FAKE NEWS DETECTIVES

THOMAS CLEMONS
TIMOTHY CARTER
GI'ANNA CHEAIRS
VINEET DUGGI

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 segemented 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

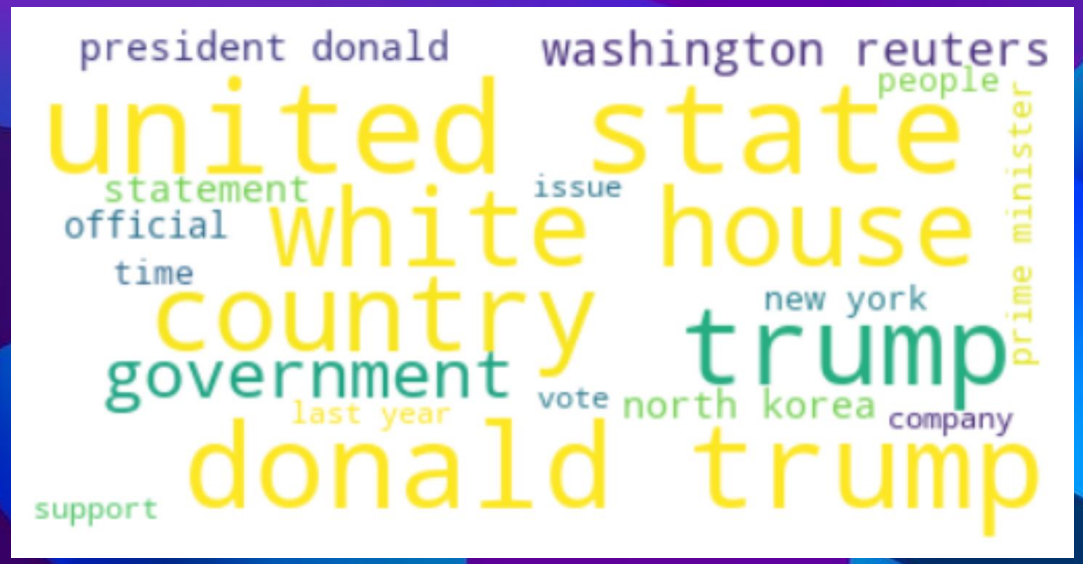
Classification Report:

	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

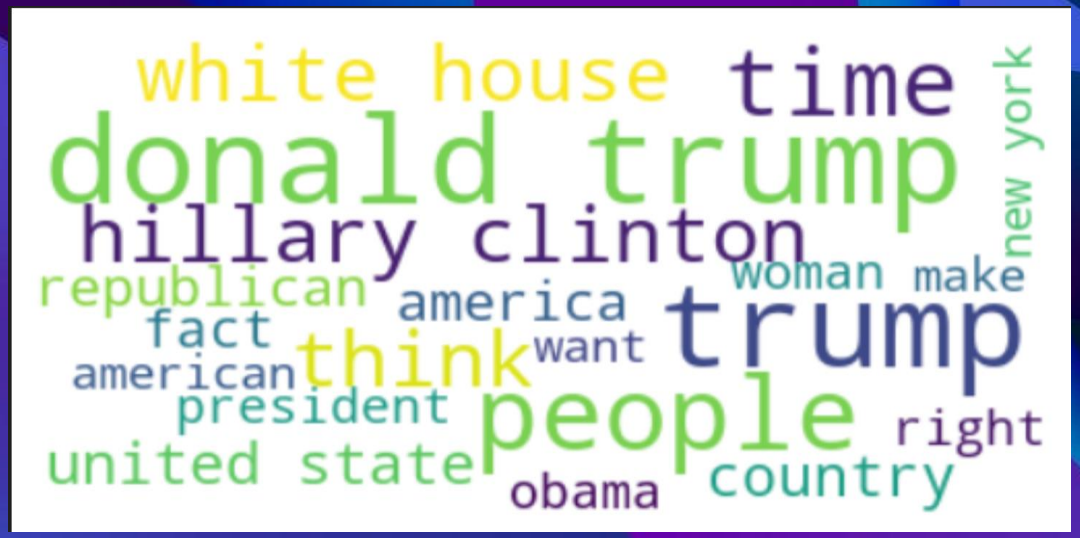
Confusion Matrix:

```
[[6811   42]
 [  31 6371]]
```

REAL



FAKE

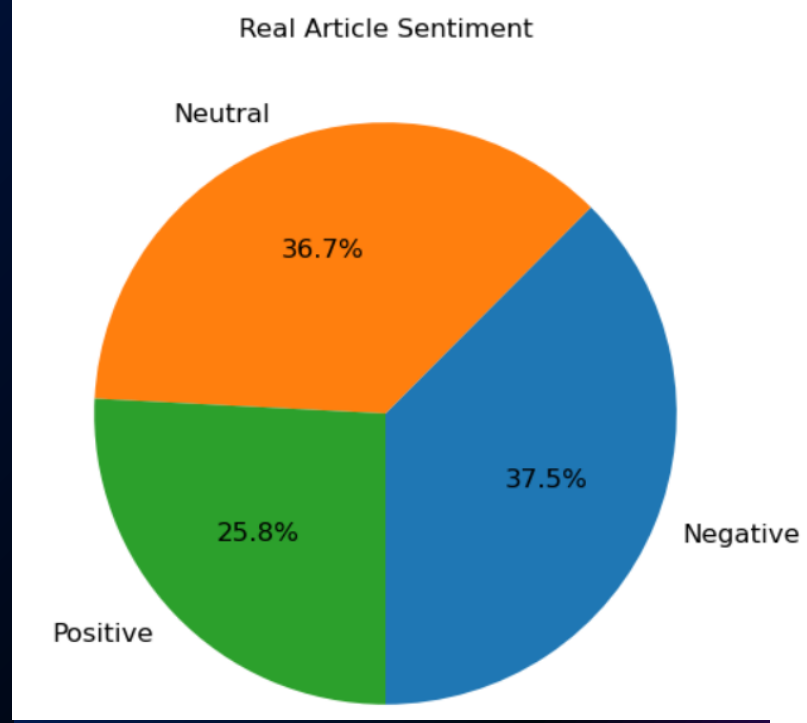


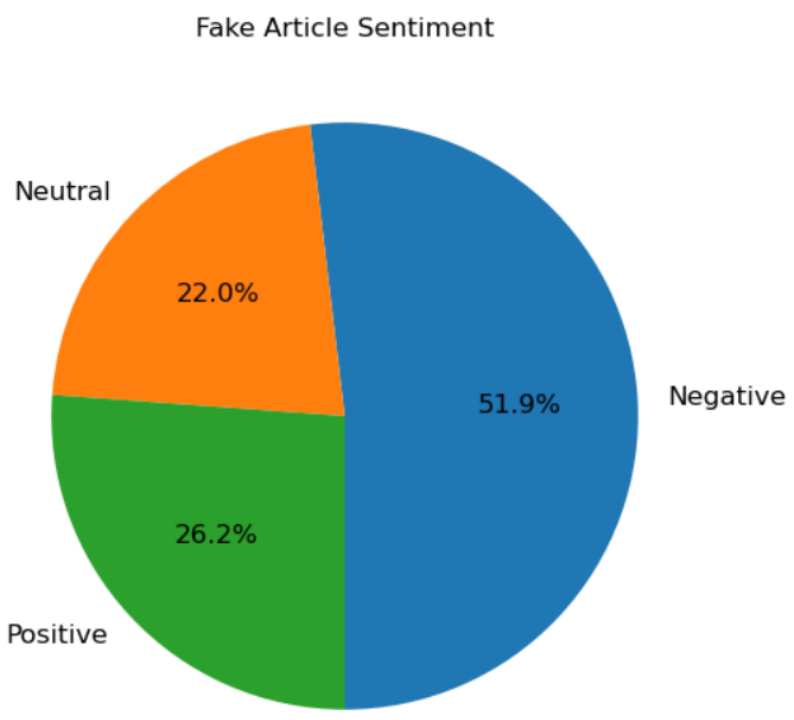
WORD CLOUD

- 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

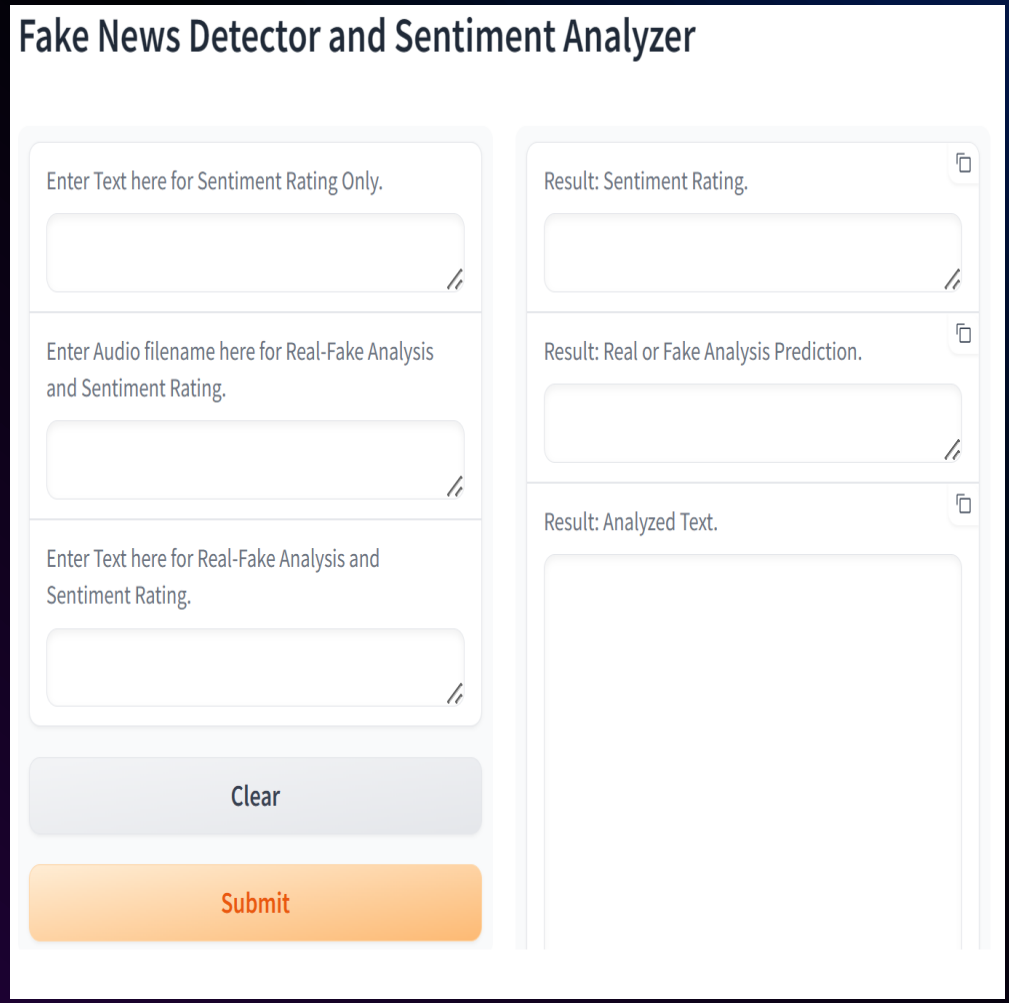
- Takes in sentences and assigns a sentiment rating
- Created a function that measures the sentiment of a sentence, based on language & tone of the article title
- Split data frame into 2 parts; 1 each for real and fake; and generated sentiment for each
- Observations:
  - Real articles had fair representation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





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



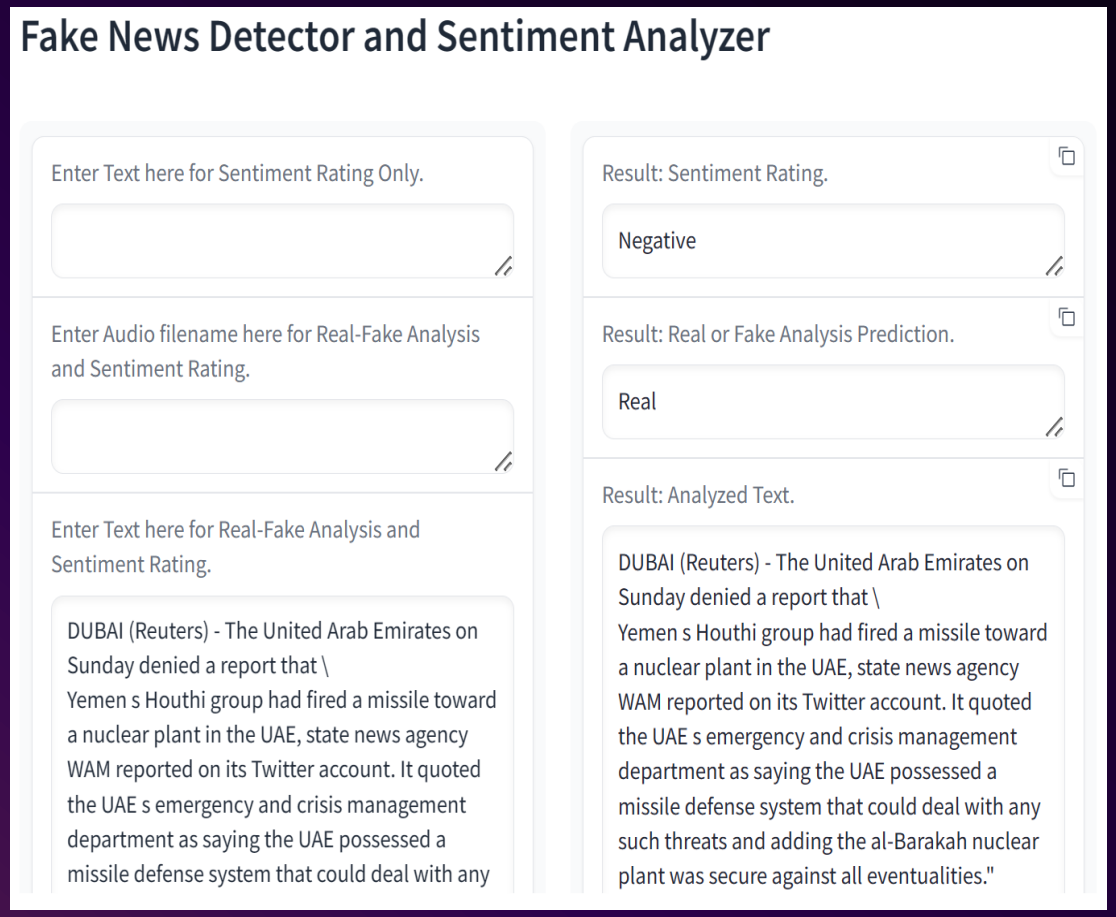
FINAL TIPS, CONCLUSIONS & WHAT'S NEXT?

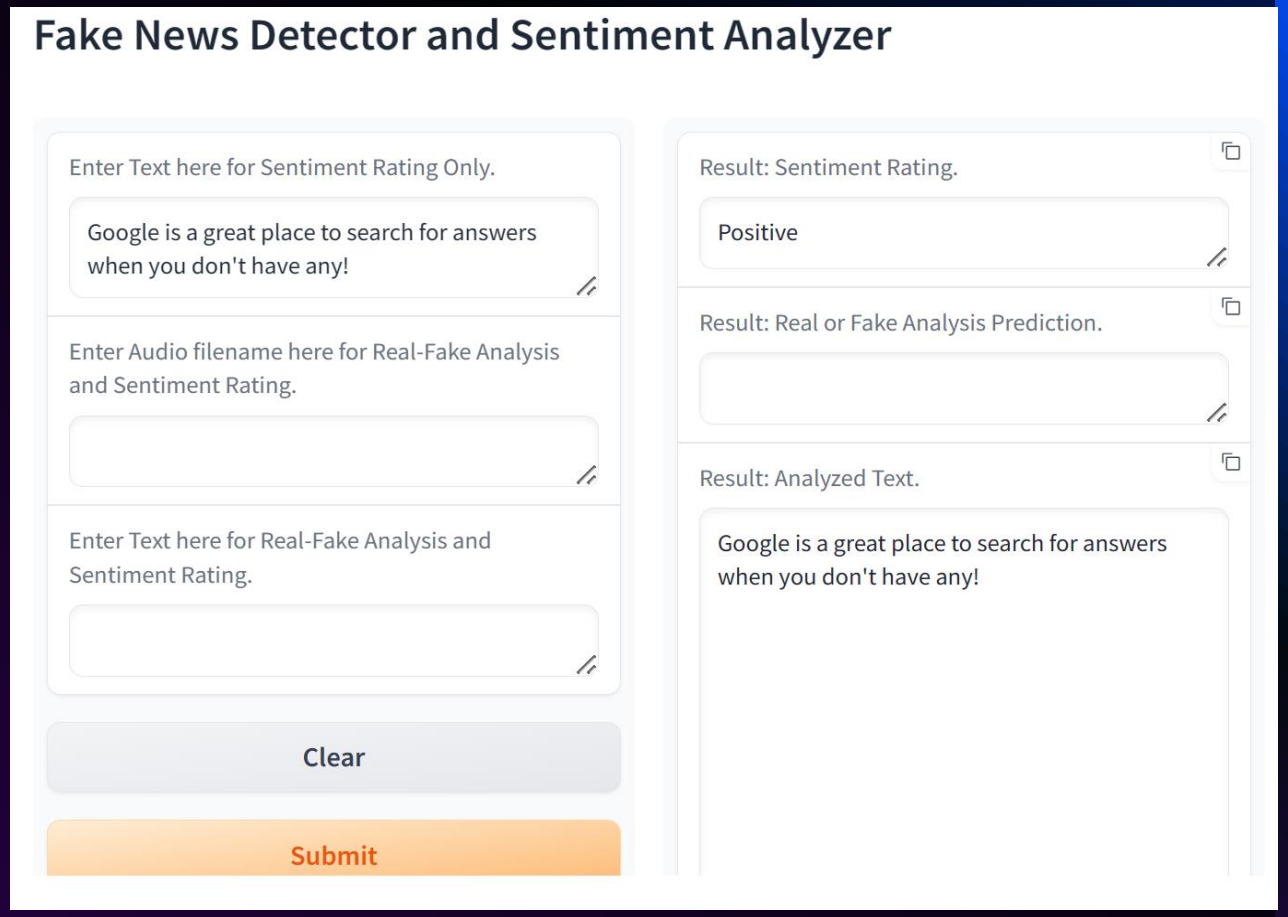
- We can successfully identify real vs fake articles, text and audio, from data files or user input which can be valuable during an election cycle
- PAC is well-suited for large scale articles and text
- TF-IDF works well with PAC by identifying important words in a text document
- Passing more text 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?

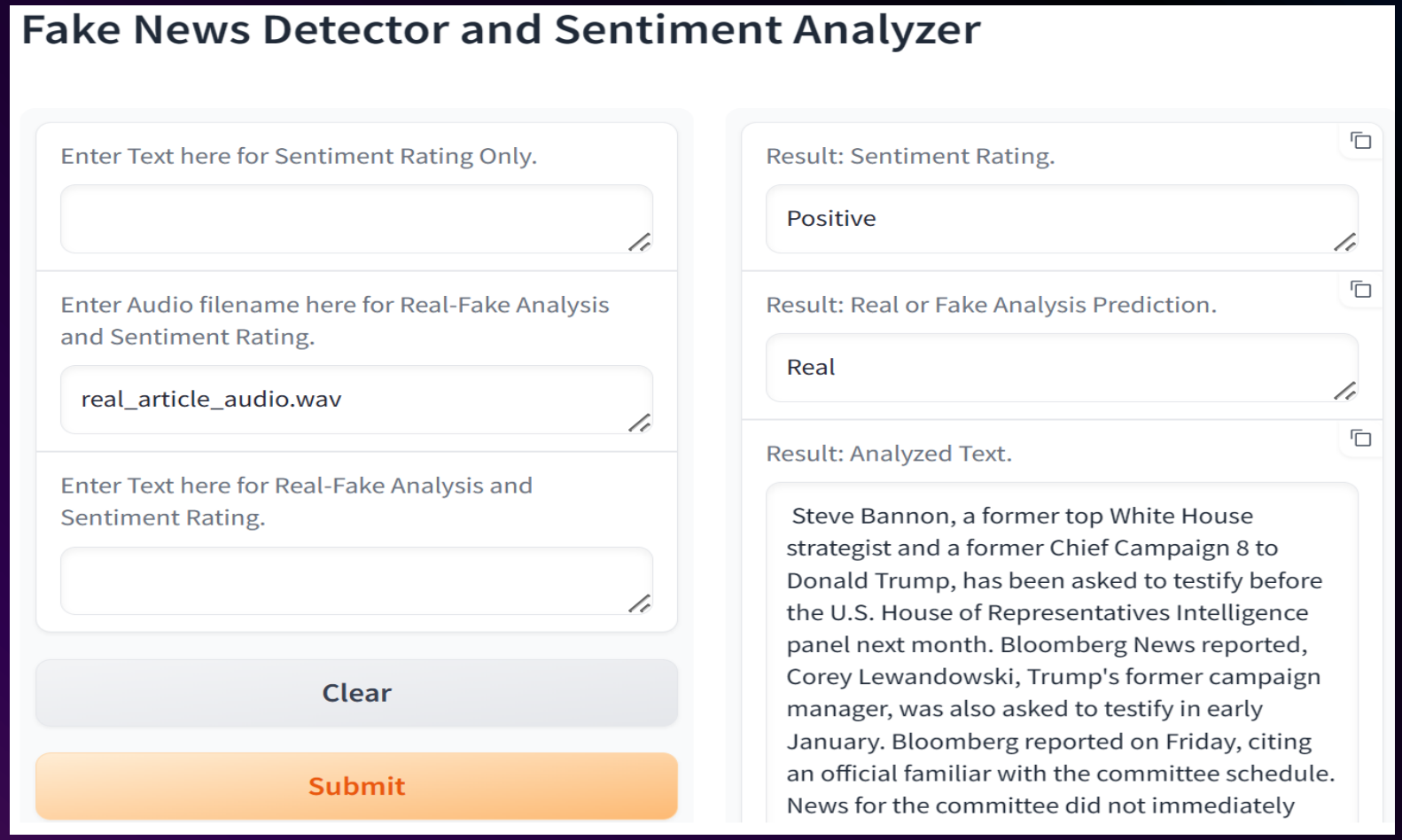
- Applying the model to blogs, tweets & social media
- Sentiment analysis of social media posts
- If we had better values in the date column, we could have done better analysis on time: time series on sentiment, etc.

APPENDIX – GRADIO EXAMPLES





APPENDIX – WHISPER EXAMPLE



THANK YOU

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Vineet Duggi