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Title: How did the US population on Twitter react when Roe v. Wade was overturned? And how was it different between the red and blue states? (1359 words)

Introduction:

The Roe v. Wade case, which originally came before a court in 1973, was a historic ruling that affirmed Americans' constitutional right to an abortion. On June 24th, 2022 the US Supreme Court overturned Roe v. Wade, the historic legislation that made abortion a Federal right in the country. With the ruling, 50 years of legal protection were destroyed, and it became possible for individual governments to restrict or outright prohibit abortion rights. The United States is deeply divided as a result of this judgment. There was a country-wide outburst against this Supreme Court order citing its negative and unfair effect on the reproductive health of many Americans. Through numerous social media platforms like Instagram, Facebook, and Twitter, many individuals are expressing their opinions online. I am planning to analyze how the Twitter population reacted to this news. Since it is well known that abortion has been a divisive topic in US politics, there is a typical tendency for Democratic politicians to strongly favor abortion rights and Republican politicians to align themselves in opposition. This drove my curiosity to analyze how the sentiment of the tweets differed in the red and blue states. I have gone through many similar works but the major reference papers were [1] [2] and [3] (see reference section).

Research Question:

How did Twitter users react after Roe v. Wade was overturned? Was there a political division on the internet based on the location or the state people were based in? How the tone of the tweets varied between the blue and red states?

Method

Data: I have collected a total of 2205 tweets from June 25 to July 25 in 2022 which had the phrase "Roe v Wade" in them. I wanted to get the data from the day after the proclamation was released as I found most of the tweets on the 24th to be hoping for some or the other result rather than the reaction to the proclamation. The data was scraped using the snsrape library and this perceives the query to be case insensitive so searching for this phrase gave me both upper and lower cases. I was keen on getting the geographic location of the tweets and specifically getting a uniform distribution of tweets from all of the 50 states in the United States. For this, I used the data from [5] - a data set consisting of a simple, accurate, and current database of the latitudes, longitudes, and populations of American cities and towns. I selected the 5 most populous cities from each state from this dataset and searched for tweets that were

from the latitudes and longitudes of these cities and a radius of 10 km using the snsrape library. The results are limited to tweets that are geotagged from that area or posted by individuals who have that location (or within a 10 km radius) listed in their profile. I was only able to find a comparatively lesser number of tweets to be geotagged so instead of a week's data I had to collect data for a month. Even though my intention was to get a uniformly distributed dataset, populous cities like New York had a higher number of geotagged tweets when compared to cities from less populous states like Wyoming, which provided no geotagged data for the time period and in which "Roe v Wade" was discussed. A future scope here is to identify a way to extract the location correctly. Since this distribution would not affect the ML algorithms used for sentiment analysis, I decided to move forward with this data itself.

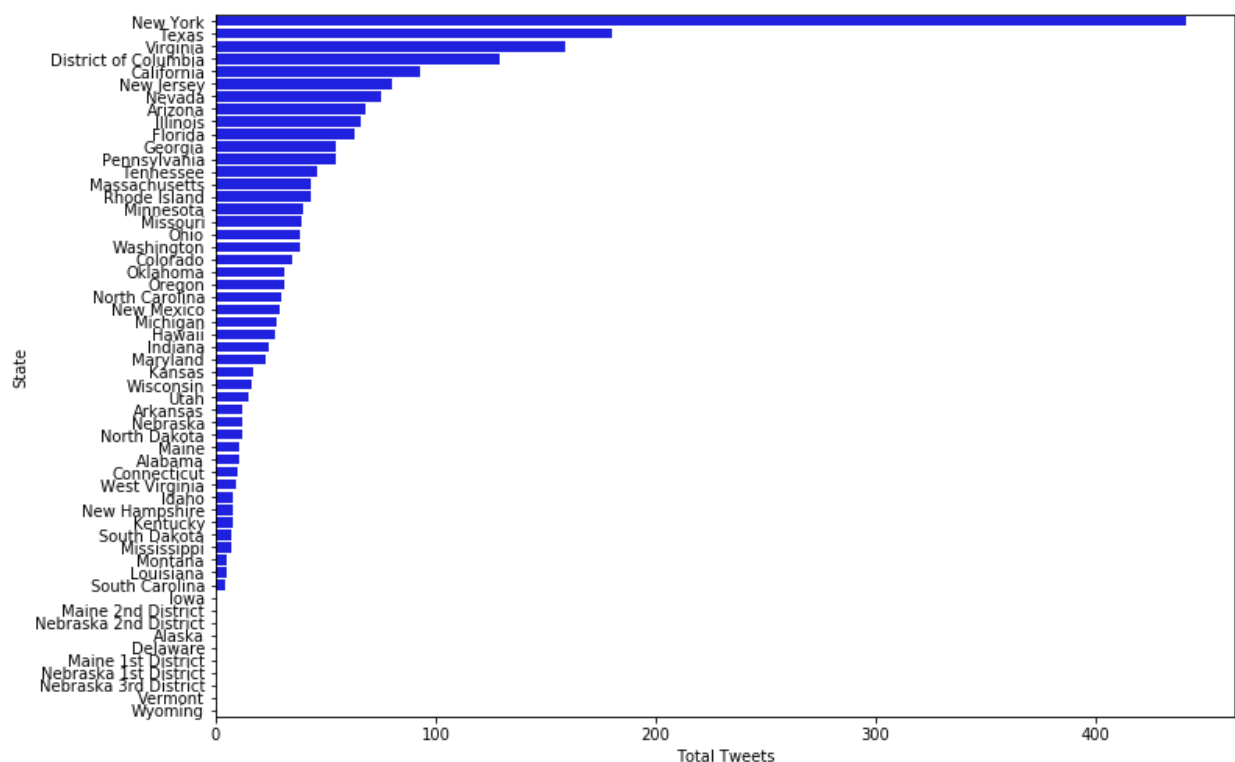


Fig 1: Total tweet distribution

Analysis:

Pandas and NumPy libraries were excessively used for data cleaning and merging. Data points like "User", "Date Created" and "Tweet" were obtained from scraping and this data was merged into the states and cities data set.

I have tried multiple ways to analyze the tweets. My first attempt was to deploy an LSTM model using the PyTorch libraries. I trained and tested the algorithm, using the dataset from the Tweet Sentiment Extraction competition which is a dataset of 27,500

data points categorized into positive, negative, and neutral. However, this model only gave an accuracy of less than 44% which was very low. So I decided to discard this Machine Learning model and decided to go ahead with an **NLTK model**.

Before attempting to extract the sentiments from the tweets, data cleaning was a crucial step. The tweet texts were edited to remove mentions, hashtags, symbols, and hyperlinks. To determine a sentence's subjectivity and polarity, the TextBlob library was employed. The range $[-1, 1]$ is used to determine polarity, where -1 denotes a negative emotion and 1 denotes a positive emotion. Negative language changes the polarity. The range of subjectivity is $[0, 1]$. The ratio of factual information to personal opinion in a document is known as subjectivity. Higher subjectivity suggests that the text comprises subjective statements rather than objective information [8]. NLTK package usage was highly beneficial in getting rid of stop words in English. Emoticons, stop words, and punctuation was eliminated.

Libraries, string, and regex were used in achieving these steps. Based on the polarity of the tweet, an analysis score was determined for the tweet texts. If the polarity is less than or equal to zero, the analysis score was set to zero which meant that the tweet was negative. For a polarity greater than zero, the score was set to 1 which meant that the tweet was positive.

From this, a total count of positive and negative tweets about 'Roe v Wade' was calculated as well as **state-wise and city-wise counts**. Positive means that the user agreed with or was happy about the proclamation and negative means that the user was against the proclamation. States and cities with a count of positive tweets more than negative tweets were categorized as 'For' and those which had more negative tweets were classified as 'Against'.

The next analysis was to find out whether the sentiment had any relation between the political inclination of the state. For this purpose, the states whose majority was voted Republican in the 2020 Presidential elections were classified as "Red" states, and those that voted Democratic were classified as "Blue" states. This data was obtained from the "The Cook Political Report" website [7].

Results:

Out of the 2205 tweets analyzed, 38.4% were positive about the overturn of Roe V Wade and 61.6% were negative. This holds up with the survey and articles published by different entities [9]. On a state-level analysis, there were only 6 states which had more

tweets in support as opposed to against the supreme court ruling. Shown below:

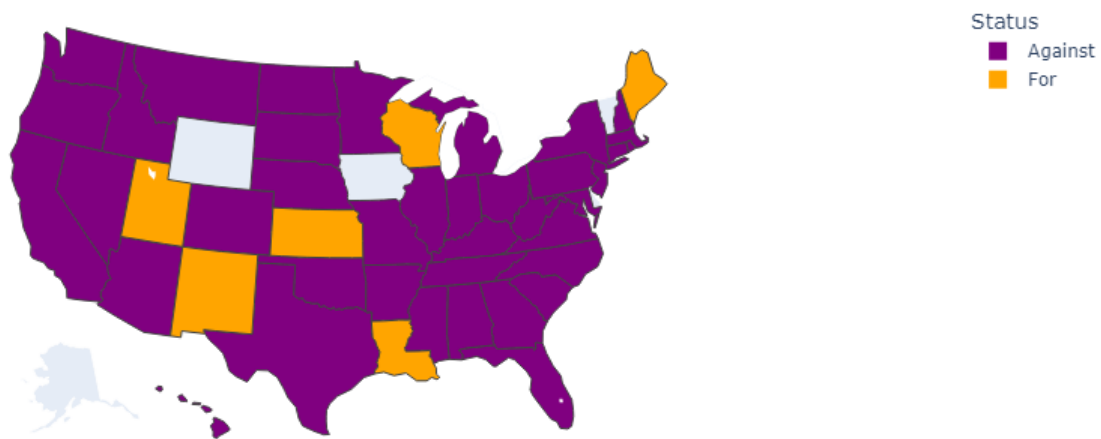


Fig 2: states tweeted 'For' - happy about Roe Wade overturn and 'Against' - against Roe v Wade overturn.

A side-by-side graph of the political allegiance between the Democratic or the Republican party in the 2020 Presidential elections and the sentiment for or against the supreme court ruling shows that these both do not have any relation.

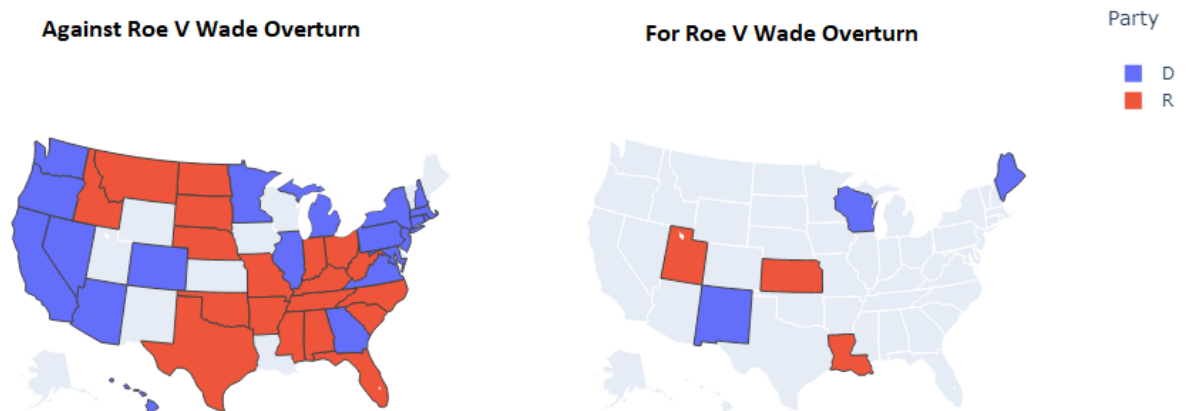


Fig 3: Blue and Red states showing the states which were 'Against' and 'For' Roe v Wade Overturn. D: The majority voted Democratic in the 2022 Presidential election. R: The majority voted Republican in the 2022 Presidential election

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