

FAKE NEWS DETECTIVES

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AGENDA

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FAKE NEWS

CAN BE DANGEROUS

THE PURPOSE OF OUR PROJECT IS TO MITIGATE
THE RISK OF SPREADING FAKE NEWS

EXECUTIVE SUMMARY

- **Goal:** The aim of our project was to create a tool to help voters determine whether an article is considered 'real or 'fake' news during this election cycle
- We identified appropriate data files, including over 40,000 articles, that were fact checked and determined to be real or fake
- We analyzed the data file attributes, cleaned, and segmented the data into real and fake dataframes for modeling
- We then ran these data files through a variety of classifier models to determine accuracy, precision, sentiment and get a sense of popular, recurring themes using WordCloud
- Finally, we created a user input box using Gradio, that allows the user to enter text and get a determination of real or fake and a sentiment rating

PROJECT APPROACH

1. Data File

1. Read in CSV files
2. Reviewed Data Frame Info
3. Reviewed Column Titles & values

2. Data Preprocessing

1. Remove/Rename missing values, drop rows with nulls
2. Classify Data as Real '1' or Fake '0'
3. Merge 2 Data Frames to 1
4. Create Function to Clean Text
5. Split Data Frame

3. Models

1. Passive Aggressive Classifier – with TF-IDF Vectorizer
2. Word Cloud
3. VADER Sentiment Analysis
4. Whisper Speech to Text Transcription
5. GRADIO Text Input

DATA PRE-PROCESSING AND CLEAN-UP

Reviewed 'real' and 'fake' CSV files columns

Cleaned up null & bad dates, but there were over 12k, so we dropped dates all together

Added a 'class' column to differentiate real vs fake articles

Concatenated & Merged to 1 Data Frame including real and fake

Verified class totals using value.counts

Created clean_text function, to remove URLs, numbers, punctuation, etc. Tokenize & rejoin

Added 'clean_text' column to Data Frame.

Split Data Frame into 4 parts



PASSIVE AGGRESSIVE CLASSIFIER

- Calculated TF-IDF and trained PAC model
- Generated Classification Report
- Generated a Confusion Matrix to verify PAC accuracy
- Saved PAC & TF-IDF models using Pickle for future use
- Observations:
 - Model performed well with train/test data
 - High accuracy and precision
 - High TP and TN, very low FP and FN

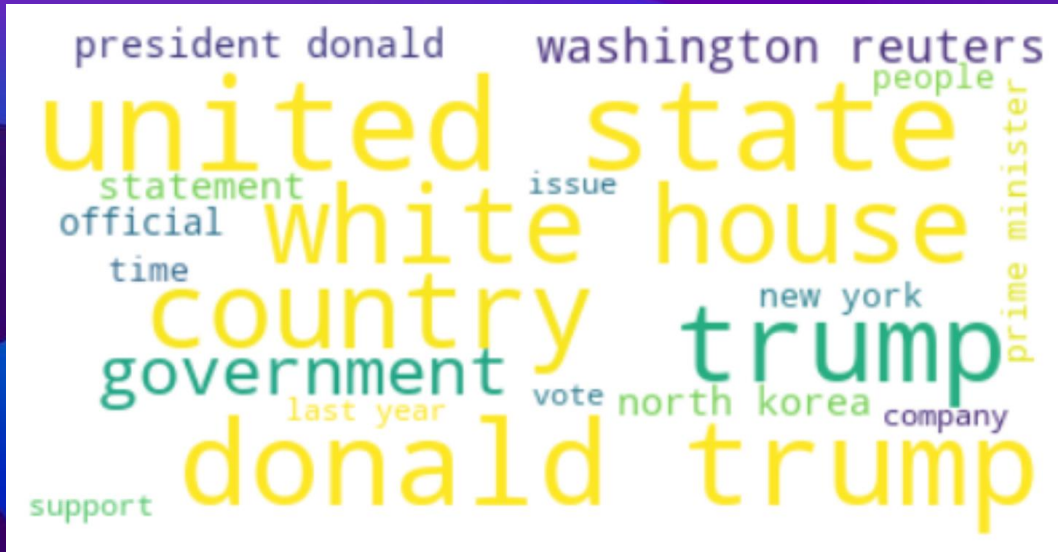
```
Classification Report:
              precision    recall  f1-score   support

     0       1.00      0.99      0.99      6853
     1       0.99      1.00      0.99      6402

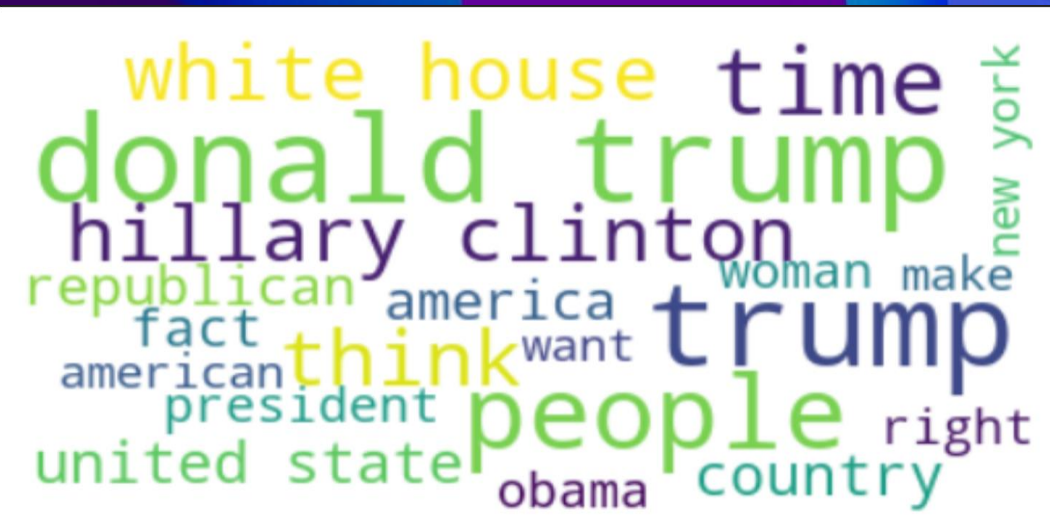
 accuracy              0.99      13255
 macro avg           0.99      0.99      0.99      13255
 weighted avg       0.99      0.99      0.99      13255
```

```
Confusion Matrix:
[[6811   42]
 [  31 6371]]
```

REAL



FAKE



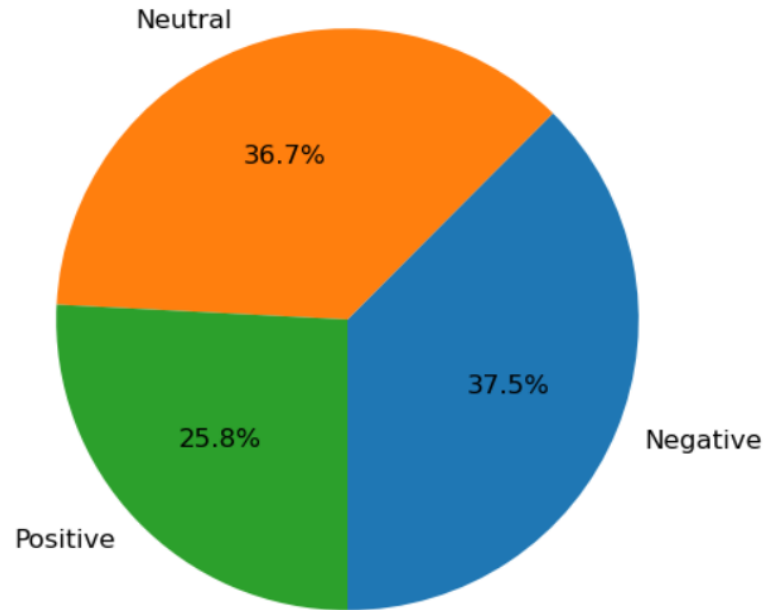
WORD CLOUD

- Created smaller Data Frames that dropped all but the 2 columns needed for the word cloud; 'cleaned_text' & 'class'.
- Split it into 2 data frames; 1 each for real and fake; Created 2 Word Clouds of top 20 words
- Iteratively added stopwords
- Observations:
 - Timeframe 2016-2017; Pre-election through post-election
 - Real articles include references to Donald Trump and election
 - Fake articles include references to Obama, Hillary Clinton

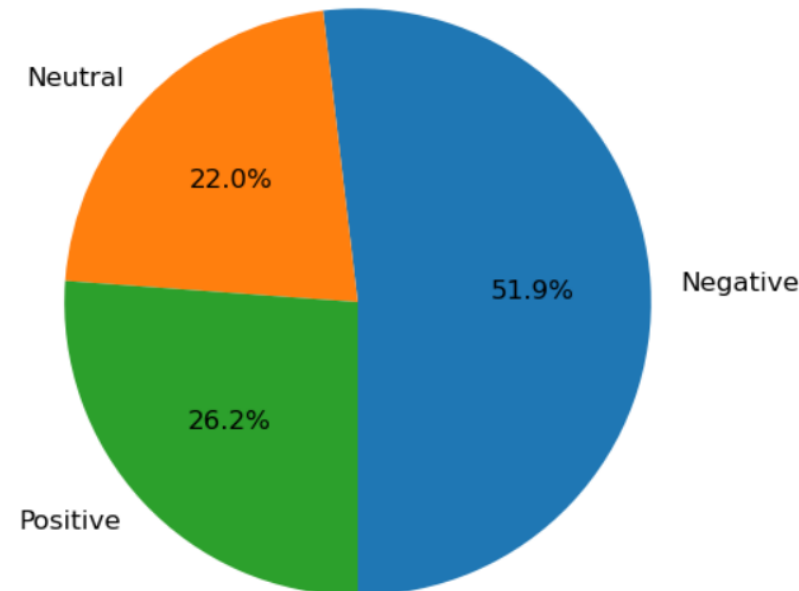
VADER SENTIMENT ANALYSIS

- Takes in sentences and assigns a sentiment rating
- Created a function that measures the sentiment of a sentence, based on language & tone of the article title
- Split data frame into 2 parts; 1 each for real and fake; and generated sentiment for each
- Observations:
 - Real articles had fair representation of sentiments
 - Fake articles were more negative in tone, 40% higher

Real Article Sentiment



Fake Article Sentiment



GRADIO CLASSIFICATION & WHISPER TRANSCRIPTION

- Created Gradio interface that takes text input to provide a sentiment ratings and real vs fake assessment
- Incorporates Whisper Speech-to-text transcription to allow users to get sentiment and real vs fake assessment of audio files
- Observations:
 - Results accurately predict sentiment rating and assigns real/fake

Fake News Detector and Sentiment Analyzer

Enter Text here for Sentiment Rating Only.

Enter Audio filename here for Real-Fake Analysis and Sentiment Rating.

Enter Text here for Real-Fake Analysis and Sentiment Rating.

Clear

Submit

Result: Sentiment Rating.

Result: Real or Fake Analysis Prediction.

Result: Analyzed Text.

FINAL TIPS, CONCLUSIONS & WHAT'S NEXT?

- We can successfully identify real vs fake articles, text and audio, from data files or user input which can be valuable during an election cycle
- PAC is well-suited for large scale articles and text
- TF-IDF works well with PAC by identifying important words in a text document
- Passing more text into Vader Sentiment prediction model seems to make the sentiment lean more negative
- Continuing to iteratively remove stopwords in the Word Cloud model can become cumbersome and eventually counter-productive.

WHAT'S NEXT?

- Applying the model to blogs, tweets & social media
- Sentiment analysis of social media posts
- If we had better values in the date column, we could have done better analysis on time: time series on sentiment, etc.

APPENDIX – GRADIO EXAMPLES

Fake News Detector and Sentiment Analyzer

Enter Text here for Sentiment Rating Only.

Enter Audio filename here for Real-Fake Analysis and Sentiment Rating.

Enter Text here for Real-Fake Analysis and Sentiment Rating.

DUBAI (Reuters) - The United Arab Emirates on Sunday denied a report that \ Yemen s Houthi group had fired a missile toward a nuclear plant in the UAE, state news agency WAM reported on its Twitter account. It quoted the UAE s emergency and crisis management department as saying the UAE possessed a missile defense system that could deal with any

Result: Sentiment Rating.

Negative

Result: Real or Fake Analysis Prediction.

Real

Result: Analyzed Text.

DUBAI (Reuters) - The United Arab Emirates on Sunday denied a report that \ Yemen s Houthi group had fired a missile toward a nuclear plant in the UAE, state news agency WAM reported on its Twitter account. It quoted the UAE s emergency and crisis management department as saying the UAE possessed a missile defense system that could deal with any such threats and adding the al-Barakah nuclear plant was secure against all eventualities."

Fake News Detector and Sentiment Analyzer

Enter Text here for Sentiment Rating Only.

Google is a great place to search for answers when you don't have any!

Enter Audio filename here for Real-Fake Analysis and Sentiment Rating.

Enter Text here for Real-Fake Analysis and Sentiment Rating.

Clear

Submit

Result: Sentiment Rating.

Positive

Result: Real or Fake Analysis Prediction.

Result: Analyzed Text.

Google is a great place to search for answers when you don't have any!

APPENDIX – WHISPER EXAMPLE

Fake News Detector and Sentiment Analyzer

Enter Text here for Sentiment Rating Only.

Enter Audio filename here for Real-Fake Analysis and Sentiment Rating.

Enter Text here for Real-Fake Analysis and Sentiment Rating.

Clear

Submit

Result: Sentiment Rating.

Positive

Result: Real or Fake Analysis Prediction.

Real

Result: Analyzed Text.

Steve Bannon, a former top White House strategist and a former Chief Campaign 8 to Donald Trump, has been asked to testify before the U.S. House of Representatives Intelligence panel next month. Bloomberg News reported, Corey Lewandowski, Trump's former campaign manager, was also asked to testify in early January. Bloomberg reported on Friday, citing an official familiar with the committee schedule. News for the committee did not immediately

THANK YOU

FAKE NEWS DETECTIVES

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