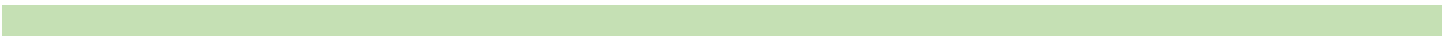


Marijuana Legalization in Canada



Problem Statement:

The aim of the project is to find a strategy to legalize Controversial policies (like Marijuana legalization) in a nation with multiple provinces, like Canada. We would like to provide recommendations to the Government as to how to proceed with Legalization of sensitive topics in the future based on the sentiments of people during the legalization of Cannabis.

Data Sources:

We select Twitter as our Social media website. Twitter is one of the best social media platforms to access the sentiments of people on any subject. Hence, we decided to choose twitter to analyze the reactions of people in the light of legalization of cannabis.

Pre-Processing:

1. Scraping of twitter data using 'twitterscraper' API at Province-level.

We scraped data using 'twitterscraper' API and Keyword-matching with the help of words related to Marijuana and provinces. A sample code run from the terminal (Or Command Prompt in case of Windows) to scrape data. For example, Quebec is **twitterscraper "legalization AND weed AND quebec" -l 5000 -c -o quebec.csv**. Using the same strategy, we obtained data for 7 Provinces, namely Quebec (QC), Alberta (AB), British Columbia (BC), Manitoba (MB), Nova-Scotia (NS), Ontario (ON), Saskatchewan (SK) shown in table 1.

Table 1: User'id and their tweets

user	tweet-id	timestamp	likes	replies	retweets	text
CannabisBee	173187039230050304	2012-02-24 23:26:22	0	0	0	#cannabis Pot legalization activists caught in a 'cannabis con
DrugsWars	173172618705383426	2012-02-24 22:29:04	0	0	0	Pot legalization activists caught in a 'cannabis conundrum' -
cannabisreader	658667048986411008	2015-10-26 15:30:36	0	0	0	Calgary Police Chief Roger Chaffin says he's ready to talk pot http://ow.ly/TQv4A
cannabisresins	628065755293175809	2015-08-03 04:51:59	0	0	0	MME_CALGARY: #Marijuana Legalization In Italy: Lawmakers Suppo ... pic.twitter.com/AKakQDDn2E SavinaHea
liftandco	828670572481572864	2017-02-06 18:23:55	9	1	11	Calgary city council is now beginning their discussion on cann http://www.calgary.ca/General/Pages/Council-and-Committee-webc
PACE_ag	811400996895203329	2016-12-21 02:40:47	1	0	1	Province will seek input from #Albertans on marijuana minimum http://calgaryherald.com/news/local-news/province-will-look-in
ExpertJoints	808933580554518531	2016-12-14 07:16:09	2	0	2	Key recommendations of the federal task force on cannabis lega MtGcXy pic.twitter.com/JTMI7xRKZl
quondon	808929685891596289	2016-12-14 07:00:40	0	0	0	Key recommendations of the federal task force on cannabis lega

2. Concatenation of all tables into a single table
3. Scraping the number of followers for each user.
We performed web scraping using Selenium web driver and BeautifulSoup to obtain the number of followers for each of the users mentioned in the table.
4. Text pre-processing: conversion to lower-case letters, tokenization, removal of stop words, lemmatization

Analysis :

1. Frequency of important Hashtags at the Province Level
2. Frequency of words excluding Hashtags at the province level. (To see what people, talk about the most excluding the common hashtags)
3. Unweighted and weighted sentiment analysis at the province level for 1) before announcement 2) during the period between Announcement and legalization 3) after legalization (legalized date: Oct. 17th, 2018)

Table 2: Unweighted sentiment analysis:

Province	Before announcement	announcement_legalization	After legalization	announcement senti change	legalization sentiment change
AB	0.062125	0.107916	0.050827	73.71%	-52.90%
BC	0.057156	0.166197	0.115196	190.78%	-30.69%
MB	0.131123	0.036769	0.177426	-71.96%	382.54%
NS	-0.020758	-0.029575	0.105561	-42.48%	456.93%
ON	0.056615	0.172025	0.135803	203.85%	-21.06%
QC	0.047537	0.116557	0.092182	145.19%	-20.91%
SK	0.090785	0.105815	0.020695	16.56%	-80.44%

Based on table 2, before announcement, people's sentiments in different provinces somehow very neutral (compound value > 0.1 is to be considered positive and compound <0 is negative). After the announcement of legalization, most of provinces have positive feelings towards legalization except Manitoba and Nova Scotia. Most of provinces consider legalization as a way to boost the economy, control cannabis purchase/usage and reduce the black market (1). Manitoba and Nova Scotia are two first provinces which provide fines information if people break province cannabis rules, which may lead to a decrease in sentiment. After legalization, all provinces are facing supply problems, which lead to a decrease in sentiment. The following table shows the potential reasons for sentiment change after the announcement and after legalization.

Province	Change in sentiment
AB	<p>Before legalization:</p> <ul style="list-style-type: none"> • Effective regulation can reduce black market and increase security using double ID (2) • Regulation and law are restricting the black market (2) <p>After legalization:</p> <ul style="list-style-type: none"> • High price in regulated market compared to black market due to tax (3) • People still used to black market partly due to not enough supply and inconvenience (3) • Regulation is not ready (4)
BC	<p>Before legalization</p> <ul style="list-style-type: none"> • B.C. cannabis use was more tolerated and commonplace than rest of the country (5) • Second highest per capita usage (24.6 grams) (6) • B.C is the most supportive province of legalization (61% supported vs 53% in rest of Canada) (5) • 40% of all Canadian cannabis are grown in BC (most ideal cannabis growing area) (7) <p>After legalization:</p> <ul style="list-style-type: none"> • Only one government cannabis shop is ready, whereas Alberta is taking away BC's claim as pot capital (Alberta 70 private retail licenses, while B.C. just 1 public and 1 private license) (8) • Win for big businesses and law enforcement, but those who pioneered legalization felt excluded from the harsh penalties (9) • Predicted it will take 2 - 3 years for the system to mature (10)
MB	<p>Before legalization:</p> <ul style="list-style-type: none"> • Announce the fines if people break MB's cannabis rules (fines up to \$2500) (11) <p>After legalization:</p> <ul style="list-style-type: none"> • Eight communities ask resident to vote whether to allow a cannabis retailer in town (12) • On average \$7.21/gram (\$0.42 more expensive than the national average price) (13) • An unlimited number of private stores will be allowed to sell cannabis (13)
NS	<p>Before legalization:</p> <ul style="list-style-type: none"> • Announce the fines if people break NS's cannabis rules (14) - Charge \$25 to \$2000 in fines if smoking on street, sidewalk, or near a park will be punishable by \$25 to \$2000 in fines - Charge \$1,000 to \$10,000 if growing cannabis outside of the housing <p>After legalization:</p> <ul style="list-style-type: none"> • One of first provinces gets legalized in term of time zone • Allows to grow up to 4 cannabis plants per household (15) • NS is the province with the highest per capita usage was in Nova Scotia (27.1 grams per person per year) (6)
ON	<p>After legalization:</p> <ul style="list-style-type: none"> • People finally thought Trudeau lived up to his commitment of legalizing marijuana (16) • Medical marijuana shortages due to large demand. (16) • Very large processing times for approved dispensaries. Marijuana can be obtained quicker and at lesser cost illegally (16) • Pardons for past simple possession convictions- Have a lot of backlogs. (17)

QC	After legalization: <ul style="list-style-type: none"> Quebecers exhausted the province's supply of legal weed within hours of legalization and Société Québécoise du Cannabis (SQDC) has supply problem (18) The supply crunch and other aspects of legalization are hurting medical cannabis patients (19) The black market and grey market still appealing because the price of legal cannabis increased by 17% (from \$6.83 to \$8.02\$ per gram in just a few months) and the price of cannabis in the black market is around \$6.50 per gram. (18) Government tightens the rules on cannabis consumption and increase the legal age from 18 to 21 (20)
SK	After legalization: <ul style="list-style-type: none"> Saskatchewan Cannabis prices among the highest in the country (21) Only few retailers are open in Saskatchewan, but they are not located in big cities such as Regina or Saskatoon (22)

Table 3: weighted sentiment analysis

Province	Before announcement	announcement_legalization	After legalization	announcement senti change	legalization senti change
AB	0.188291	0.378431	0.136355	100.98%	-63.97%
BC	0.196171	0.53665	0.321148	173.56%	-40.16%
MB	0.468012	0.145631	0.573359	-68.88%	293.71%
NS	-0.049391	-0.096372	0.322199	-95.12%	434.33%
ON	0.190894	0.545393	0.397824	185.70%	-27.06%
QC	0.170628	0.314733	0.091971	84.46%	-70.78%
SK	0.284976	0.344638	-0.043366	20.94%	-112.58%

- Another possibility of having different sentiment for different provinces is that people's sentiments are shaped by accounts that are influential, meaning accounts have a huge number of followers
- We use the sentiment score for every tweet and multiply it by the log of number of followers
 - Reason of using log is to normalize the huge variation for the follower number
- We find the similar sentiment change pattern when we take into account of the impact of influential accounts
- From this result, people's sentiment is likely to be shaped by other people, especially those who are influential on Twitter, because their posts are more likely to be seen by many other people

Recommendations/conclusion

Whenever Government of Canada wants to launch a controversial policy into Canada, it should consider the impact on provincial level. As from our analysis, each province has a different reaction towards marijuana legalization. In the future, it is better to start testing a sensitive policy in a province, then propagate the same policy to other provinces to avoid strong negative sentiment. People Often Use Social Media to learn and discuss about Political Issues, social media should be one of the most important platforms for policy maker to engage and understand about people's desires. Also, policy makers should focus on the influential people's sentiment on social media towards one topic because their opinions can potentially give us insights on the whole population's view

Limitations

There are some limitations during data preprocessing stage. First, people use French as the medium of communication in Quebec. Since tweets were extracted in English, a major chunk of communication in Quebec is missed out. Second, the number of tweets for different provinces are different. Third, there are too many links and hashtag, but the actual meaningful text is less. There is a limitation related to results. Number of followers extracted is as of one week back (During the week of Feb 12th, 2018). We could not extract the number of followers at the time of the tweet.

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