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A short note on speech analytics of US Presidential Debate -2024

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Abstract
The most well-known political discussions are those between American presidential candidates. They are also the most watched, controlled, and investigated political TV shows. In this study, we use Natural language Processing (NLP) methods to extract the overall polarity of the speakers. We use sentiment analysis algorithms to determine the sentiment expressed by the speakers. This gives us a better grasp of the general attitudes and emotions expressed in the debate. This work critically focuses on Sentiment analysis of the US presidential debate speeches which can offer insightful information about the candidates' thoughts and feelings as well as the discussion's general tone. Through the examination of linguistic patterns and pivotal expressions, scholars can acquire a more profound comprehension of the public's perception of each candidate.

Keywords: Sentiment Analysis, Presidential Debate, US, NLP.

Introduction

Primary debates are particularly important in shaping the direction of a party and helping voters make informed decisions during the nomination process. They provide a platform for candidates to showcase their policies, values, and vision for the country, ultimately influencing voter opinions and preferences. The US presidential debate is a highly anticipated event in which candidates discuss their plans and beliefs in front of a nationwide audience. It allows voters to evaluate and contrast candidates' stances on key subjects before making an educated selection at the polls.

Sentiment analysis (SA) is a method for determining opinions and emotions from text data [1]. It entails employing natural language processing and machine learning algorithms to assess the overall attitude communicated in a piece of text, which might be positive, negative, or neutral [2].

The objective of this work is to analyse the emotion or sentiment of the Joe Biden and Donald Trump presidential debates through the use of Natural language processing techniques. By examining their language, tone, and body language during the debate, we can gain insights into their emotions and attitudes towards the various topics discussed. This analysis can provide valuable information on how each candidate is perceived by the public and help predict their future actions and decisions based on their emotional responses. For this study we considered transcripts of the first general *election debate*, sponsored by CNN, was attended by presumptive nominees Joe Biden and Donald Trump and was held on June 27, 2024. Later, when Joe Biden withdrew from the presidential contest, Kamala Harris, the current vice president of the United States, garnered enough support from Democrats to be the party's nominee against Donald Trump in the next elections.

Literature Review

Sentiment analysis is an NLP technique that determines the positive, negative, or neutral sentiment expressed in order to offer the polarity of unstructured data, such as text or speech [3]. This method is frequently used to measure public opinion and attitude about a certain issue or brand in market research, customer feedback analysis, and social media monitoring [2]. Election seasons are another opportunity to apply sentiment analysis. For instance, let's

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imagine there are two candidates, "A" and "B." We may determine which candidate is more popular by using emotional analysis. This may be achieved by examining news stories, surveys, and social media posts to determine how people feel generally about each contender. Political campaigns may appeal to a larger audience by customizing their messaging and strategy based on a knowledge of voter mood [4].

In recent years, existing assessments of sentiment analysis applications have shifted their attention to market research, medical, and social media. [5] explored sentiment analysis in marketing research from three perspectives: unit of analysis, sample design, and methodologies for sentiment recognition and statistical analysis. In [6] summarized stock forecasting methodologies using semantic, sentiment, event extraction, and hybrid algorithms. In [7] analysed and contrasted various social media tactics and offered many data kinds and research techniques, as well as their constraints.

One of the first studies using social media data and election outcome prediction for the German legislative elections was presented by [8]. According to the study, Twitter was often used for political conversion, and the political discourse on social media reflected the political environments offline [8]. In a similar vein, sentiment analysis was used in [9] General Election. The ratio of party tweets to all tweets, the ratio of positive party tweets to all positive tweets, and the percentage of negative party tweets to all negative tweets were the three major methods used to estimate the number of votes. With an absolute margin of error of 1.61%, the analysis predicted the vote totals for each of the five parties in the Irish election with accuracy. [10]. Similar to this, a week prior to election Day, Sang and Bos [8] used the two-step normalization approach to forecast the results of the 2011 Dutch election. More than 28,000 tweets had their sentiments analysed and carefully weighted. The quantity of tweets about a party that weren't critical were contrasted with all of the tweets regarding the party. With an absolute inaccuracy of 17.4%, the study's prediction of the voting activity was successful [11]. Together, these studies show how sentiment analysis may be used to accurately forecast election results by taking into account the percentage of favourable tweets.

Globally, there have been several uses of the Twitter dataset for general election prediction. The general election in the United Kingdom in 2015 was aided by Twitter's abundance of information, which helped forecast the result [8]. The goal of the 2019 Twitter dataset collection was to predict the results of the general election in India [12] [10], [13]. Turkey's 2018 general election was predicted using a dataset sourced from social media [14].

So far, research has been carried out on the tweets or social media posts of the public to analyse the sentiment and predict future trends for US elections. However, there is potential for further studies to incorporate other forms of data, such as news articles or political speeches, to provide a more comprehensive analysis. This multi-faceted approach could offer a more accurate prediction of election outcomes. This research aims to find the sentiment or emotion of the speaker in the US presidential debate. This research will provide a more direct and immediate insight into the emotions and opinions of the candidates themselves, rather than relying on indirect sources like social media. By analysing the sentiment in real-time

during debates, a more accurate understanding of the candidates' perspectives can be gained. This real-time analysis can help voters make more informed decisions based on the candidates' emotions and opinions as they are expressed. Additionally, it can also shed light on how candidates respond to different topics and challenges during the debates.

Methodology

The present study consists of 3 phases. Phase 1 is the acquisition of data i.e., transcripts of the first general election debate, sponsored by CNN, was attended by presumptive nominees Joe Biden and Donald Trump and was held on June 27, 2024. Phase 2 focuses on the pre-processing of the text which is carried out to purge and delete unnecessary stop words from the text. In phase 3, the NLTK's VADER sentiment analyser is used to calculate and obtain the sentiment scores and, overall polarity values of speakers.

One example of a hybrid method for sentiment analysis of social media information is the VADER (Valence Aware Dictionary and Sentiment Reasoner) tool. This method blends rule-based heuristics with a lexicon-based technique. Textual sentiment analysis has shown the effectiveness of the VADER approach. A contextual lexicon, or list of words that have been classified as positively or negatively depending on their semantic orientation, is used by the system to perform its tasks. Positive, neutral, and negative are the three main parts. The final stage is to normalize each of the three previously identified components. The sum of the first three components is always one. The range of the Compound Scores is -1 to +1, where +1 denotes the greatest positive emotion and -1 the most negative attitude.

SentimentIntensityAnalyzer (SIA), a strong Python sentiment analysis tool, was employed. SIA assigns text ratings based on positivity, negativity, and neutrality. The total sentiment polarity is determined, with values ranging from -1 (extremely negative) to +1 (highly positive). SIA analyses text using a vocabulary of terms with predefined sentiment scores. SIA evaluates the context in which words are used, rather than relying just on individual word scores.

In this study, we analysed the sentiment or polarity on the transcripts of the first general election debate, sponsored by CNN, was attended by Joe Biden and Donald Trump which was held on June 27, 2024.

Results and Discussion

After preliminary analysis and preprocessing steps, the results obtained are detailed in this section. Initially wordclouds were generated for both the speakers. In addition to this most frequently used bigrams were also generated which are detailed as follows.
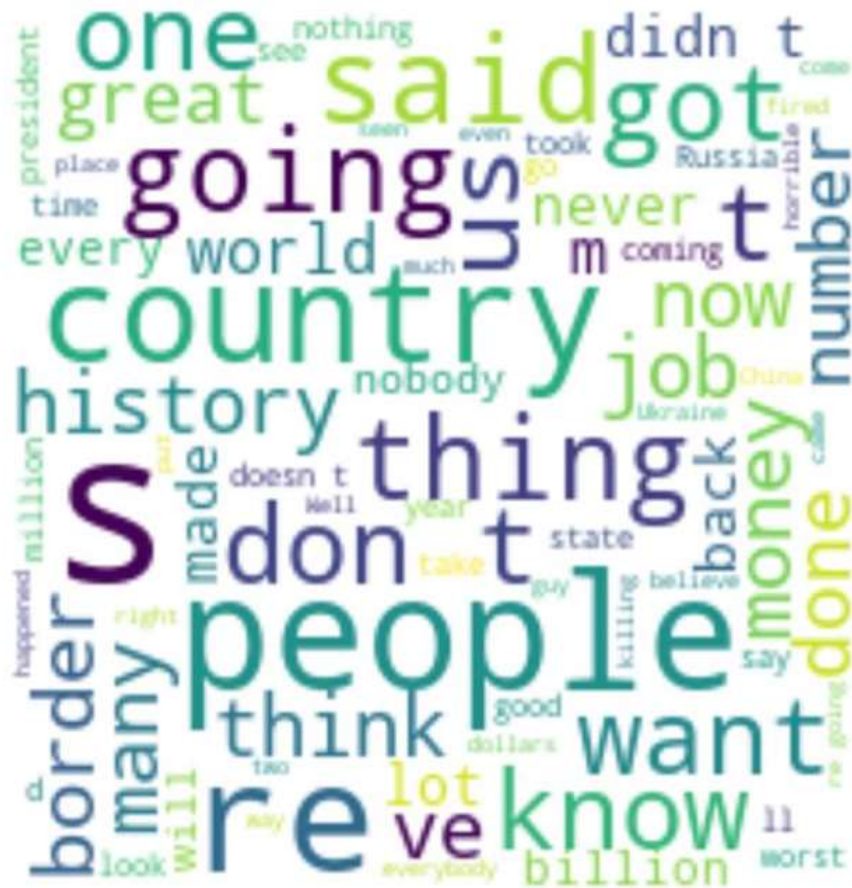
Fig. 1: Wordcloud - Donald Trump.
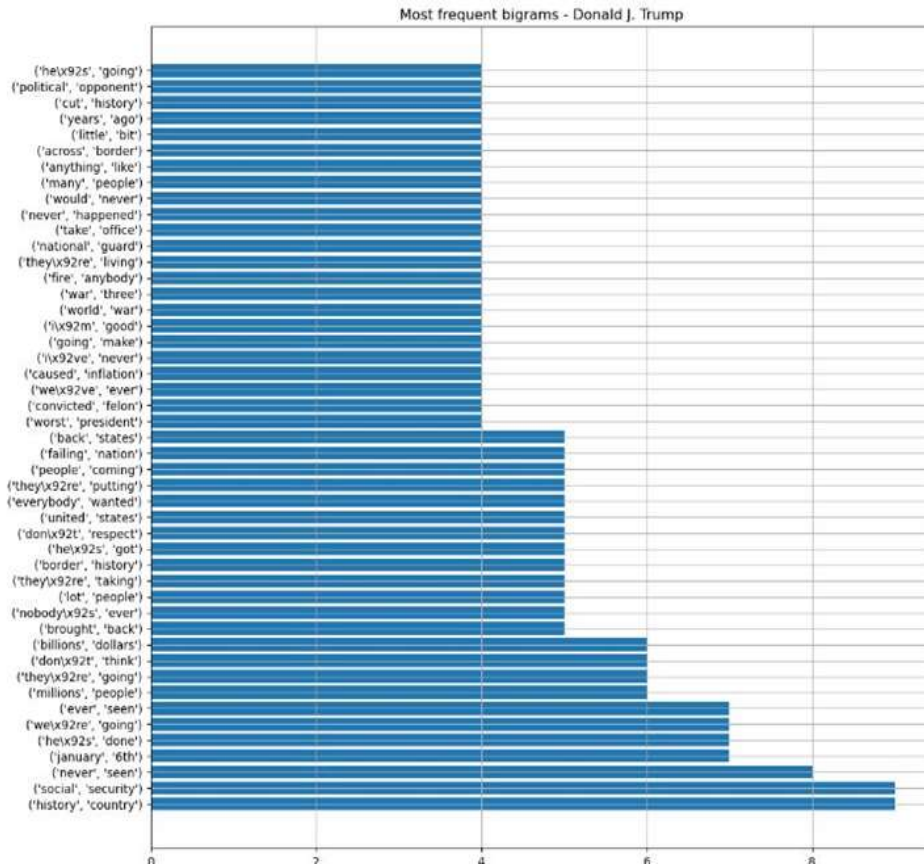

Fig. 2: Wordcloud - Joe Biden.

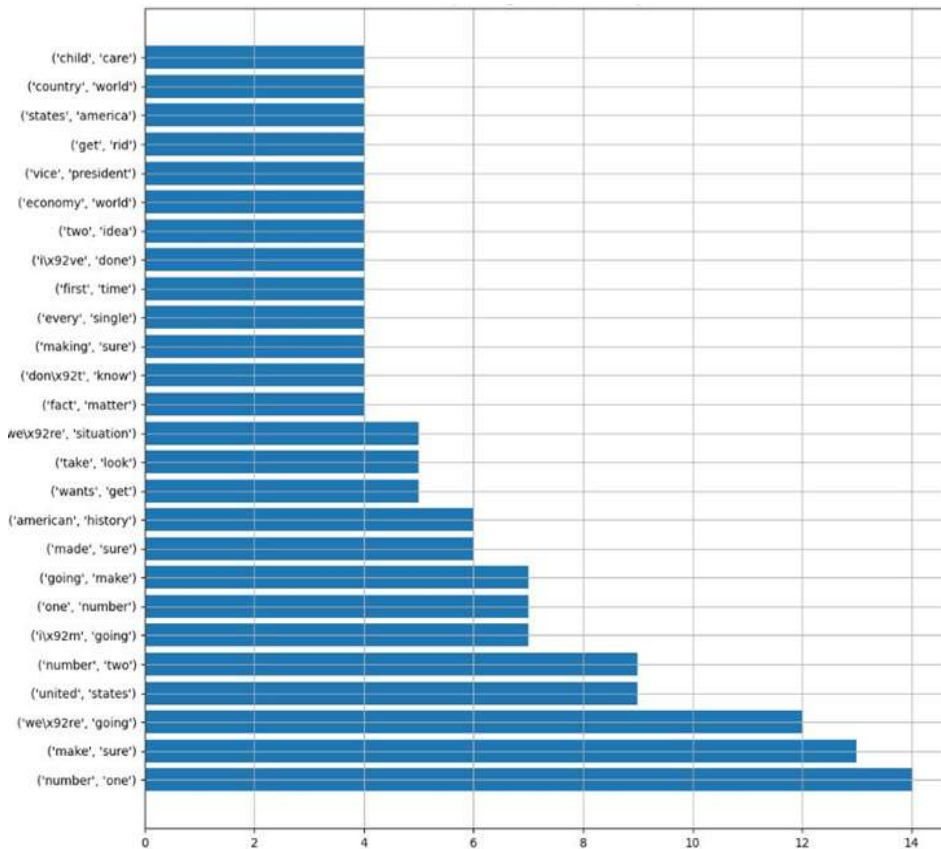**Fig.3:** Most Frequent Bigrams – Donald Trump.

Fig. 4: Most Frequent Bigrams – President Joe Biden.

Further, by using the VADER SA tool, The SentimentIntensityAnalyzer class has a method called polarity_scores() that accepts a piece of text as input and returns a dictionary with the sentiment scores for the content. Using the SIA class, the overall polarity values are calculated for both the nominees Joe Biden and Donald Trump. The results are detailed in Figure 5 and Figure 6.

```
JB: sentiment score = -0.9995
JB: split = {'neg': 0.117, 'neu': 0.776, 'pos': 0.106}
```

Fig. 5: Sentiment scores - Joe Biden.

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DT: sentiment score = -0.9999
DT: split = {'neg': 0.136, 'neu': 0.754, 'pos': 0.11}
```

Fig. 6: Sentiment scores - Donald Trump.

Conclusion

A brief note on speech analytics of the US Presidential Debate 2024 provided unique insights into the candidates' communication styles, important discussion themes, and levels of audience participation. Researchers were able to acquire a better understanding of how each candidate engaged with voters and communicated their ideas by examining aspects such as tone, word choice, and speaking duration.

It is noted that both nominees, Joe Biden and Donald Trump, criticized each other's weaknesses, hence the overall polarity score for both speakers is bad (most negative). Personal assaults and critiques predominated over genuine policy arguments during the debate. This aggressive atmosphere most certainly contributed to the unfavourable opinion against both candidates. Additionally, the absence of substantive policy considerations may have left viewers dissatisfied with the debate. Moving future, voters may want more constructive and informative discussions to assist them in making sound decisions.

Further, in future it is expected that, the speakers in the debates may focus on policy and solutions rather than personal attacks in order to better serve the voters and present a clearer picture of each candidate's agenda. Future discussions that focus on problems that directly affect voters can help educate the public and encourage more fruitful political conversation. Finally, moving the focus to policy discussions can result in a more educated electorate and a more productive democratic process.

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