
Using Twitter Sentiment during COVID-19 for S&P Prediction

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Background and Problem Statement



During COVID-19 there was significant volatility introduced to the market based on sentiment of the economy.

- Social media continues to be one of the greatest sources of data to evaluate sentiment
- From its peak on February 19, 2020, to its low point on March 23, 2020, the S&P 500 index dropped approximately **34%**.

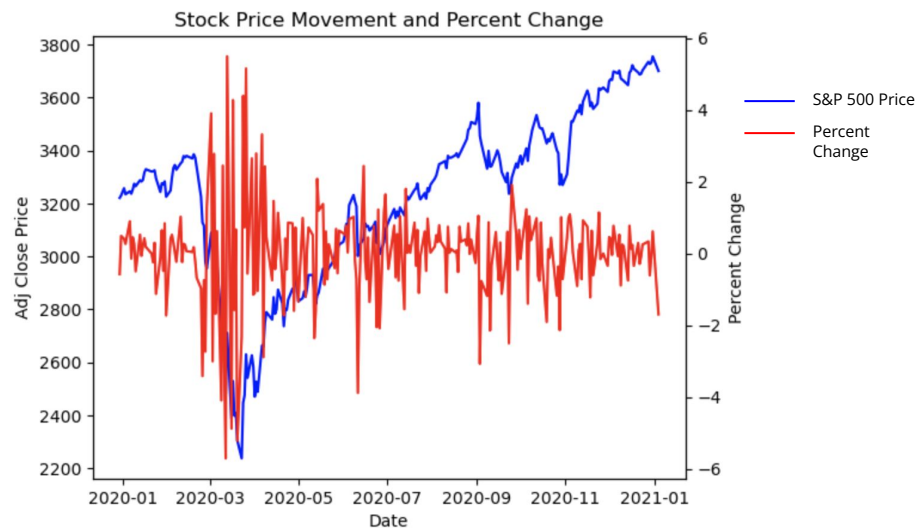
Problem Statement

Leverage the COVID-19 period to assist in predicting stock performance for the next global event

Data



- PanceaLab acquired roughly 1.5m COVID-19 chatter tweets throughout the period March 2020 - June 2020
 - 8gb of data
 - Data driven selection of keywords: COVID19, CoronavirusPandemic, COVID-19, 2019nCoV, CoronaOutbreak, coronavirus, WuhanVirus, covid19, coronaviruspandemic, covid-19, 2019ncov, coronaoutbreak, wuhanvirus
 - Timestamp, account, tweet
-
- S&P 500 daily price activity acquired from Yahoo Finance
 - High, low, adjusted close, volume



Twitter Data



| created_at | id | retweet_count | favorite_count | text |
|---------------------|---------------------|---------------|----------------|----------------------|
| 2020-07-01 15:10:32 | 1278345250428370944 | 0 | 1 | @davidmweissman Y... |
| 2020-07-01 15:10:32 | 1278345250684182528 | 94 | 0 | RT @AdoptionsUk: ... |
| 2020-07-01 15:10:32 | 1278345250071666688 | 3700 | 0 | RT @davidplouffe:... |
| 2020-07-01 15:10:32 | 1278345250549923840 | 93417 | 0 | RT @lookitstaylor... |
| 2020-07-01 15:10:32 | 1278345249782239233 | 4037 | 0 | RT @RepSwalwell: ... |

Data Cleaning

| created_at | id | retweet_count | favorite_count | text |
|---------------------|---------------------|---------------|----------------|----------------------|
| 2020-07-01 15:10:32 | 1278345250428370944 | 0 | 1 | yes i read spy ma... |
| 2020-07-01 15:10:32 | 1278345250684182528 | 94 | 0 | happy news silver... |
| 2020-07-01 15:10:32 | 1278345250071666688 | 3700 | 0 | covid19 may have ... |
| 2020-07-01 15:10:32 | 1278345250549923840 | 93417 | 0 | shaming people fo... |
| 2020-07-01 15:10:32 | 1278345249782239233 | 4037 | 0 | im so angry with ... |

S&P 500

| date | Open | High | Low | Close* | Adj Close** | Volume | percent_change |
|------------|---------|---------|---------|---------|-------------|------------|---------------------|
| 2020-03-16 | 2508.59 | 2562.98 | 2380.94 | 2386.13 | 2386.13 | 7805450000 | -4.881626730553818 |
| 2020-03-17 | 2425.66 | 2553.93 | 2367.04 | 2529.19 | 2529.19 | 8370250000 | 4.26811671874872 |
| 2020-03-18 | 2436.5 | 2453.57 | 2280.52 | 2398.1 | 2398.1 | 8799300000 | -1.5760311922840178 |
| 2020-03-19 | 2393.48 | 2466.97 | 2319.78 | 2409.39 | 2409.39 | 7956100000 | 0.6647224961144381 |
| 2020-03-20 | 2431.94 | 2453.01 | 2295.56 | 2304.92 | 2304.92 | 9053950000 | -5.222990698783686 |
| 2020-03-23 | 2290.71 | 2300.73 | 2191.86 | 2237.4 | 2237.4 | 7411380000 | -2.3272260565501504 |
| 2020-03-24 | 2344.44 | 2449.71 | 2344.44 | 2447.33 | 2447.33 | 7563150000 | 4.388681305556972 |
| 2020-03-25 | 2457.77 | 2571.42 | 2407.53 | 2475.56 | 2475.56 | 8300010000 | 0.7238268837197933 |
| 2020-03-26 | 2501.29 | 2637.01 | 2500.72 | 2630.07 | 2630.07 | 7766990000 | 5.1485433516305665 |
| 2020-03-27 | 2555.87 | 2615.91 | 2520.02 | 2541.47 | 2541.47 | 6201670000 | -0.5634089370742679 |
| 2020-03-30 | 2558.98 | 2631.8 | 2545.28 | 2626.65 | 2626.65 | 5751120000 | 2.6444130083080006 |
| 2020-03-31 | 2614.69 | 2641.39 | 2571.15 | 2584.59 | 2584.59 | 6576210000 | -1.1511880949558038 |
| 2020-04-01 | 2498.08 | 2522.75 | 2447.49 | 2470.5 | 2470.5 | 5964000000 | -1.1040479087939508 |
| 2020-04-02 | 2458.54 | 2533.22 | 2455.79 | 2526.9 | 2526.9 | 6464190000 | 2.7805120111936406 |

What were people tweeting about?



Elon Musk  
@elonmusk · [Follow](#)

The coronavirus panic is dumb

2:42 PM · Mar 6, 2020



1.4M



See the latest COVID-19 information on Twitter

[Read 40K replies](#)



Donald J. Trump 
@realDonaldTrump

Until November 4th., Fake News Media is going fu
Covid, Covid, Covid. We are rounding the turn. 99.!

8:18 AM · Oct 27, 2020 · Twitter for iPhone

16.8K Retweets 2.7K Quote Tweets 87.1K Likes



Brian Tyler Cohen
@briantylercohen · [Follow](#)



Holy shit. Katie Porter holds the CDC Director's feet to the fire and gets him to commit to FREE TESTING for coronavirus for ALL AMERICANS.

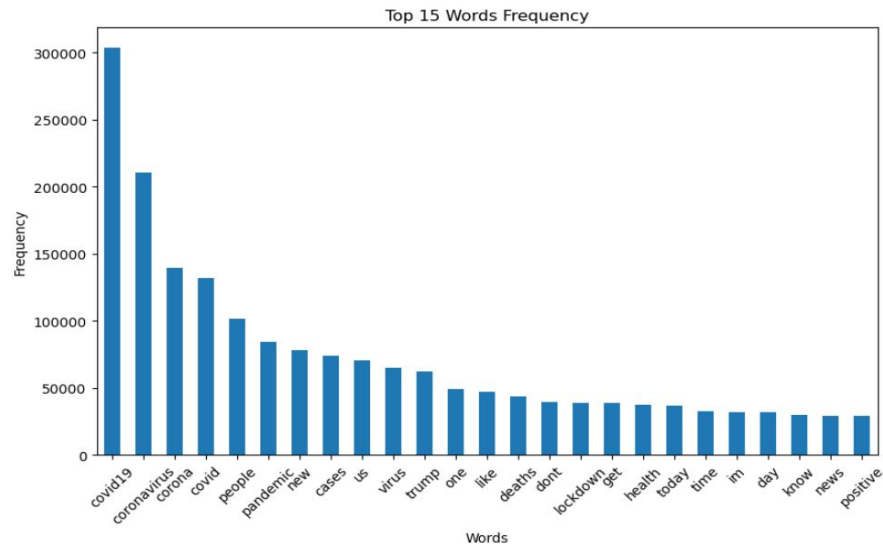
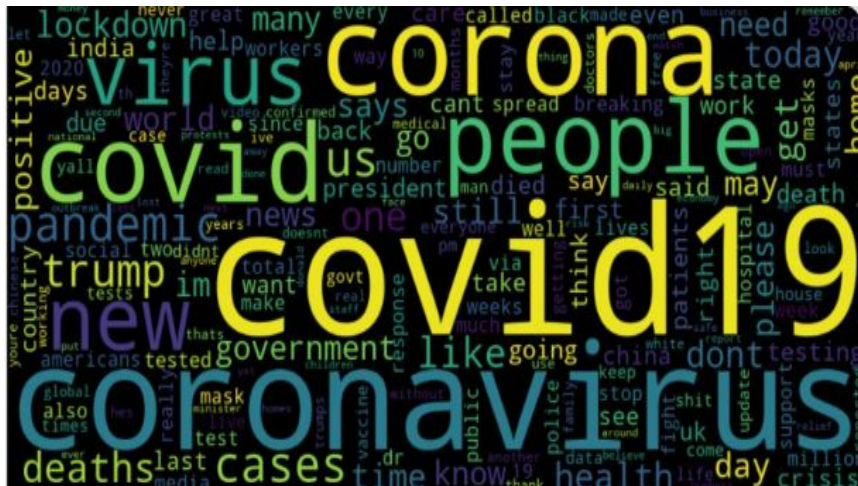
Watch every second of this.



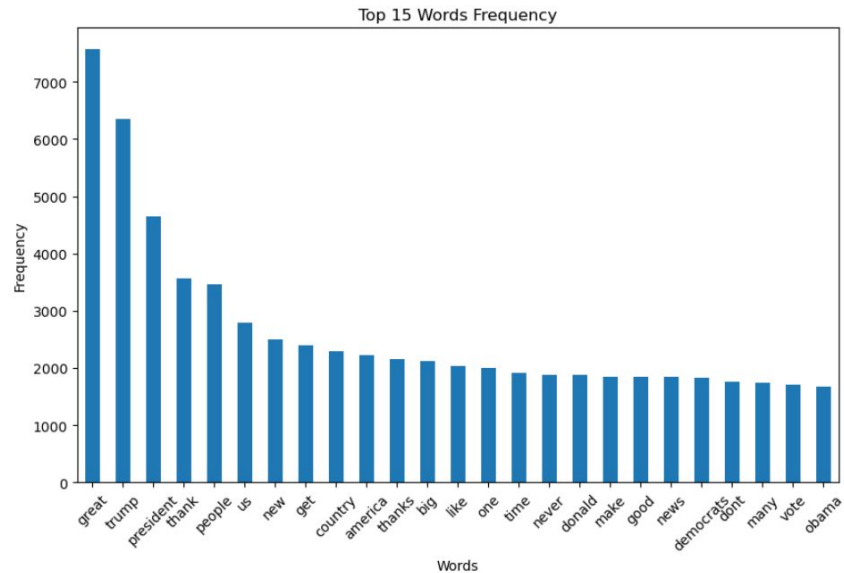
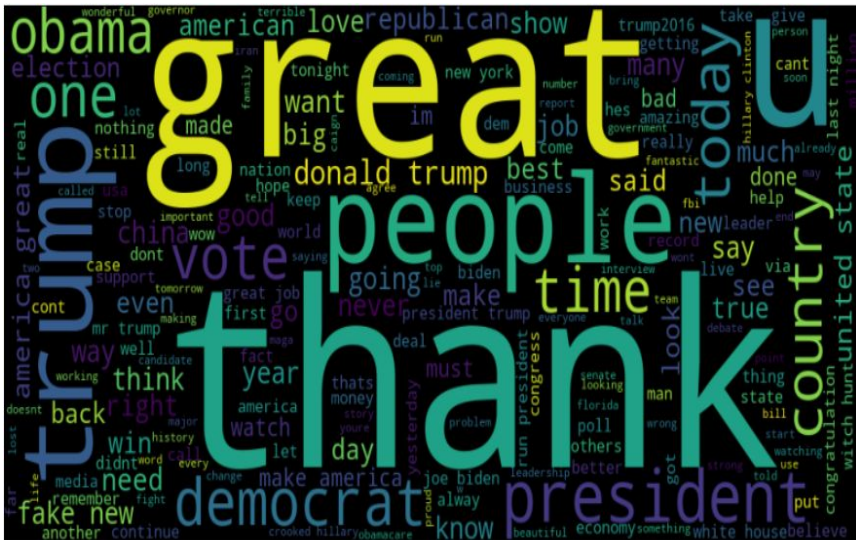
12:30 PM · Mar 12, 2020



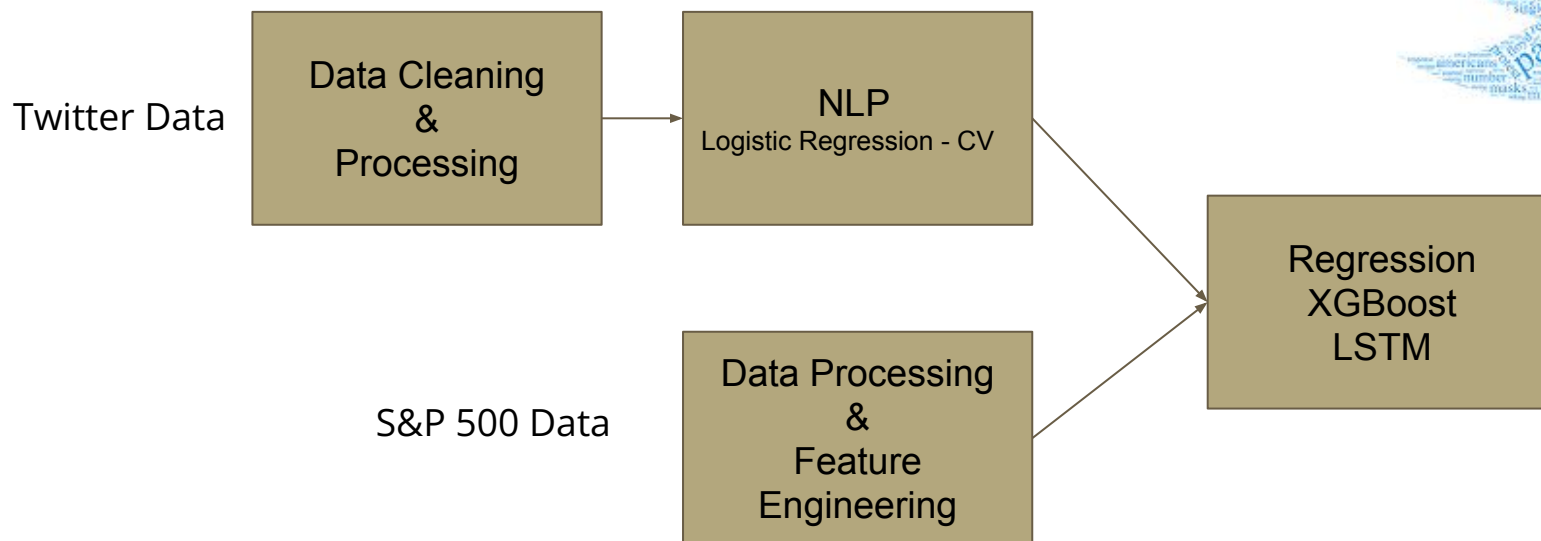
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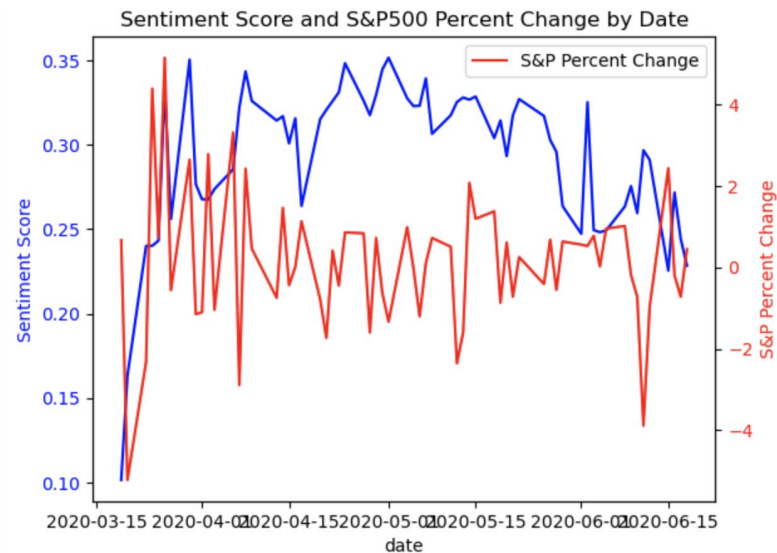
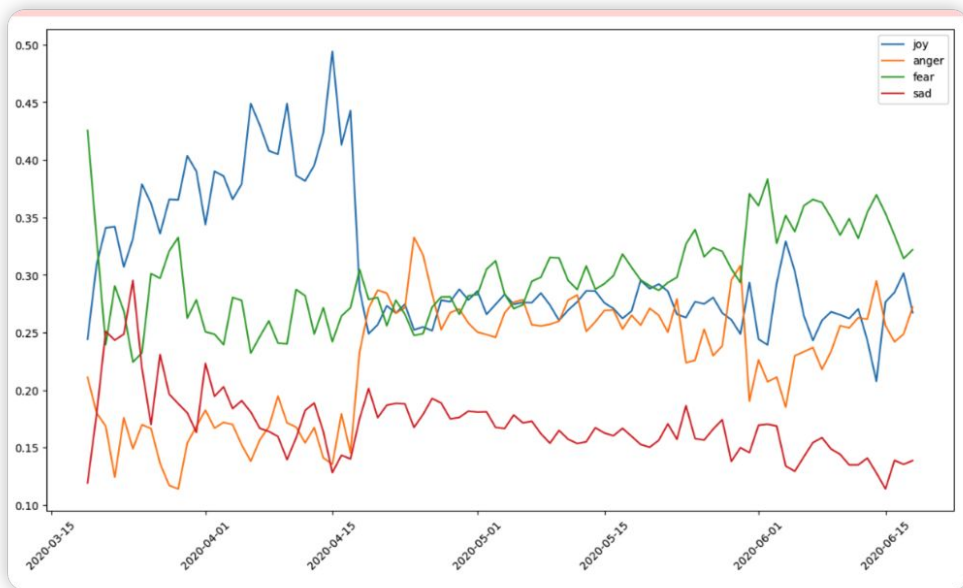
Twitter and Trump



Approach



Twitter Sentiment over months



Model Results & Findings

Sentiment Analysis

| Logistic Regression - CV | |
|--------------------------|------|
| Test Set Accuracy | 0.54 |

S&P 500 Predictions

| Linear Regression | |
|-------------------|------|
| RMSE | 1.93 |

| XGBoost | |
|---------|------|
| RMSE | 1.12 |

| LSTM | |
|------|------|
| RMSE | 1.53 |

Thank you!



Sources

- *“Covid-19 Twitter Chatter Dataset for Scientific Use.” PanaceaLab, www.panacealab.org/covid19/. Accessed 21 May 2023.*
- *“Yahoo Finance - Stock Market Live, Quotes, Business & Finance News.” Yahoo.com, yahoo.com/finance. Accessed 22 May 2023.*
- *Trump tweets - “Trump Archive - Tweets by Trump.” thetrumparchive.com. Accessed 21 May 2023.*
- *<https://www.tweetbinder.com/blog/covid-19-coronavirus-twitter/>*