Political Opinion Mining Through Twitter Data

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Research Questions

1. How frequently will sentiment analysis methods agree on their detection of sentiment when evaluating the same piece of text?
2. Does sentiment vary depending on which hashtag from Table 2 is used?
3. Do the sentiment analysis methods have a tendency towards a certain classification?

Approach

There was 2,658 total tweets collected through looking for the hashtags: #politics, #democrat, #republican. When collecting these tweets only tweets that did not contain forms of media, photos, or videos were included. From the Twitter API, or the Twitter database where all the tweets information is stored. The user's handle, the time and date of the tweet, the text, and the hashtag used were all recorded.

The sentiment analysis was performed using three methods: VADER, HuggingFace Transformers Pipelines, and TextBlob which are discussed to the right. After the analysis is completed the sentiment determined by each method were stored for each tweet. Three example tweets and the respective sentiments can be seen in Figure 1.

Tweet Text	Vader Sentiment	Hugging Face Sentiment	TextBlob Sentiment
Look who is talking about democracy is dead !! #democracy #Politics	Negative	Negative	Negative
I support any candidate who's proposed legislation bans car flags and fedoras on people that were born after 1970. #politics	Positive	Positive	Positive
#Republican explanation of "optics": "If something I'm doing makes it appear that I don't care, it's because I don't."	Negative	Negative	Neutral

Figure 1. Three example tweets and the determined sentiment per analysis method.

VADER

VADER outputs a positive, negative, and neutral score between 0-1 and collectively add to 1. Also a compound score that is the sentiment between -1 and 1 to determine whether it is positive negative or neutral. It was designed for microblog-like contexts and was evaluated over multiple data types of this form including: social media text, editorials, product reviews and movie reviews.[1]

HuggingFace Transformers Pipeline

This method outputs a sentiment "positive" or "negative", there is no neutral value. In addition there is a numeric value between 0 and 1 for confidence. It has been created for users looking to download a pre-trained model for NLP projects and is trained on the "distilbert-base-uncased-finetuned-sst-2-english" model.[2]

TextBlob

TextBlob outputs two numeric scores, polarity and subjectivity. Polarity is between -1 and 1 and determines the sentiment, where subjectivity is between 0 and 1 and determines how subjective the text is. The premise of TextBlob being created was to make a simple API for common NLP problems.[3]

Methods Comparison

- VADER and TextBlob agreed on 1,439 tweets
- Total agreement on 754 tweets
- TextBlob has a tendency towards positive
- Transformers Pipelines have a negative tendency

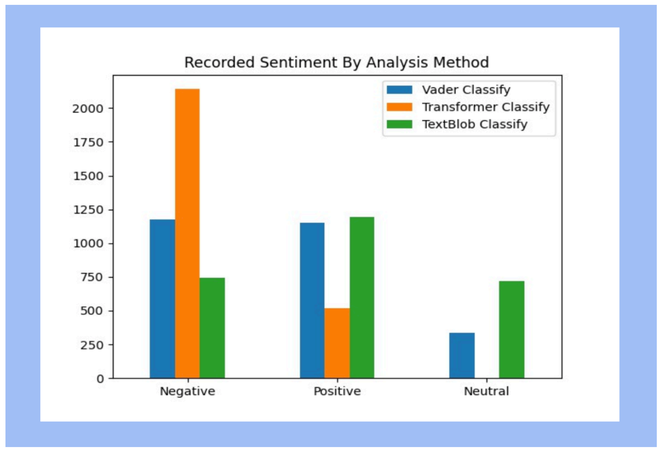

Figure 2. The count of each sentiment detected by each of the three analysis methods.

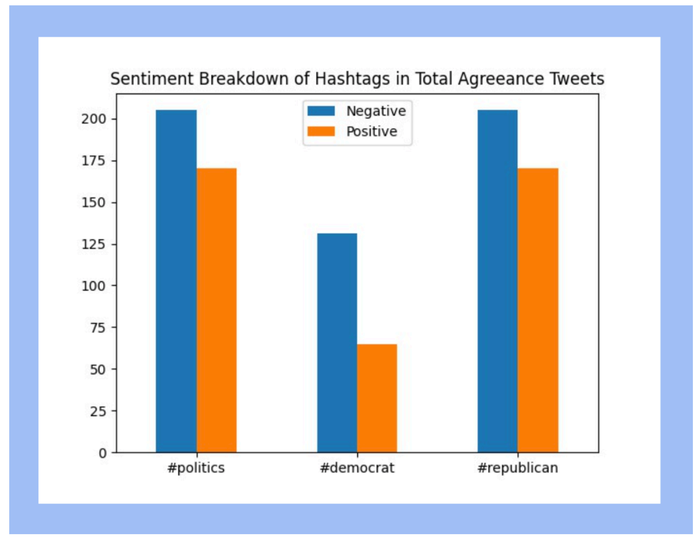

Figure 3. Count of sentiment per hashtag.

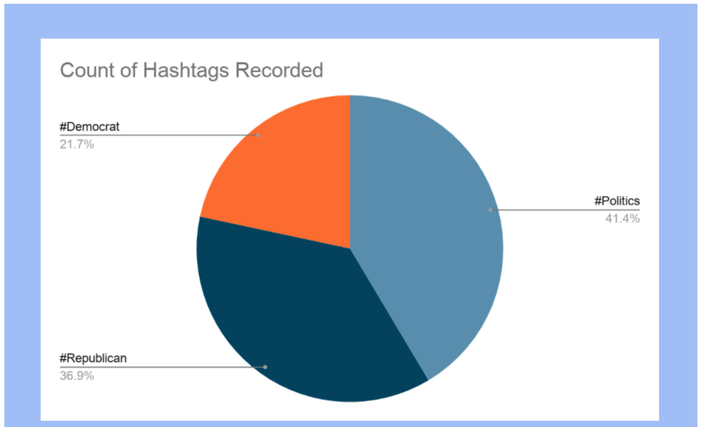

Figure 4. Number of tweets recorded per hashtag.

Analysis

- #politics and #republican are more frequently tweeted about than #democrat
- Overall there are significantly more negative tweets than positive tweets.
- Based on a random sampling, TextBlob and VADER are the most reliable analysis methods

References

[1] C.J. Hutto and Eric Gilbert. "VADER: A Parsimonious Rule-based Model for Sentiment Analysis ofSocial Media Text". In: Jan. 2015.

[2] Thomas Wolf et al. "Transformers: State-of-the-Art Natural Language Processing". In: Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing: System Demonstrations. Online: Association for Computational Linguistics, Oct. 2020, pp. 38-45. URL:https://www.aclweb.org/anthology/2020.emnlp-demos.6.

[3] Steven Loria. textblob Documentation. Oct. 2020.URL:https://textblob.readthedocs.io/_/downloads/en/dev/pdf/.