The Impact of Emotion on Social Media Engagement: Analyzing Sentiment in Donald Trump's Tweets

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Abstract

This project investigates how positive and negative sentiment in Donald Trump's tweets impacts engagement metrics such as retweets and likes. Using tools like VADER and Hugging Face, we found that emotionally charged tweets were generally correlated with greater interaction.

1 Introduction

This paper analyzes the sentiment and intensity of Donald Trump's tweets, comparing them to engagement metrics including likes and retweets. Using a pre-existing dataset of Trump's tweets that ranged from 2016 to 2020, we scored and analyzed them with VADER and Hugging Face to explore how emotional content correlated to engagement. This topic delves into the impact of emotional manipulation on media engagement, examining why certain content captures attention more effectively than others.

2 Experimental Setup

For our experiment, we utilized a pre-existing dataset of Donald Trump's tweets, which consisted of 43,352 tweets going up until June of 2020. Unfortunately, due to Twitter's current policies, additional scraping of more recent tweets was not feasible. Each entry in the dataset we used included the content of the tweet, the date of the tweet, and engagement metrics such as the number of retweets, likes, and comments. For our purposes, we preprocessed the data to focus on tweets after 2015 to solely analyze the tweets relevant to his presidential candidacy. This preprocessing reduced the dataset to 14,790 relevant tweets.

To evaluate the tweet's sentiment and intensity, we used two primary tools: VADER and Hugging Face. VADER is a sentiment analysis tool attuned to sentiments expressed in social media, taking into account emojis, slang, and other Internet specific features. It outputs scores from -1 to 1, with a score closer to 1 being more intensely positive and a score closer to -1 being more intensely negative. Hugging Face also performs sentiment analysis, but it outputs a label of either positive or negative, along with a confidence rating from 0 to -1 for negative sentiment, or 0 to 1 for positive sentiment.

For each tweet, we ran a VADER and Hugging Face sentiment analysis, and added the corresponding values to our dataset: the intensity rating for VADER, and the confidence rating for Hugging Face. We also kept track of the likes and retweets for each tweet as a marker of engagement. With these two techniques, we were able to perform a well-rounded analysis of how engagement correlated with the results from each technique individually, as well as the aggregate of both results.

3 Results

Figure 1 shows our results comparing the VADER sentiment score against weighted engagement. Since the average ratio for retweets to favorites for Trump's tweets is 1:5, we calculated weighted engagement by taking the average out of the total number of favorites divided by 5 and retweets. We can see that the most negative sentiment scores of -1.0 to -0.8 corresponded to the highest average engagement. The average engagement generally declined as the sentiment scores became more neutral, with another slight increase in engagement from scores of 0.4 until 1.0.

In order to observe this trend more clearly, Figure 2 illustrates the correlation associated with the absolute value of the VADER sentiment score, to measure strictly for intensity of emotion. This graph illustrates a trend towards a slow increase in engagement as the absolute sentiment increases, with a significant increase in engagement for the highest absolute sentiment with a score of 0.9 to 1.0.

When analyzing the sentiment scores we calcu-

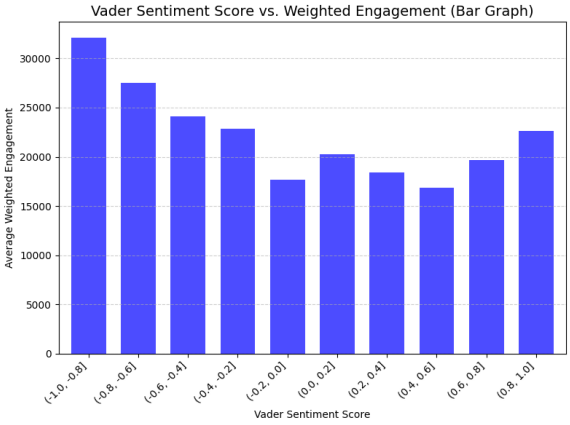

Figure 1: Vader Sentiment Score vs Engagement.

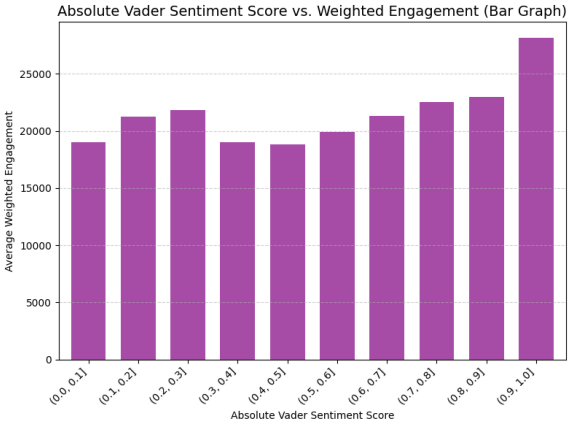

Figure 2: Absolute Vader Sentiment Score vs Engagement.

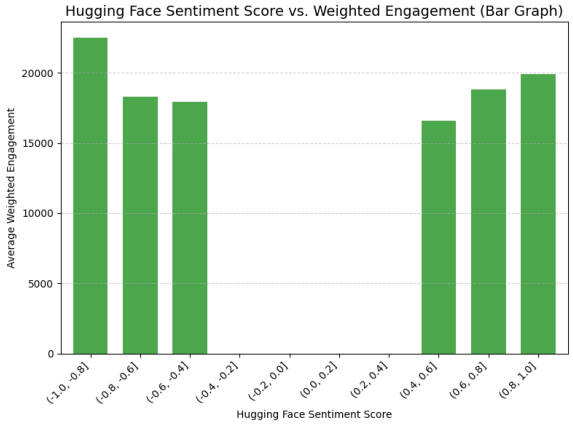

Figure 3: Hugging Face Sentiment Score vs Engagement.

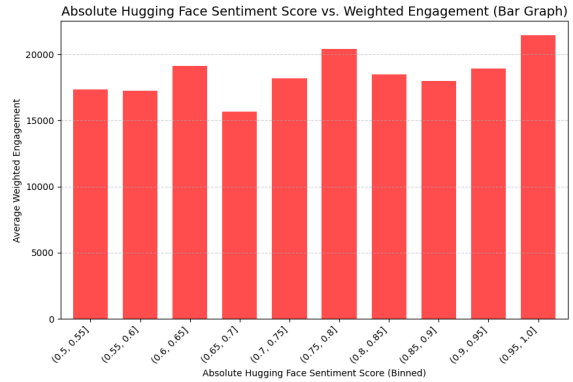

Figure 4: Absolute Hugging Face Sentiment Score vs Engagement.

lated with Hugging Face, there is a similar trend. Figure 3 and Figure 4 chart the trends for the raw and absolute values of the Hugging Face sentiment scores, respectively. Given these charts, we can see that the most negative sentiments from -1 to -0.8 and the highest absolute sentiments from 0.9 to 1.0 are both correlated with the highest weighted engagement. In Figure 3, we can also see that there is another increase in engagement for positive sentiment. However, the absolute sentiment scores do not display a clear trend towards higher intensity meaning higher engagement.

Finally, we took an average of both the VADER and Hugging Face scores to obtain an analysis that takes both techniques into account. The regular scores are shown in Figure 5, and the absolute value scores are shown in Figure 6. These figures once again iterate a possible correlation of higher sentiment to higher engagement. Figure 5 shows three peaks, with them being the most negative, most positive, and most neutral tweets. Figure 6 then demonstrates a clear trend where the tweets with the highest absolute scores are correlated with higher engagement.

In order to analyze these results more closely, we conducted a linear regression analysis using the average absolute VADER and Hugging Face sentiment scores against weighted engagement, as shown in Figure 7. The correlation coefficient was 0.11, with a p-value of 0. A correlation coefficient of 0.11 suggests a weak positive relationship between the two variables, which means that as the intensity of the sentiment increases, weighted engagement also increases slightly. A p-value of 0 indicates that the observed correlation is statistically significant and unlikely to occur by random chance. However, this is likely affected by the large dataset, so the practical impacts of this correlation are not certain.

Overall, however, these results indicate some relationship between emotionally charged tweets and higher engagement.

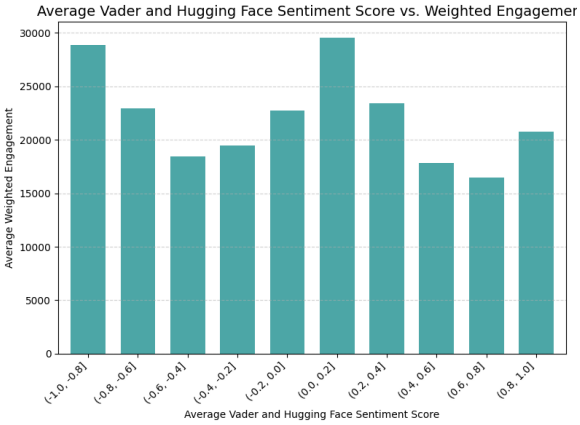

Figure 5: Vader and Hugging Face Sentiment Score vs Engagement.

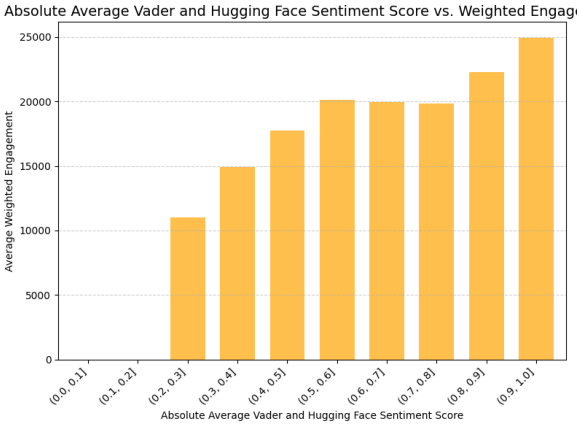

Figure 6: Absolute Vader and Hugging Face Sentiment Score vs Engagement.

4 Ethical Considerations

Our project raises important ethical questions about the impact of emotionally charged content on public engagement, particularly in the political sphere. By analyzing the relationship between sentiment and engagement metrics in Donald Trump's tweets, this touches on the broader implications of emotional manipulation in digital communication. Social media platforms often amplify tweets that evoke strong emotional responses, whether positive or negative. They can do so through algorithms that prioritize highly engaging content, which can often foster divisiveness and spread misinformation.

In an era dominated by "fake news" and "clickbait," understanding people's susceptibility to emotionally charged information — regardless of its validity — is crucial. However, by exploring the ethical implications of such manipulation, these results aim to highlight the influence of media tactics

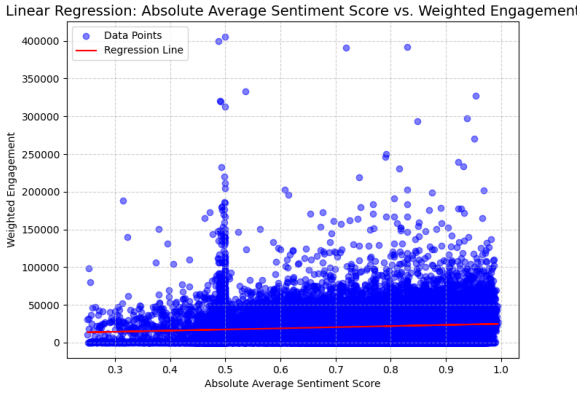

Figure 7: Absolute Vader and Hugging Face Sentiment Score vs Engagement.

on public perception and awareness.

5 Conclusion

Overall, our project reveals the significant role that sentiment and its intensity play in driving engagement on social media, particularly in the context of Donald Trump's tweets. We used tools like VADER and Hugging Face to observe trends in his Tweets from 2016 to 2020, finding that more emotional tweets often got more engagement. Additionally, the tweets with intense negative sentiment driving more engagement than tweets with intense positive sentiment. Ultimately, these results contribute to a larger conversation about the ethical and societal impacts of social media.

A Appendix

Anjali Nuggehalli: 3 hours. Conducted initial tests using VADER and Hugging Face for sentiment analysis, visualized the sentiment scores through detailed plots, and developed a weighted engagement score that accurately incorporates retweets and favorites. Additionally outlined the ethical considerations for the project, ensuring a comprehensive approach to its implementation.

Angie Zhou: 3 hours. Wrote up status report and conducted preliminary tests with the data to generate visualizations. Created the combined VADER and Hugging Face sentiment score bar graphs. Attempted to scrape additional recent tweets and wrote the rough draft for the paper.

Hugh Chapin: 3 hours. Preprocessed the dataset to make it ready for various tests and sentiment analysis. Conducted initial experiments on the dataset to measure overall sentiment scores.

Ran VADER and Hugging Face on the entire dataset, creating a dataframe for further experimentation and analysis. Helped create visualizations for the results and edit the paper draft.