Shifting Trends of COVID-19 Tweet Sentiment with Respect to Voting Preferences in the 2020 Election Year of the United States

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Introduction

U.S. Politics & Covid-19

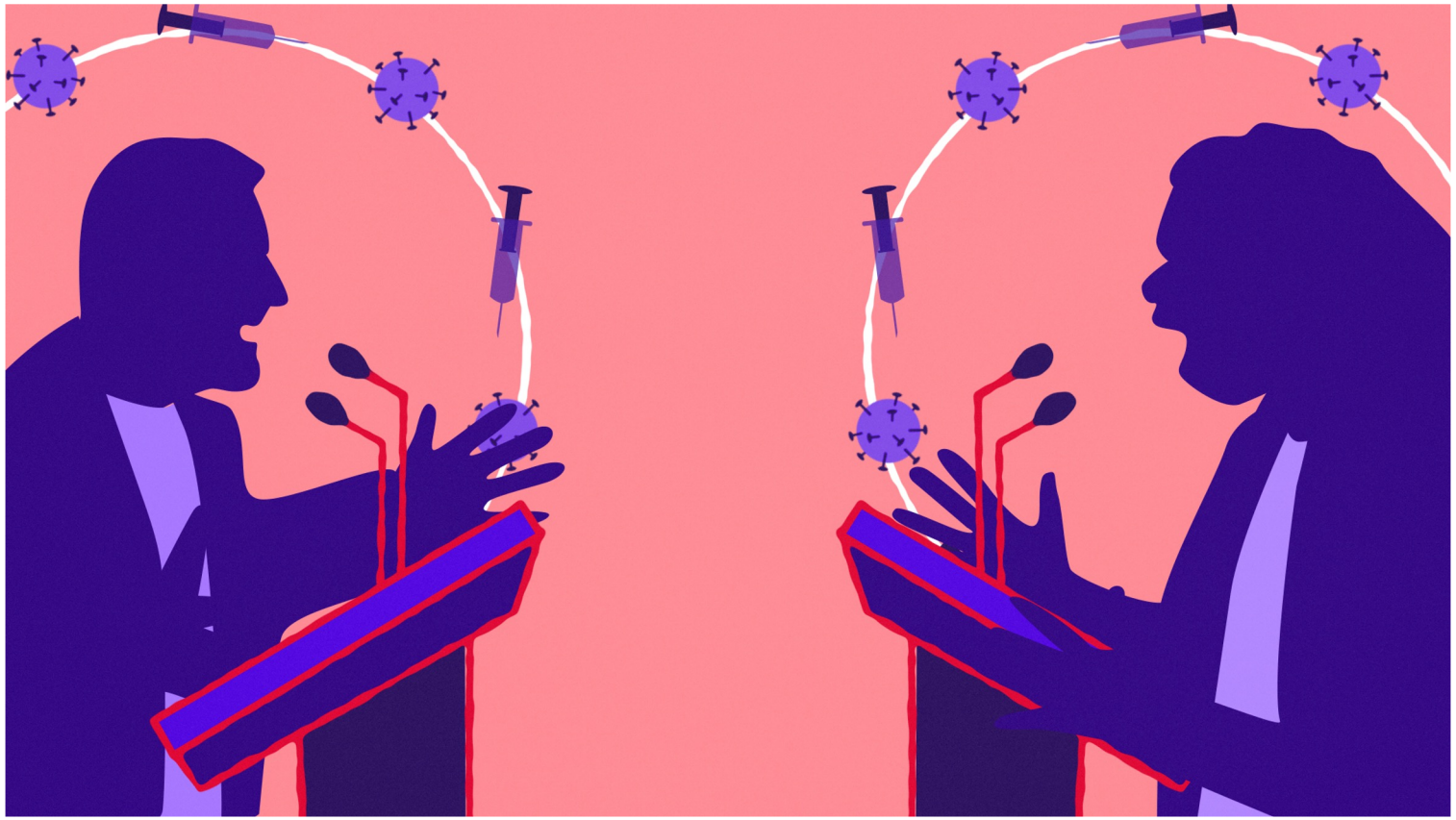


Image source: statnews.com

Blue and Red States in the U.S.A.

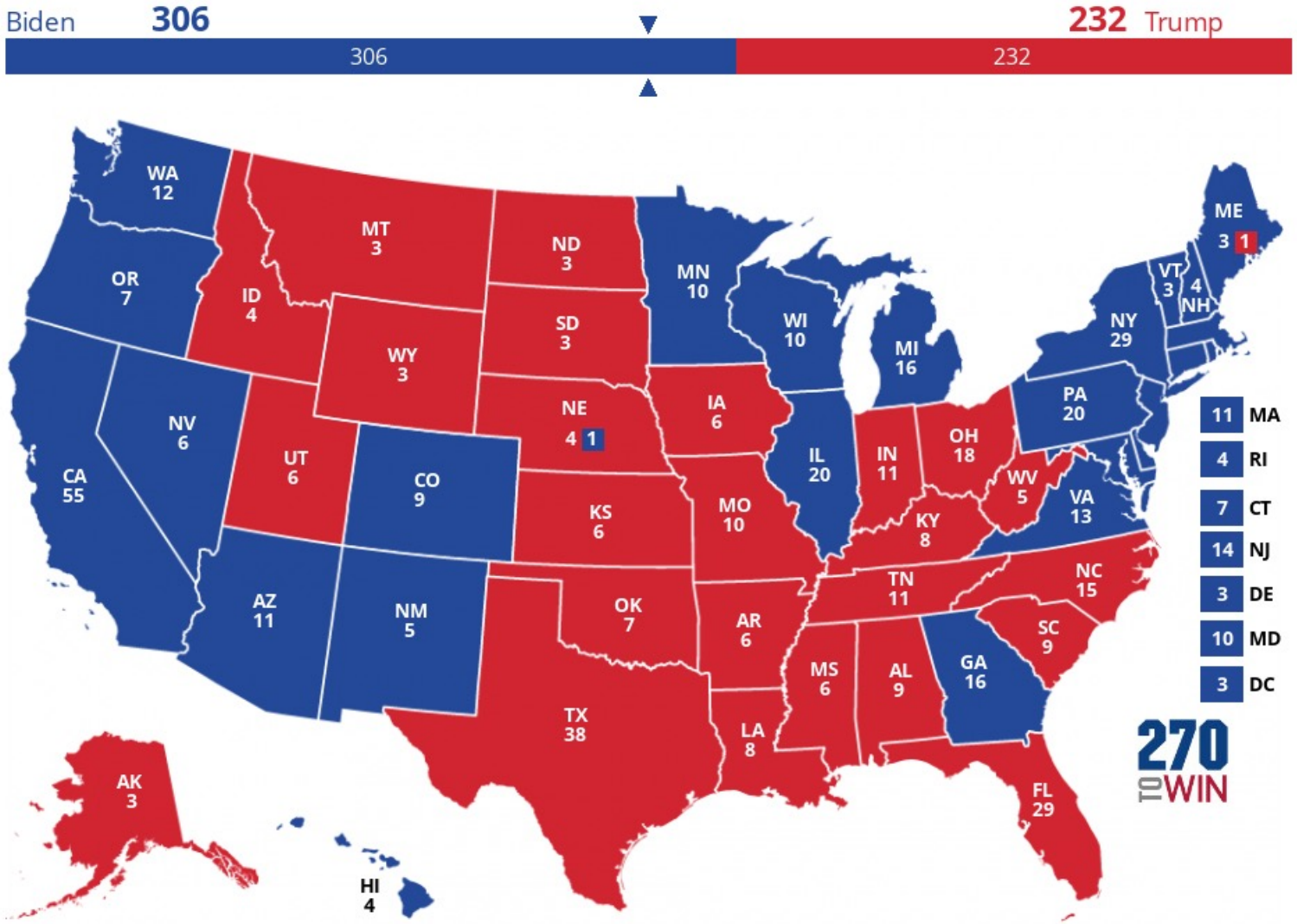


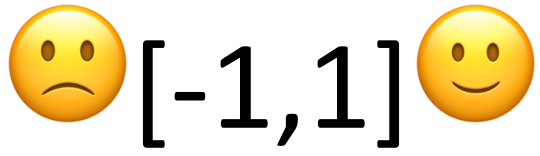
Image source: https://www.270towin.com/

Twitter as a Data Source

- API for app development
- Tweet objects and metadata:
  - Date
  - Location
  - Tweet contents
- Dataset of Tweets based on 90 key words surrounding Covid-19

Sentiment Analysis & NLP

Sentiment scores ~ Mood



Goals

Is there association between COVID-19 tweets and voting preferences in the 2020 U.S.A. election?

Tweet Data

> Appl Intell (Dordr). 2021;51(5):2790-2804. doi: 10.1007/s10489-020-02029-z. Epub 2020 Nov 6.

Design and analysis of a large-scale COVID-19 tweets dataset

Rabindra Lamsal [1]

Table 1 Overview of the filtering keywords as of July 17, 2020

In use since	Keywords[a]
March 20, 2020	corona, #corona, coronavirus, #coronavirus
April 18, 2020	covid, #covid, covid19, #covid19, covid-19, #covid-19, sarscov2, #sarscov2, sars cov2, sars cov 2, covid_19, #covid_19, #ncov, ncov, #ncov2019, ncov2019, 2019-ncov, #2019-ncov, #2019ncov, 2019ncov
May 16, 2020	pandemic, #pandemic, quarantine, #quarantine, flatten the curve, flattening the curve, #flatteningthecurve, #flattenthecurve, hand sanitizer, #handsanitizer, #lockdown, lockdown, social distancing, #socialdistancing, work from home, #workfromhome, working from home, #workingfromhome, ppe, n95, #ppe, #n95

Sample Tweets	Date, Location	Sentiment
Dinner tonight is a B.L.T. and a corona. Sponsored by Covid-19 @ Miami Beach, Florida https://t.co/GyznR8Yqed	2020-04-11 Miami Beach, FL	0
Bare shelves: the time of #corona @ South Burlington, Vermont https://t.co/idfYhEOFfV	2020-04-11 South Burlington, VT	0
EMBRACE THE SUCK: In spirituality, contrasting experiences refers to the ones we'd really rather not have. Maybe it's seasonal chronic illness woes (🤦\u200d♀), perhaps it's various elements of Corona chaos, or it could https://t.co/upvcbRBAZS	2020-04-10 Long Beach, CA	-0.87
The best alone time I can have. Wanted to share 🙏\n#stayhome #staysafe #socialdistancing #stayhomestaysafe #inspiring #fun #creative #art #collab #teamwork #newmusic #newalbum #cancel #corona #solo #guitar #life https://t.co/edpaPmXrHa	2020-04-10 Los Angeles, CA	0.91
This quarantine turning me into Joe Jackson 🤦🏾♂😂😂😂\n.\n.\n.\n#llfruge #tallformyheight #mvpofnochildleftbehind #quarantinedad #jacksons #beyonce #Brooklyn #corona #corona #covid #fatherdaughter #florida @ Fleming https://t.co/xmAhSg39hZ	2020-04-11 Fleming Island, FL	0.83

Tweet Sentiment Estimation

- VADER Sentiment
  - Designed for social media
- Average by state per day

date	AK	AL	AR	AZ	CA	CO	CT	DC	DE	FL	GA	HI	IA	ID	IL	IN	KS
20200320	0	0.8591	0.128	0.4961	0.159037	0.632033	0.13844	0	0	0.236633	0.128652	0	0	0	0.22034	0.269864	0.
20200321	0	0.550667	0.2202	0.34802	0.32214	0.4679	0	0	0	0.287658	0.275525	0	0.8553	0	0.194075	0.291994	
20200322	0	0.471225	0	0.612588	0.253292	0.291575	0.7845	0	0.5409	0.522935	0.463239	0	0	0	0.423533	0.149189	0.
20200323	0	0	0.631	0.560175	0.274739	0.386767	0.7269	0	0	0.143119	0.129638	0	0.8807	0	0.1642	0.352373	
20200324	0	0	-0.05615	0.27142	0.286396	0.34	0.9287	0	0	0.281813	0.251791	0	0.03545	0	-0.04134	0.219129	
20200325	0	0	0.6632	0	0.151723	0.6369	0.1635	0	0	-0.05179	0.197659	0	0	0.4295	0.085583	0.15485	0.
20200326	0	-0.4341	0	-0.2846	0.286078	0.308	0.33985	0	-0.2263	0.2266	0.25732	0	-0.1079	0	0.65615	0.190742	0.3
20200327	0	0.2263	0	0.41085	0.126934	0.23575	0.440967	0	0	0.287253	0.166187	0	0.29295	0	0.250567	0.473975	0.
20200328	0	0	-0.0772	0.55085	0.304568	0.362233	0	0	0	0.399	0.109365	0	0.6379	0	0.2844	0.104029	0.44
20200330	0	0	0	0.1289	0.211116	0.371967	0	0	0	0.347369	0.246344	0	0.4215	-0.5423	-0.01425	0.27855	
20200331	0	0.2202	0.2202	0.557225	0.182626	0.095633	0	0	0.128	0.266181	0.2041	0	0.4753	0.10115	0.520425	0.200633	
20200401	0	-0.1697	0	0.21665	0.327692	-0.3612	0.3243	0	0	0.359375	0.457409	0	0.6705	0.8126	0.4559	-0.31705	0.4
20200402	0	0	0.4215	0.414683	0.266767	0.29352	0.855	0	0	0.422056	0.423283	0	-0.7351	0	0.4441	0.206836	
20200403	0	0	0.80705	0.446233	0.204173	0.314367	0.3556	0	0	0.342	0.2579	0	0.6808	0	0.4404	0.5098	
20200404	0	0.1543	0	0.237125	0.345734	0.15835	0	0	0	0.125864	0.324313	0	0.6239	0	0.8516	0.556686	
20200405	0	0	0.8832	0.21116	0.278304	0.046867	0.4019	0	0	0.260831	0.470071	0	-0.0292	0	0.8385	0.146643	
20200406	0	0.492967	-0.08985	0.4286	0.309959	-0.02548	0.6369	0	0	0.152573	0.606243	0	0	0.3612	0.33765	0.626186	
20200407	0	0.7783	0	-0.2553	0.249727	0.362967	0	0	0	0.436467	0.277655	0	0	0.7545	0.36206	0.468656	
20200408	0	0.9473	0	-0.5252	0.11149	0.4654	0	0	0	0.459817	0.281789	0	0	0	0.09636	-0.05503	
20200409	0	0	0	0.401367	0.249562	-0.4291	0	0	0	0.10918	0.1913	0	0	0	0.9274	0.31948	
20200410	0	0	0	0.2295	0.280111	0.190633	0	0	0	0.204125	0.2951	0	0	0	-0.5423	-0.02277	

Voting Data

- State, party called, percent

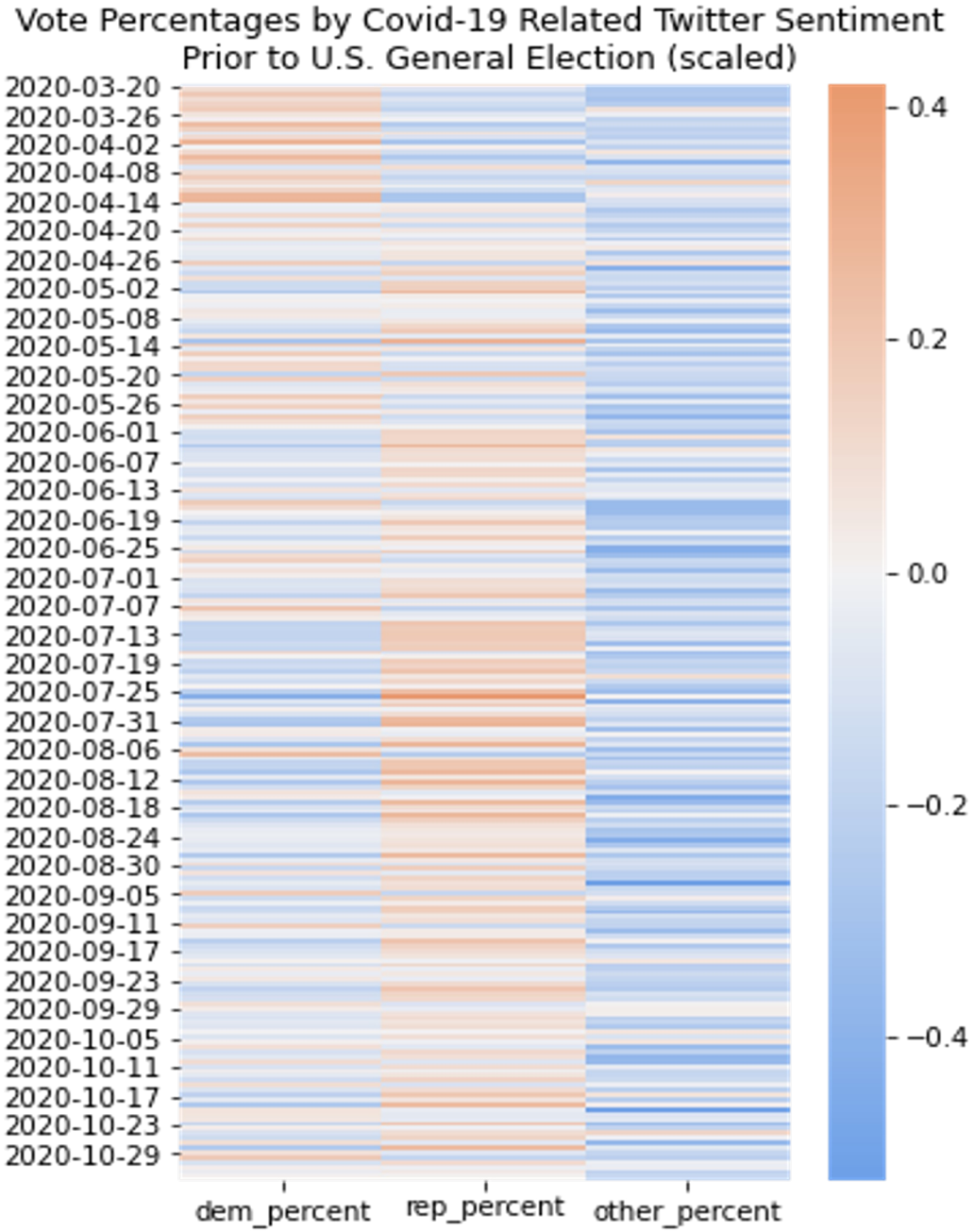
state	called	final	dem_votes	rep_votes	other_vote	dem_perce	rep_perce	other_per	dem_this_	margin_sh	vote_chan	stateid
U.S. Total	D	Yes	81,282,916	74,223,369	2,891,441	51.30%	46.90%	1.80%	4.50%	2.40%	15.90%	
15 Key Battlegrounds			31,908,248	33,002,287	950,354	48.40%	50.10%	1.40%	-1.70%	2.00%	17.20%	
Non-Battlegrounds			49,374,668	41,221,082	1,941,087	53.40%	44.50%	2.10%	8.80%	2.70%	15.10%	
15 Key Battlegrounds												
Arizona	D	Yes	1,672,143	1,661,686	53,497	49.40%	49.10%	1.60%	0.30%	3.90%	31.60%	AZ
Florida	R	Yes	5,297,045	5,668,731	101,680	47.90%	51.20%	0.90%	-3.40%	-2.20%	17.50%	FL
Georgia	D	Yes	2,473,633	2,461,854	62,229	49.50%	49.30%	1.20%	0.20%	5.40%	22.10%	GA
Iowa	R	Yes	759,061	897,672	34,138	44.90%	53.10%	2.00%	-8.20%	1.20%	8.00%	IA
Maine 2nd District	R	Yes	168,696	196,692	10,961	44.80%	52.30%	2.90%	-7.40%	2.80%	6.50%	ME2
Michigan	D	Yes	2,804,040	2,649,852	85,410	50.60%	47.80%	1.50%	2.80%	3.00%	15.40%	MI
Minnesota	D	Yes	1,717,077	1,484,065	76,029	52.40%	45.30%	2.30%	7.10%	5.60%	11.30%	MN
Nebraska 2nd District	D	Yes	176,468	154,377	6,909	52.20%	45.70%	2.00%	6.50%	8.80%	15.80%	NE2
Nevada	D	Yes	703,486	669,890	32,000	50.10%	47.70%	2.30%	2.40%	0.00%	24.90%	NV
New Hampshire	D	Yes	424,921	365,654	15,607	52.70%	45.40%	1.90%	7.40%	7.00%	8.30%	NH
North Carolina	R	Yes	2,684,292	2,758,775	81,737	48.60%	49.90%	1.50%	-1.30%	2.30%	16.50%	NC
Ohio	R	Yes	2,679,165	3,154,834	88,203	45.20%	53.30%	1.50%	-8.00%	0.10%	7.70%	OH
Pennsylvania	D	Yes	3,458,229	3,377,674	79,380	50.00%	48.80%	1.10%	1.20%	1.90%	13.10%	PA
Texas	R	Yes	5,259,126	5,890,347	165,583	46.50%	52.10%	1.50%	-5.60%	3.40%	26.20%	TX
Wisconsin	D	Yes	1,630,866	1,610,184	56,991	49.40%	48.80%	1.70%	0.60%	1.40%	10.80%	WI
Non-Battlegrounds												
Alabama	R	Yes	849,624	1,441,170	32,488	36.60%	62.00%	1.40%	-25.50%	2.30%	9.40%	AL
Alaska	R	Yes	153,778	189,951	15,801	42.80%	52.80%	4.40%	-10.10%	4.70%	12.80%	AK
Arkansas	R	Yes	423,932	760,647	34,490	34.80%	62.40%	2.80%	-27.60%	-0.70%	7.80%	AR
California	D	Yes	11,110,250	6,006,429	384,192	63.50%	34.30%	2.20%	29.20%	-0.90%	23.40%	CA
Colorado	D	Yes	1,804,352	1,364,607	87,993	55.40%	41.90%	2.70%	13.50%	8.60%	17.10%	CO
Connecticut	D	Yes	1,080,831	714,717	28,309	59.30%	39.20%	1.60%	20.10%	6.40%	10.90%	CT

Results

Correlation Heat Map

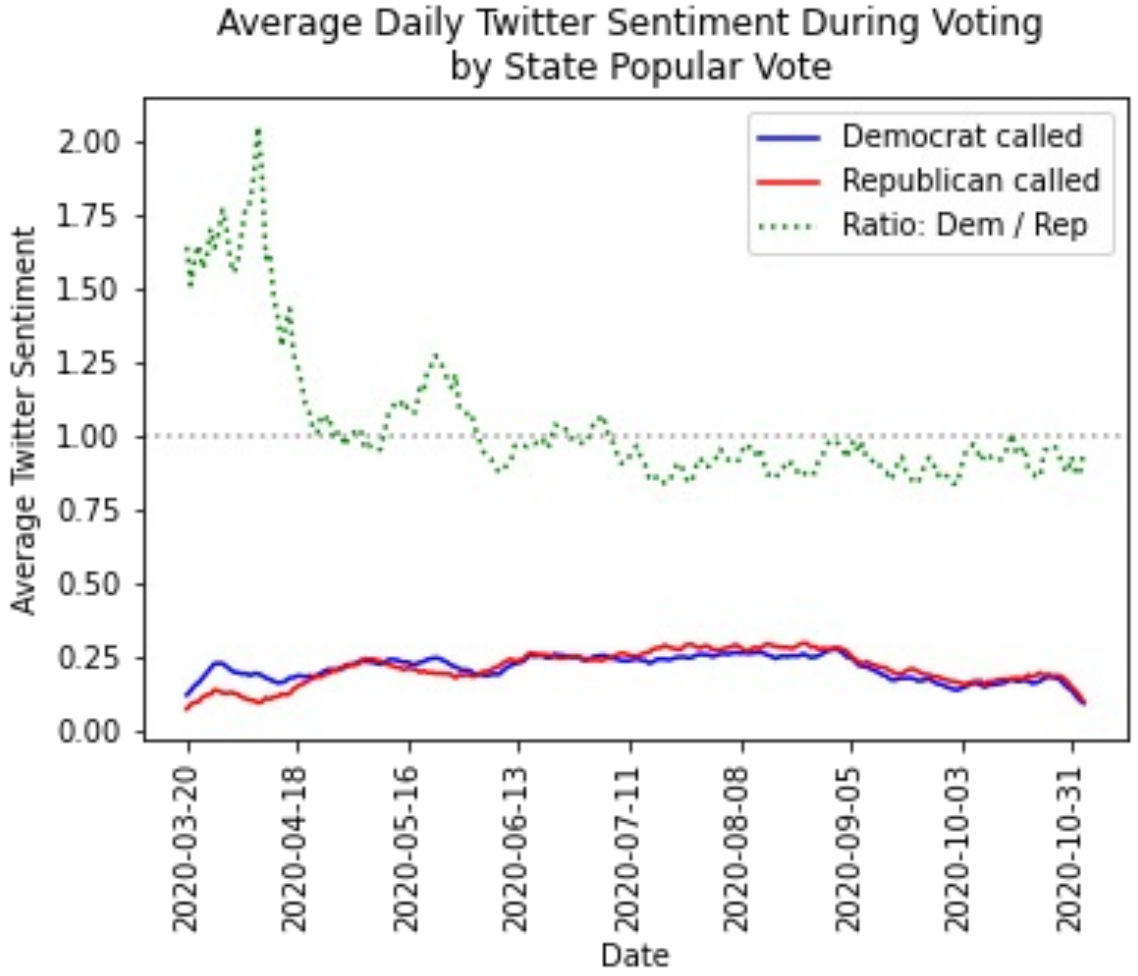
Daily average tweet sentiment

~ votes count by state

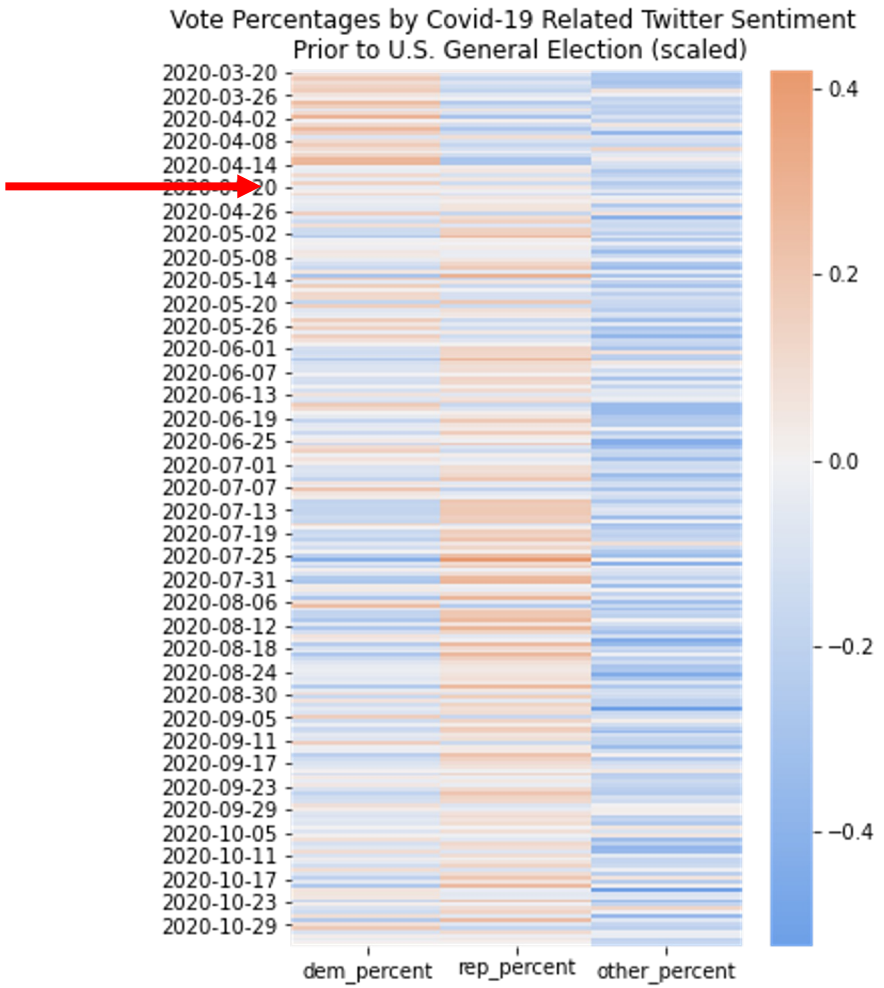


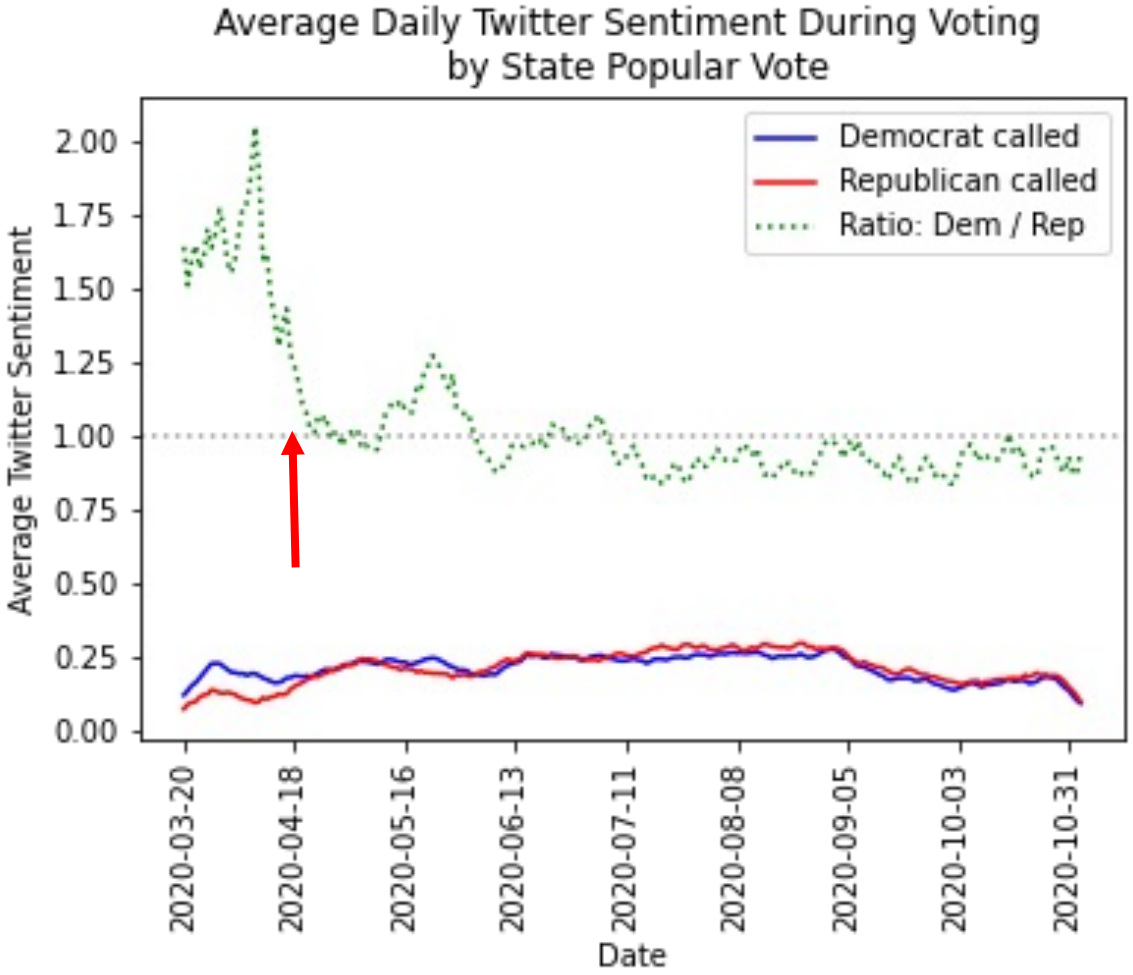
Time Series

- Sentiment Averages for states by party called
- Ratio:
  - Avg. Dem Sentiment ÷ Avg. Rep Sentiment



Trends


Vote Percentages by Covid-19 Related Twitter Sentiment
Prior to U.S. General Election (scaled)
2020-03-20
2020-03-26
2020-04-02
2020-04-08
2020-04-14
2020-04-20
2020-04-26
2020-05-02
2020-05-08
2020-05-14
2020-05-20
2020-05-26
2020-06-01
2020-06-07
2020-06-13
2020-06-19
2020-06-25
2020-07-01
2020-07-07
2020-07-13
2020-07-19
2020-07-25
2020-07-31
2020-08-06
2020-08-12
2020-08-18
2020-08-24
2020-08-30
2020-09-05
2020-09-11
2020-09-17
2020-09-23
2020-09-29
2020-10-05
2020-10-11
2020-10-17
2020-10-23
2020-10-29
dem_percent
rep_percent
other_percent
0.4
0.2
0.0
−0.2
−0.4


Average Daily Twitter Sentiment During Voting
by State Popular Vote
Democrat called
Republican called
Ratio: Dem / Rep
Average Twitter Sentiment
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
2020-03-20
2020-04-18
2020-05-16
2020-06-13
2020-07-11
2020-08-08
2020-09-05
2020-10-03
2020-10-31
Date

Conclusion

We observed weak correlations between the average sentiment of COVID-19 related tweets and popular votes in two-week intervals, and the trends gradually become opposite for Democratic and Republican voting preferences. We then compared the average sentiments of COVID-19 related tweets between states called in favor of the Republican (red states) or Democratic parties (blue states). We found that at the beginning of lockdowns COVID-19 tweet sentiments in the blue states were much more positive than those in the red states. However, COVID-19 tweet sentiments in the red states gradually become more positive during the summer of 2020 and persisted until the election day.

Acknowledgements

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Sources

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