.03)</td>
<td>1</td>
<td>0.85 (-.03)</td>
<td></td>
</tr>
<tr>
<td>Saudi</td>
<td>0.98 (-.01)</td>
<td>0.93 (-.01)</td>
<td>1</td>
<td>0.85 (-.03)</td>
<td></td>
</tr>
</tbody>
</table>
### Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Reformist</th>
<th>Pahlavi</th>
<th>Hardliner</th>
<th>Mujahedin</th>
<th>Saudi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reformist</td>
<td>0.66</td>
<td>0.86</td>
<td></td>
<td>0.93 (-0.02)</td>
<td>0.98 (-0.01)</td>
</tr>
<tr>
<td>Pahlavi</td>
<td>0.66</td>
<td>0.98</td>
<td></td>
<td>0.83 (-0.03)</td>
<td>0.93 (-0.01)</td>
</tr>
<tr>
<td>Hardliner</td>
<td>0.86</td>
<td>0.98</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mujahedin</td>
<td>0.93 (-0.02)</td>
<td>0.83 (-0.03)</td>
<td>1</td>
<td>0.85 (-0.03)</td>
<td></td>
</tr>
<tr>
<td>Saudi</td>
<td>0.98 (-0.01)</td>
<td>0.93 (-0.01)</td>
<td>1</td>
<td>0.85 (-0.03)</td>
<td></td>
</tr>
</tbody>
</table>

- Polarization between Mujahedin & Saudi communities and other communities decrease thanks to bot accounts.
### Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Reformist</th>
<th>Pahlavi</th>
<th>Hardliner</th>
<th>Mujahedin</th>
<th>Saudi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reformist</td>
<td></td>
<td></td>
<td>0.86</td>
<td>0.93 (.02)</td>
<td>0.98 (.01)</td>
</tr>
<tr>
<td>Pahlavi</td>
<td>0.66</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardliner</td>
<td>0.86</td>
<td>0.98</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mujahedin</td>
<td>0.93 (.02)</td>
<td>0.83 (.03)</td>
<td>1</td>
<td></td>
<td>0.85 (.03)</td>
</tr>
<tr>
<td>Saudi</td>
<td>0.98 (.01)</td>
<td>0.93 (.01)</td>
<td>1</td>
<td>0.85 (.03)</td>
<td></td>
</tr>
</tbody>
</table>

- Polarization between Mujahedin & Saudi communities and other communities decrease thanks to bot accounts.
- Polarization between Hardliner community and other communities are not affected by bot accounts.
## Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Reformist</th>
<th>Pahlavi</th>
<th>Hardliner</th>
<th>Mujahedin</th>
<th>Saudi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reformist</td>
<td></td>
<td></td>
<td>0.86</td>
<td>0.93 (-.02)</td>
<td>0.98 (-.01)</td>
</tr>
<tr>
<td>Pahlavi</td>
<td></td>
<td></td>
<td>0.98</td>
<td>0.83 (-.03)</td>
<td>0.93 (-.01)</td>
</tr>
<tr>
<td>Hardliner</td>
<td></td>
<td></td>
<td>0.86</td>
<td>0.98</td>
<td>1</td>
</tr>
<tr>
<td>Mujahedin</td>
<td>0.93 (-.02)</td>
<td>0.83 (-.03)</td>
<td>1</td>
<td></td>
<td>0.85 (-.03)</td>
</tr>
<tr>
<td>Saudi</td>
<td>0.98 (-.01)</td>
<td>0.93 (-.01)</td>
<td>1</td>
<td></td>
<td>0.85 (-.03)</td>
</tr>
</tbody>
</table>

- Polarization between Mujahedin & Saudi communities and other communities decrease thanks to bot accounts.
- Polarization between Hardliner community and other communities are not affected by bot accounts.
Social Media & Politics

Iran Protests

Jagmeet Singh election as the head of NDP in Canada
• On October 1, 2017 NDP held an election to assign its new leader.
On October 1, 2017 NDP held an election to assign its new leader.
New Democratic Party – Canada

- On October 1, 2017 NDP held an election to assign its new leader.
On October 1, 2017 NDP held an election to assign its new leader.
Jagmeet Singh wants to be Prime Minister: Of Canada or Khalistan?

By Tarek Fatah
Author & Columnist, Canada
@TarekFatah

ing, extre... a fellow Sikh, is making news in Canada — 17 years later.

You may be surprised to learn the suicide bomber and his accomplice are being hailed as heroes, not just in the privacy of the homes of their supporters, but publicly. Inside our parliament, in the Ontario legislature, on the grounds of the House of Commons, and of course, vociferously on Twitter.

On August 31, 1995, in the Indian city of Chandigarh, a Sikh suicide bomber blew himself killing Punjab’s chief minister Beant Singh and 17 others.

The dead terrorist belonged to the banned outfit known as Babbar Khalsa, as was his backup bomber Balwant Singh Rajnoor, who was later convicted to be hanged for the murders. The hanging was scheduled for March 31, but has now been “stayed” after protests in Punjab and here in Canada.

Demanding clemency for Rajnoor. The terrorist accomplice, though, remains unpunished of his crime and has refused to ask for clemency, thus adding to his appeal to some radical Sikh youth still clamouring for a separate state of Khalistan.

Last Wednesday, hundreds of Sikhs came out to demonstrate in support of Rajnoor on the steps of Parliament Hill. Ostensibly this was a protest against capital punishment, but the posters displayed reflected a hero worship of the unpunished terrorist.

In principle, I believe Rajnoor should be spared the death sentence, which should be abolished, in India. But any display of admiration or sympathy for a terrorist who planned to be the backup suicide bomber, is repugnant and should have no place in Canada.

Expressing this sentiment triggered a flurry of hate messages on my Twitter feed.

One McMaster undergraduate Sikh student sent me a profanity-laced tweet and added I should have died of cancer. Another threatened me to a physical engagement, writing: “Let’s meet up tough guy. Calling Sikhs terrorist ... Seems like you can talk a lot on twitter.”

If it had been just these two on Twitter, one could have shrugged it off, but the sympathy for the terrorist went right up to our legislators.

NDP justice critic, Jagmeet Singh, stood up in the Ontario legislature and suggested Ontario use its trade relations as a bargaining chip to save the backup suicide bomber. In his speech, the NDP Justice critic failed to tell his colleagues the man he was promoting was a convicted terrorist who had a hand in assassinating the equivalent of the Ontario Premier.

I asked MPP Jagmeet Singh whether he considered Rajnoor a terrorist, and why he didn’t mention this fact in his speech. He refused to answer my question. I asked him if he supported the Khalistan movement and got no answer. His assistant e-mailed me that Jagmeet Singh would respond to my questions only if I guaranteed to show him this column before it went to press. She also wanted an assurance that Singh’s response would appear within the Sun in its entirety. The questions asked were straightforward and should have been easy to answer, but apparently Jagmeet Singh and many other supporters of the convicted terrorist think otherwise.

It’s a sad day for Canada when our lawmakers won’t clearly condemn the acts of a terrorist when invited to do so. It’s more evidence of how multiculturalism is permitting the most outrageous of ideas to take root in our society.
New Democratic Party – Canada

• On October 1, 2017 NDP held an election to assign its new leader.
New Democratic Party – Canada

- On October 1, 2017 NDP held an election to assign its new leader.
• By using Twitter Search API, I crawled three hashtags and three keywords over three weeks.

• Collected ~160,000 tweets from ~55,000 users between September 22, 2017 and October 11, 2017.
• By using Twitter Search API, I crawled three hashtags and three keywords over three weeks.

• Collected \(~160,000\) tweets from \(~55,000\) users between September 22, 2017 and October 11, 2017.

Election Day
October 1st
Communities

- Conservatives
- Jagmeet Singh & Supporters
- Niki Ashton & Supporters
- Liberal accounts
- Majority India-based Accounts

Before
Communities

Conservatives
Jagmeet Singh & Supporters
Niki Ashton & Supporters
Liberal accounts
Majority India-based Accounts

Conservatives: Before - 1, After - 6
Jagmeet Singh & Supporters: Before - 2, After - 3
Niki Ashton & Supporters: Before - 9, After - 3
Liberal accounts: Before - 3, After - 0
Majority India-based Accounts: Before - 0, After - 4
Communities

- Conservatives
- Jagmeet Singh & Supporters
- Niki Ashton & Supporters
- Liberal accounts
- Majority India-based Accounts
Profile Location

Canada: 104
Calgary, Alberta: 69
Alberta, Canada: 45
Ontario, Canada: 30
Calgary: 29
Profile Location

Toronto, Ontario: 66
Toronto: 61
Canada: 52
Ottawa, Ontario: 20
Ontario, Canada: 18
Profile Location

Canada: 47
Toronto, Ontario: 39
Toronto: 26
Ottawa, Ontario: 18
Montréal, Québec: 17
Profile Location

Canada: 54
Calgary, Alberta: 25
Edmonton, Alberta: 25
Toronto: 23
Ottawa, Ontario: 19
Polarization Effect of India Community

India accounts' effect

[Graph showing the polarization effect of different India accounts with varying labels such as jagm-niki, jagm-niki++, jagm-lib, jagm-lib++, cons-jagm, cons-jagm++, cons-niki, cons-niki++, cons-lib, cons-lib++, lib-niki, lib-niki++]
Polarization Effect of India Community

India accounts' effect

Very slight perturbations

- jagm-niki
- jagm-niki++
- jagm-lib
- jagm-lib++
- cons-jagm
- cons-jagm++
- cons-niki
- cons-niki++
- cons-lib
- cons-lib++
- lib-niki
- lib-niki++
Polarization Effect of India Community

- Slightly more polarization between Jagmeet Singh supporters and Conservatives.
- Slightly less polarization between Conservative and Liberal accounts.
Polarization Effect of Bot Accounts

![Bot accounts' effect chart]
Polarization Effect of Bot Accounts

![Bot accounts' effect graph](image-url)
## Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Cons.</th>
<th>Singh</th>
<th>Ashton</th>
<th>Liberals</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons.</td>
<td></td>
<td>0.92</td>
<td>0.99</td>
<td>0.95</td>
<td>0.94</td>
</tr>
<tr>
<td>Singh</td>
<td>0.92</td>
<td></td>
<td>0.93</td>
<td>0.93</td>
<td>1</td>
</tr>
<tr>
<td>Ashton</td>
<td>0.99</td>
<td>0.93</td>
<td></td>
<td>0.91</td>
<td>0.99</td>
</tr>
<tr>
<td>Liberals</td>
<td>0.95</td>
<td>0.93</td>
<td>0.91</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>0.94</td>
<td>1</td>
<td>0.99</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
## Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Cons.</th>
<th>Singh</th>
<th>Ashton</th>
<th>Liberals</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons.</td>
<td>0.93 (+.01)</td>
<td>0.99</td>
<td>0.93 (-.02)</td>
<td>0.95 (+.01)</td>
<td></td>
</tr>
<tr>
<td>Singh</td>
<td>0.93 (+.01)</td>
<td>0.91 (-.02)</td>
<td>0.95 (+.02)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ashton</td>
<td>0.99</td>
<td>0.91 (-.02)</td>
<td>0.91</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Liberals</td>
<td>0.93 (-.02)</td>
<td>0.95 (+.02)</td>
<td>0.91</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>0.95 (+.01)</td>
<td>1</td>
<td>0.99</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Polarization Effect of Bot Accounts

<table>
<thead>
<tr>
<th></th>
<th>Cons.</th>
<th>Singh</th>
<th>Ashton</th>
<th>Liberals</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons.</td>
<td>0.93 (+.01)</td>
<td>0.99</td>
<td>0.93 (-.02)</td>
<td>0.95 (+.01)</td>
<td></td>
</tr>
<tr>
<td>Singh</td>
<td>0.93 (+.01)</td>
<td></td>
<td>0.91 (-.02)</td>
<td>0.95 (+.02)</td>
<td>1</td>
</tr>
<tr>
<td>Ashton</td>
<td>0.99</td>
<td>0.91 (-.02)</td>
<td></td>
<td>0.91</td>
<td>0.99</td>
</tr>
<tr>
<td>Liberals</td>
<td>0.93 (-.02)</td>
<td>0.95 (+.02)</td>
<td>0.91</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>0.95 (+.01)</td>
<td>1</td>
<td>0.99</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- Polarization between Jagmeet Singh community and other communities increase due to bot accounts.
Discussion

- Bot accounts appear to have impact on polarization among groups.
- Explicit foreign communities have slight polarization impact on the rest of the groups.
- Impact on polarization broadly agrees with groups’ offline-world agendas.
What could NOT be measured?

• News feed / Visibility effect
Thank you!

Any Questions/Comments?
Random Account Impact – Canada
Suspended Account Impact – Iran