Approval Rating using Twitter data

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Abstract

Approval rating in the simplest term means whether the people approve a particular opinion, person, practice or decision or not. Mostly, approval rating is calculated for politicians, political parties and their decisions. So, even in our project we will try to find the approval rating for the US President Donald Trump. Traditionally, public opinion polls were used for approval rating but we would like to find out in this paper if we make use of social media data Twitter, do we get better results and are we able to make improved calculations for approval rating.

Introduction

In today's world, the social media generates millions of posts per minute and per hour. And the data created by social media tends to grow exponentially. From this huge amount of data if we could segregate useful data, it can provide us rich corpus to make predictions and perform various kinds of analysis.

For our project we will be making use of Twitter. Twitter is a social networking website where all the members can post and read tweets. By default Twitter keeps its setting as public so that everyone can read the tweets and not just a closed group of people. Thus, it becomes a popular place for people to express their views and opinions. Also, if the members want they can have anonymous ids from which they can post data. Thus, people can openly express their political views. Thus, using Twitter API's we will be fetching twitter data and calculate approval rating for the current US President Donald Trump.

Approval Ratings by definition is the percentage of respondents to an opinion poll who express approval of someone or something, typically a political figure. Rather than the traditional model where opinion polls make the base for calculation of approval rating, we will be making use of Twitter data. In order to perform sentiment analysis of twitter data we will be making use of Affin score, Sentiwordnet and custom scores. (App) (Margaret Rouse)

Related work

Traditionally, the approval rating was calculated using opinion polls. In the early 1930's George Gallup introduced the Presidential job approval ratings to determine how well the president is supported by the people. In this poll, Gallup used either telephone surveys or face to face interviewing to gather people opinion. Telephone surveys were suitable only in places where 80 percent of the population possessed phones. In a survey people were typically asked questions like whether they approve their President or not. Participants most likely can have one of the three answers to the question i.e. either they approve the President or they don't approve the President or they don't have any opinion. They interviewed approximately 1500 residents of the country according to the Wikipedia and they perform analysis on this data to provide an overall rating to the President.

Rasmussen Reports is an American polling company that also similar to Gallup polls collects and distributes public opinion information. They also conduct phone surveys using pre-recorded telephone queries reducing the involvement of people. If people interview the participants there are chances of the interviewer influencing the participant.

The Quinnipiac University Poll is a public opinion polling center based at Quinnipiac University in Connecticut. The organization has 100's of interviewers who interview the participants for opinion polling.

The Pew Research Center is a nonpartisan American think tank based in Washington, D.C.They also employee similar techniques to gather opinions.

There are various other opinion polling companies that give the approval rating using phone surveys. Though these organizations bring data from the citizens and then try to find approval ratings but there are chances of being skewed by popular public opinion.

In the paper "Who Needs Polls? Gauging Public Opinion

from Twitter Data" the author uses twitter data but collects data for 7 months of President Obama and for evaluation even they consider n Gallups and Rasmussens Presidential approval poll as the base case. They use create their model using maximum likelihood to find out the sentiments. (David Cummings)
In the paper "From Tweets to Polls: Linking Text Sentiment to Public Opinion Time Series" divide the methodology in paper two steps opinion mining i.e. finding relevant opinions and analyzing sentiments. They used word frequencies to determine the sentiments. (Brendan OConnor)

In the paper "Public Opinion Polling with Twitter" the author uses twitter data to find public opinion about Obama. The paper uses hedonometer that could calculate happiness score to determine the sentiment of the tweets. For evaluation they use Gallup polls. (Emily M. Cody)

Data

As mentioned earlier in this project we will be making use of Twitter data. So, to fetch twitter data we made use of open source python API Tweepy. As mentioned in the Tweepy documentation, the API provides access to the entire twitter RESTful API methods. Each method can accept various parameters and return responses. For our project as we are trying to analysis tweets about the US President Donald Trump, we will be using words like @donaldtrump to find data in Twitter search API. We have tried to think of various names with which people might be referring the president in their tweets. All the tweets collected from twitter are collected in English language and also we have collected weekly data. In the data we have the userId, status id, status time and status text have been fetched. While fetching data we have applied some checks on the number of status or tweets per user to keep the dataset unbiased.

Methods

Before applying any algorithm to perform sentiment analysis we performed datacleaning and preprocessing steps. During data processing we removed hashtags and @ for tokenizing the tweets for sentiWordNet sentiment analysis. Also, we took care that there is one tweet per uId. We used pandas and NLTK to perform initial data processing steps.

In this project we will be making use of three methods to perform sentiment analysis and also find the mean of the scores for sentiment analysis.

1. Affin Score

Affin provides python Wordlist-based sentiment analysis package. Finn rup Nielsen manually labeled a list of English words between -5 to 5. We used Affin to calculate affin score for each tweet to determine whether the tweet is positive or not. We ran this algorithm a number of times to see the variation in analysis result and found the results were acceptable. To improve the affin results we added more words to the word list and used it to determine the sentiment of a tweet. It gave an improved performance.(afi)

2. SentiwordNet Score

We next used SentiwordNet is a lexical resource capable of perform sentiment analysis. Each synet in sentiWordNet will have three scores positive, negative and objective and the summation of three scores will be 1. Each score is between the interval of [0.0,1.0]. Each sysnet tells whether it is positive, negative or neutral. Further using the summation of all synets in a sentence and then in a tweet we find out whether a tweet is positive or negative. We then update our result dataset with the score from sentiwordnet. The scores from sentiwordnet resulted in finding the closest approval rating to our base case. (Stefano Baccianella and Sebastiani)

3. Custom-unigrams Score

We found positive and negative unigram sets using which we manually tried to find the sentiment of each tweet. We compared the number of positive and negative unigrams the tweet contained and created an overall custom score for the tweet.

4. Average Score

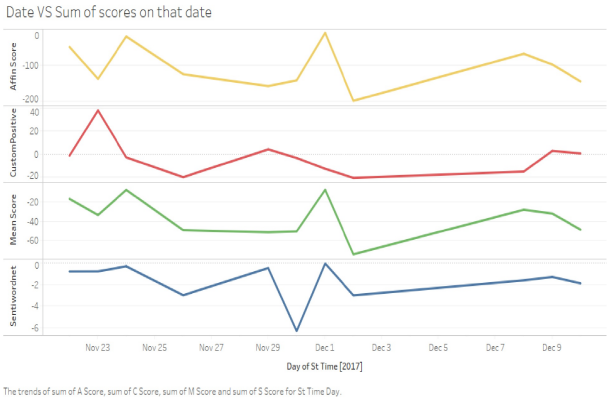
This was our last step where took average of the three scores, the affin score, custom unigram score and the sentiWordNet score. The sentiWordNet score seemed to be closer to the average score.

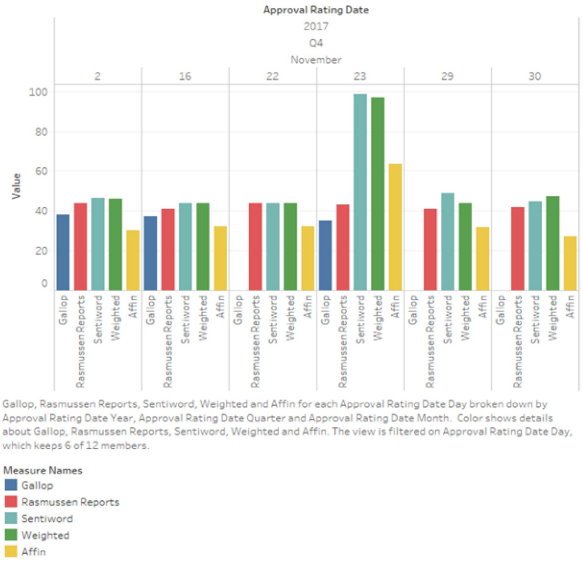
After finding the score from the three different methods, along with the associated user id, tweet time, tweet id and tweet saved the data to the MYSQL database. We then fetched the scores in a particular time frame and calculated the approval rating found by using the affin scores, custom scores, sentiwordnet scores and the mean scores and compared the ratings found from each. On running the model a number of time we found that sentiWordNet were giving best results.

Evaluation

For evaluation we have considered the results from Gallup polls and Rasmussen Reports as our base cases. We also provided visualizations to show how our predictions of approval rating using scores from the sentiWordnet, affin and the overall weighted lie within the range of approval rating of from Gallup polls and Rasmussen Reports.

Sample weekly output:
Weekly Approval Rating between 2-11-2017 and 8-11-2017 (affin) : 30.20 percent
Weekly Approval Rating between 2-11-2017 and 8-11-2017 (SentiWordNet): 46.53 percent
Weekly Approval Rating between 2-11-2017 and 8-11-2017





(weighted): 46.04 percent

Sample daily output:
Daily Approval Rating on 22-11-2017 (affin): 32.34 percent
Daily Approval Rating on 22-11-2017 (sentiWordNet): 43.71 percent
Daily Approval Rating on 22-11-2017 (weighted): 43.71 percent

For the weekly output of approval rating of week between 2-11-2017 and 8-11-2017 from the Gallup polls is 38 and 44 from Rasmussen Reports. Also, the trends show that predictions made using affin score are closer to Gallup polls and predictions using weighted and sentiwordnet are closer to Rasmussen Reports. As the Rasmussen Reports do not make use of interviewers and involve less human interaction, the chances of human errors are reduced. It seems to be an improvement on Gallup polls, so we will use that our base. Our sentiWordnet results and the weighted score results give the results closer too Rasmussen Reports. The accuracy varied with the data but sometimes we got accuracy as high as 88 percent.

Discussion and Conclusion

In the above section we see how closely the twitter data can be used to calculate approval rating. If the model could be improved and tested overtime, it could provide better results over asking on phone. Due to use of machine automated survey as humans errors are reduced. Also, people tend to write more honestly and strongly on twitter. People might be fear telling the interviewers the truth but putting up an anonymous tweet is quite easy. Also, on twitter people start casual discussions about politicians and political parties, so there are more chances of getting people's authentic views in their freely flowing discussions rather than conscious and formal interviews as takes place over the phone. So, we feel using twitter data for evaluation can generate better approval rating on users. In future we would like to extend our project to find approval rating for more politicians and political parties and also incorporate data from other social media like Redit to strengthen the efficiency of the model.

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