Does Twitter Political Engagement Imply Real-world Election Participation?

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Introduction

Participation in the presidential election has a fundamental impact on American society. Twitter, as one of the largest social network platforms, has been claimed to play a vital role in presidential elections.
Therefore, our project aims to investigate the relationship between voter participation and Twitter engagement in 2020 election.

Hypothesis

Our general hypothesis is that **the 2020 presidential election participation is associated with Twitter engagement.**

Claim (1) Greater Twitter engagement is affiliated with higher state-wise voter turnout.
Claim (2) The state-wise winner of the presidential election is related to the candidate who appeared the majority of times in the state-wise Tweets.

Data

In this project, we used two datasets.

1. A Tweets dataset from Kaggle. We cleaned and filtered out non-US location records.
2. We collected the voter turnout dataset from the Washington Post. The visualization of this dataset can be found in Figure 1.

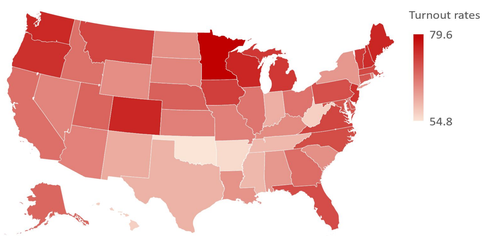

Figure 1. Presidential election turnout by state

Pearson Correlation & Single Linear Regression

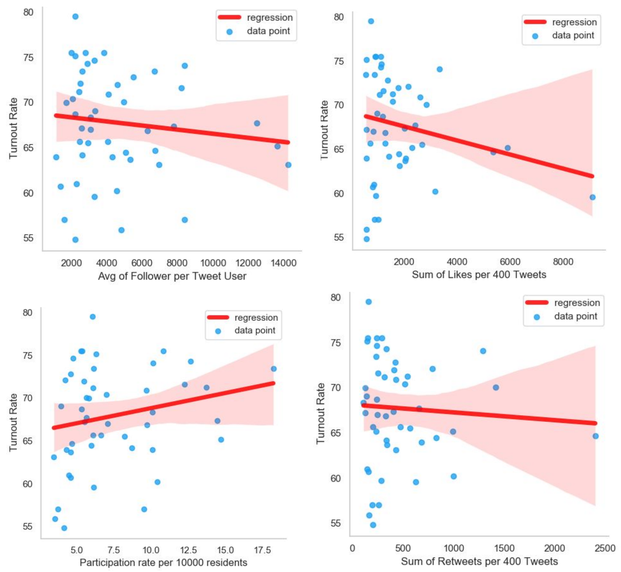

Figure 2. Single variable linear regression plots with 95% confidence band

Table 1. The result of Pearson Correlation Analysis

	Pearson Correlation	P-value
Likes	-0.17	0.25
Retweets	-0.03	0.81
Participation rate	0.22	0.13
Followers	-0.11	0.46

To measure the engagement of Twitter users, we defined four metrics.

(1) Avg number of followers per user.
(2) Sum of likes per 400 Tweet Samples.
(3) Participation rate per 10K residents.
(4) Sum of retweets per 400 Tweet Samples.

We then conducted Pearson Correlation Analysis (results shown in Table 1) and built four single linear regression models using data in 5% - 95% range to show relationships between voter turnout and Twitter engagement(results shown in Figure 2).

Pearson Correlation Analysis:

- All p-values > 0.05, our results are not statistically significant.

Single Variable Linear Regression:

- Most of the points are **out of** 95% confidence band, which means unfortunately our data doesn't observably have a linear correlation.

Multiple Linear Regression

We then ran a multiple regression to find the relationship between state-wise voting rate and four metrics defined before that indicates engagement levels. Results can be found in Table 2.

None of the p-values is < 0.05, which shows that **even when we expand to multiple variables, there is no evidence that state-wise voting rate can be explained by Twitter user engagement on political matters.**

Table 2. The result of Multiple Linear Regression

	Coefficient	P-value
Participation rate	0.0119	0.81
Likes	-0.0006	0.23
Retweets	0.0006	0.82
Followers	0.0001	0.64

Chi-Squared Test

We used the Chi-Squared Test to validate Claim (2). Twitter winner is defined as the candidate whose number of mentions in hashtags outnumbers other candidates state-wise. Table 3 displays the number of states that falls into each category (winner of real-world v.s.Twitter).

Table 3. The result of Pearson Chi-Squared test

	Trump (Twitter winner)	Biden (Twitter winner)
Trump (Real)	17	8
Biden (Real)	21	5

Chi-Squared Test results:
Chi-Squared = 1.09417, df = 1, p-value = 0.295548

Conclusions & Future Work

Conclusions:

We can't accept our hypothesis based on results. In other words, Twitter political engagement does not imply real-world election participation.

Potential Limitations of Our Dataset:

1. Mentions of the two candidates in hashtags may not be the best representation of Twitter political engagement and can lead to bias.
2. Our Twitter collection takes users as a unit, while our voting rate takes state as a unit. This prevents us from adopting many tests including z-test, t-test, etc. to perform validations.
3. Other external factors not shown in the Twitter dataset (age distribution, etc.) may affect our analysis result.

Future Work:

1. Come up with more well defined methods to measure users' Twitter engagement.
2. Experiment on past elections to see if the results are the same.

Acknowledgement

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