TRUMP VS BIDEN

2020 ELECTION

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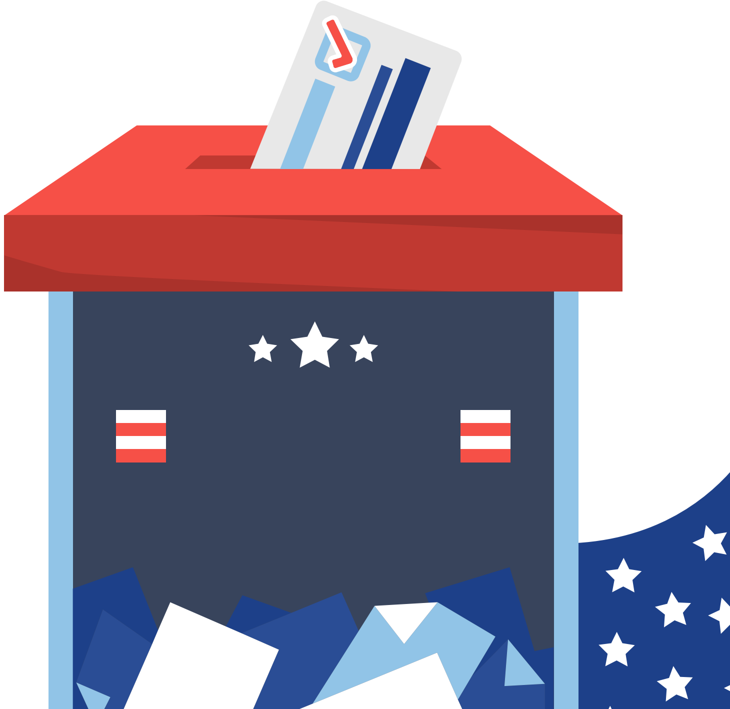
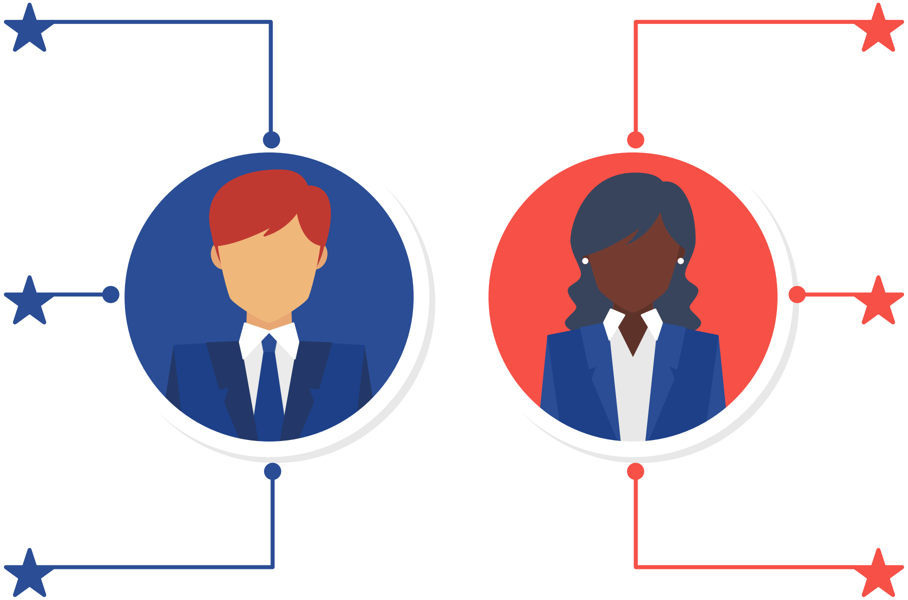
kaggle

OUR DATASET

- We used two datasets
    - Collections of tweets pertaining to Trump and Biden
        - Tweets were collected from October 15th, 2020 to November 8th, 2020



AUDIENCE AND PURPOSE



POLITICIANS

RESEARCHERS AND JOURNALISTS

GEN. POP. AND SOCIAL MEDIA USERS

CAN SOCIAL MEDIA BE USED TO PREDICT ELECTIONS

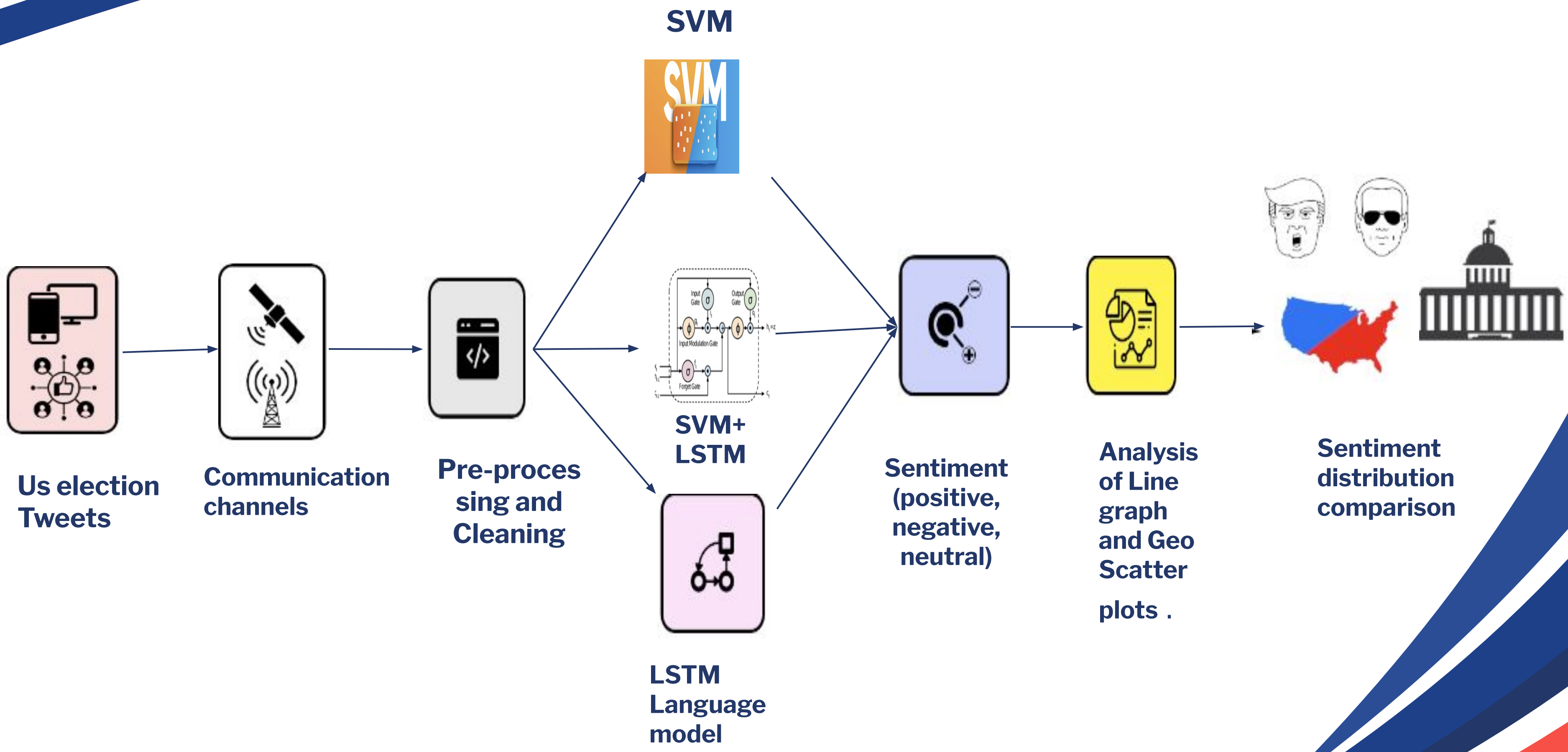
DOES SOCIAL MEDIA ATTENTION HAVE AN EFFECT ON CAMPAIGN AND PERCEPTION

VIEWS OF ELECTION

ETL & LANGUAGES

- Python
  - NLTK
    - Vader lexicon
- Pandas
- MathPlotLib
- Seaborn
- Amazon Web Services
  - S3FS
- Word Cloud
- Plotly

OUR PROCESS



Us election Tweets

Communication channels

Pre-processing and Cleaning

SVM

SVM+ LSTM

LSTM Language model

Sentiment (positive, negative, neutral)

Analysis of Line graph and Geo Scatter

plots .

Sentiment distribution comparison

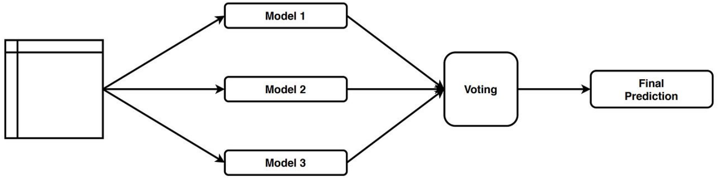
ETL CHALLENGES AND SOLUTIONS

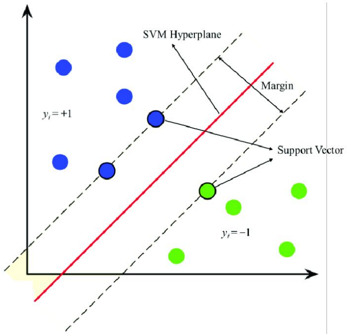
- Original Trump csv file was large with 971,158 rows
    - Encountered errors trying to load csv into a dataframe
- Read it in 5,000-row chunks to manage memory use
    - Switched to 1,000-row chunks to address malformed data upon parsing errors
    - Chunks are then combined into a single DataFrame for analysis
- Cleaned files were still large so Git Large File Storage (Git LFS) was utilized

TRAINING THE MODEL

COMPARISON OF THREE ML MODELS FOR SENTIMENT ANALYSIS

- Support Vector Machine (SVM)
- LSTM
- Ensemble model combining predictions from SVM and LSTM using a hard voting mechanism / Ensemble model combining predictions from SVM and LSTM using soft voting with 92% accuracy

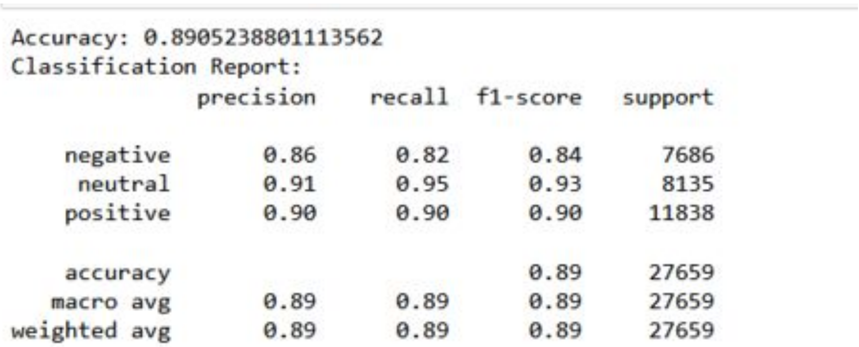




★ TRAINING THE MODEL ★

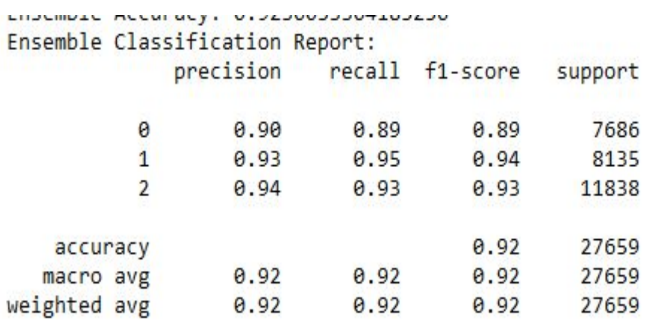
OPTIMIZATION

Using SVM



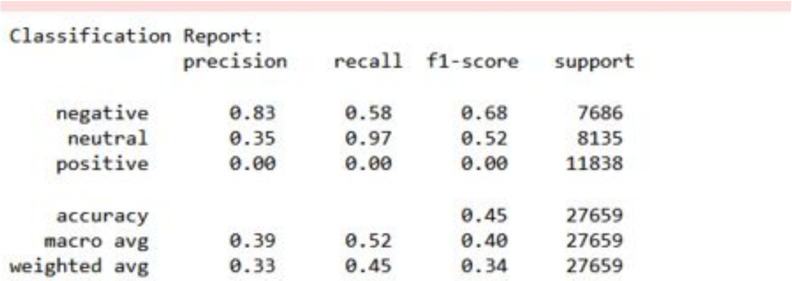
```
Accuracy: 0.8905238801113562
Classification Report:
              precision    recall  f1-score   support

    negative       0.86      0.82      0.84      7686
     neutral       0.91      0.95      0.93      8135
    positive       0.90      0.90      0.90     11838

    accuracy                           0.89     27659
   macro avg       0.89      0.89      0.89     27659
weighted avg       0.89      0.89      0.89     27659
```

Using Ensemble Training



```
Ensemble Accuracy: 0.92[illegible]
Ensemble Classification Report:
              precision    recall  f1-score   support

           0       0.90      0.89      0.89      7686
           1       0.93      0.95      0.94      8135
           2       0.94      0.93      0.93     11838

    accuracy                           0.92     27659
   macro avg       0.92      0.92      0.92     27659
weighted avg       0.92      0.92      0.92     27659
```

Using LSTM

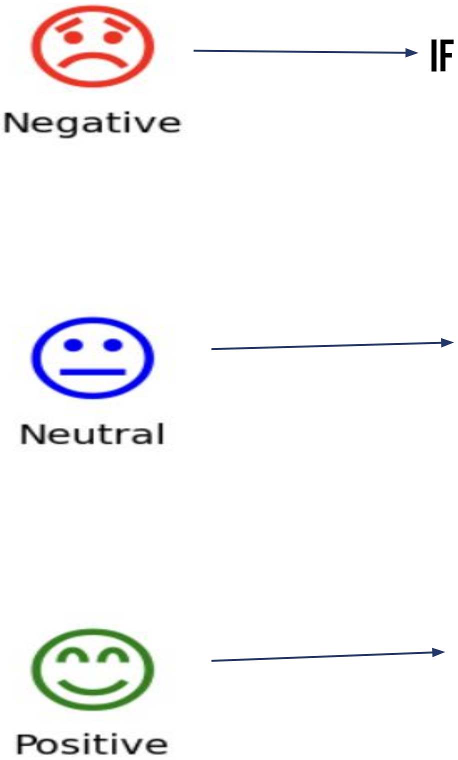


```
Classification Report:
              precision    recall  f1-score   support

    negative       0.83      0.58      0.68      7686
     neutral       0.35      0.97      0.52      8135
    positive       0.00      0.00      0.00     11838

    accuracy                           0.45     27659
   macro avg       0.39      0.52      0.40     27659
weighted avg       0.33      0.45      0.34     27659
```

SENTIMENT ANALYSIS

How VADER Works:

- Scores: VADER outputs four types of scores: positive, neutral, negative, and compound. The compound score, a combined measure of the first three, ranges from -1 (very negative) to 1 (very positive).



IF COMPOUND SCORE <= -0.05

IF COMPOUND SCORE IS BETWEEN -0.05 AND 0.05

IF COMPOUND SCORE >= 0.05

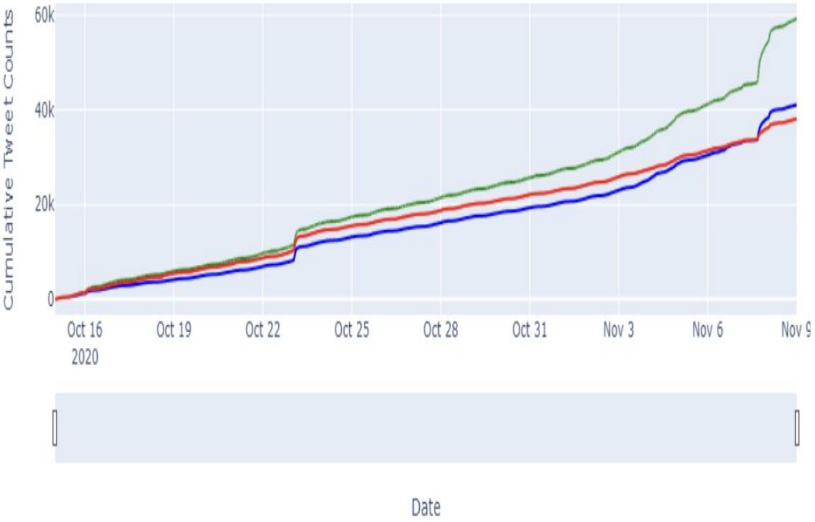
TWEETS BEFORE AND AFTER CLEANING

```
0     #Elecciones2020 | En #Florida: #JoeBiden dice ...
2    @IslandGirlPRV @BradBeauregardJ @MeidasTouch T..
.
4    #censorship #HunterBiden #Biden #BidenEmails #...
6    In 2020, #NYPost is being #censorship #CENSORE...
11   FBI Allegedly Obtained Hunter Biden Computer, ...
17   Comments on this? "Do Democrats Understand how...
21   In an effort to find the truth about allegatio...
22   Twitter is doing everything they can to help D...
26          VOTE FOR #JoeBiden https://t.co/IIROoL5U0O
```

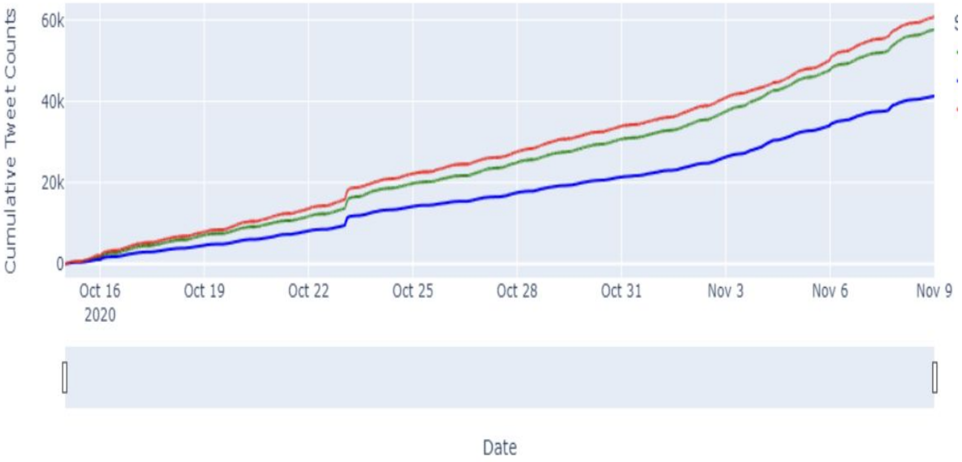
```
0    en   dice que  solo se preocupa por l mismo ...
2                          this is how  made his   \n
6    in   is being   by twitter to manipulate a us ...
11   fbi allegedly obtained hunter biden computer
d...
17   comments on this do democrats understand how
                                             r...
21   in an effort to find the truth about allegatio...
22   twitter is doing everything they can to help d...
26                                    vote for
27                     is tearing up  at the  over the
```

TEMPORAL SENTIMENT TRENDS

JOE BIDEN

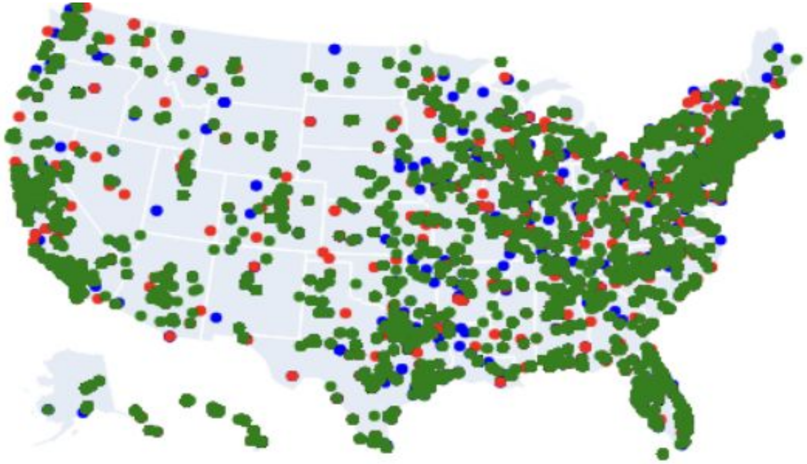


DONALD TRUMP

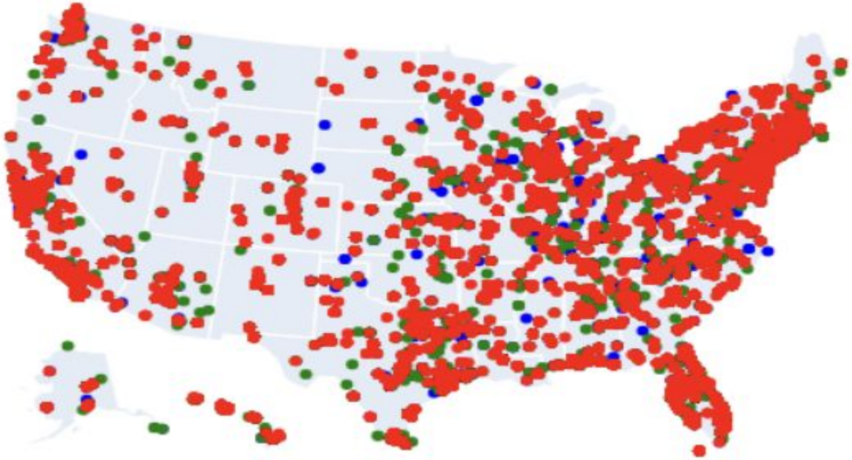


GEOGRAPHICAL SENTIMENT DISTRIBUTION

JOE BIDEN



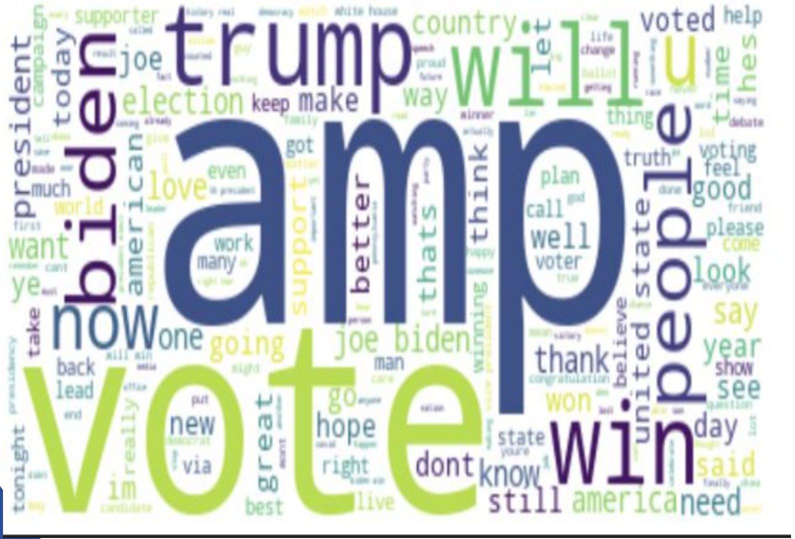
DONALD TRUMP



THEMES AND KEYWORDS

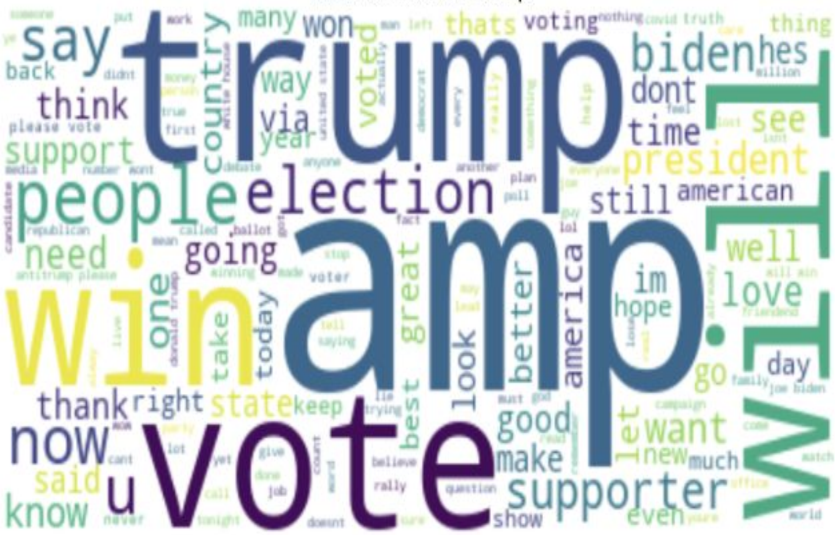
JOE BIDEN

Positive Tweets (Joe biden)



DONALD TRUMP

Positive Tweets-Trump



SENTIMENT DISTRIBUTION COMPARISON

DONALD TRUMP

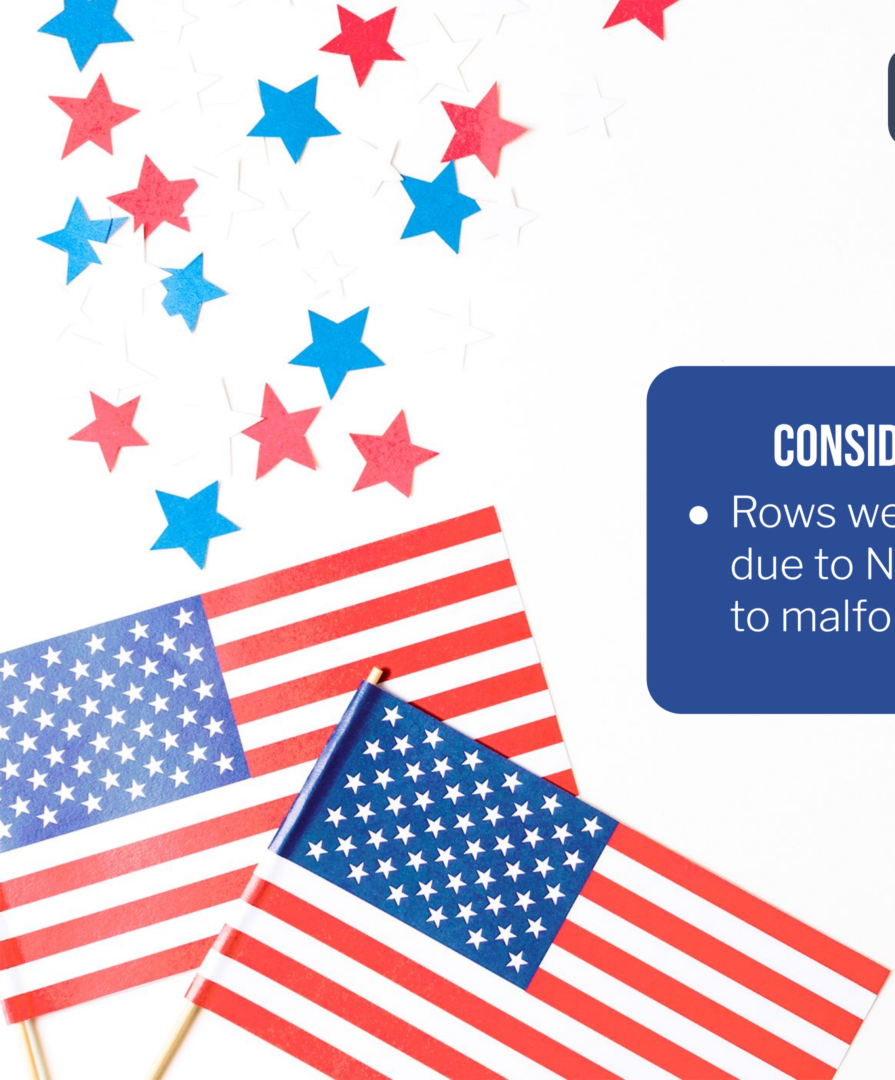
Negative	Neutral	Positive
38.05%	25.85%	36.10%

JOE BIDEN

Negative	Neutral	Positive
27.52%	29.6%	42.81%

KEY INSIGHTS

- Joe Biden's sentiment was predominantly positive,
    - Indicating stable support and resilience against negative campaigns
- Donald Trump's sentiment fluctuated, with
    - Negative sentiments slightly outweighing positive ones
    - Polarized public opinion
- State-specific analysis showed distinct regional differences in sentiment
    - Indiana showing the highest positive sentiment ratio for Biden and South Dakota for Trump
    - Guam exhibited the highest negative sentiment ratio for both candidates, indicating areas of low support



CONSIDERATIONS AND LIMITATIONS

CONSIDERATIONS

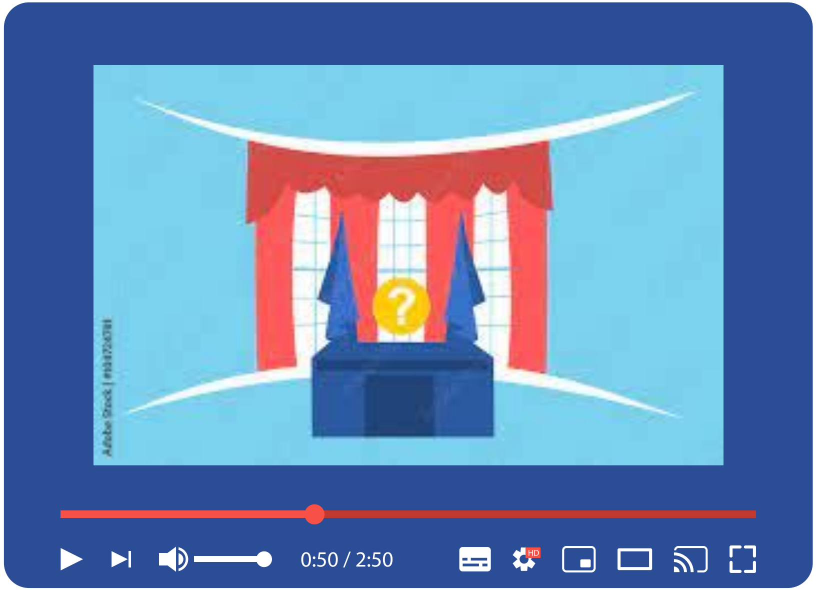
- Rows were dropped due to NaN and due to malformed data

LIMITATIONS

- Access to tweets was limited due to Twitter’s new API policy
- Lost data because it was malformed

CONCLUSION AND QUESTIONS

- Given our final sentiment scores we can conclude that twitter sentiment analysis is an effective leading indicator of election results.
- Moving forward, candidates should pay close attention to social media sentiment scores over time as they can be a predictor of overall outcome.
- Will this hold true in 2024?



RESOURCES

- Trump and Biden 2020 Tweets