Social Network Analysis of a Twitter Dataset

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ABSTRACT

This project endeavors to unravel the intricate dynamics of sentiment surrounding "ISIS" on Twitter, employing a sophisticated methodology rooted in sentiment analysis and network visualization. In the contemporary landscape of social media, platforms like Twitter serve as crucibles of public discourse, where attitudes and ideologies converge and proliferate. Understanding the undercurrents of sentiment within these digital ecosystems is imperative for comprehending societal trends and information dissemination.

Through the lens of sentiment analysis, this study aims to delineate the contours of positive sentiment towards "ISIS" on Twitter, leveraging the VADER sentiment analyzer to categorize tweets as positive or neutral. By focusing exclusively on positive sentiment, the project hones in on the propagation of supportive attitudes and ideological affirmations within the Twitterverse, shedding light on the amplification mechanisms at play.

In tandem with sentiment analysis, network analysis emerges as a pivotal tool for unraveling the complex tapestry of user interactions and sentiment diffusion. By extracting key nodes representing top mentioned users and retweeters, the project constructs a network graph that visually elucidates the spread of positive sentiment. This visualization serves as a window into the interconnected nature of user engagement and sentiment dissemination, offering insights into the pathways through which sentiments traverse the digital landscape.

Beyond its immediate scope, this project holds broader implications for social media analysis and opinion research, offering a blueprint for dissecting sentiment dynamics across diverse topics and themes on Twitter and other digital platforms. By deciphering the intricate interplay of sentiment and network structures, this study seeks to deepen our understanding of digital discourse and societal dynamics in the digital age.

APPROACH

The project employs a multifaceted approach to delve into sentiment dynamics surrounding "ISIS" on Twitter. Initially, sentiment analysis is conducted using the VADER sentiment analyzer to categorize tweets into positive or neutral sentiments. Given the significance of positive sentiment in understanding the propagation of supportive attitudes within the network, subsequent analysis focuses exclusively on positive sentiment tweets.

Network analysis techniques play a pivotal role in unraveling the intricate web of user interactions and sentiment diffusion. The methodology involves extracting key nodes representing top mentioned users and retweeters, thereby creating edges based on retweet interactions. This process lays the foundation for visualizing the network graph using NetworkX and Matplotlib, offering a comprehensive visual representation of sentiment propagation within the Twitter ecosystem.

By harnessing the power of network visualization, the project identifies influential nodes and traces the spread of positive sentiment throughout the network. This visualization provides researchers with a nuanced understanding of user interactions and sentiment dynamics, shedding light on the underlying mechanisms driving public discourse and ideological trends on social media platforms.

Furthermore, the project's methodology holds promise for broader applications in social media analysis and opinion research. Beyond sentiment analysis towards "ISIS," the approach can be adapted to explore diverse topics and themes on Twitter and other social media platforms, contributing to a deeper understanding of social dynamics in the digital age.

METHODOLOGY

The methodology for this project encompasses a multifaceted approach aimed at comprehensively analyzing sentiment towards "ISIS" on Twitter and visualizing its propagation within the network. The first step involves data acquisition, wherein a dataset of tweets related to "ISIS" is collected from Twitter using appropriate keywords and filters. This dataset forms the foundation for subsequent analysis and exploration of sentiment dynamics.

Following data acquisition, sentiment analysis is conducted using the VADER sentiment analyzer, a lexicon and rule-based tool specifically designed for sentiment analysis of social media text. Tweets within the dataset are processed through the VADER sentiment analyzer to classify them into positive, negative, or neutral categories based on their sentiment polarity scores. By focusing exclusively on positive sentiment, the

analysis narrows its scope to elucidate the dissemination of supportive attitudes towards "ISIS" on Twitter.

Simultaneously, network analysis is employed to visualize the interconnectedness of Twitter users and track the propagation of positive sentiment within the network. Using network analysis techniques implemented through libraries like NetworkX in Python, the project constructs a graph representation of user interactions, wherein nodes represent users and edges signify interactions such as mentions and retweets. This graphical representation enables the visualization of user engagement patterns and the spread of positive sentiment across the network.

Furthermore, the methodology involves the identification of key nodes within the network, particularly top mentioned users and retweeters, to discern influential users and understand their role in propagating positive sentiment. By analyzing the centrality measures of nodes, such as degree centrality and betweenness centrality, the project identifies influential users who act as hubs for the dissemination of positive sentiment within the network.

Lastly, the methodology encompasses visualization techniques to present the findings in an accessible and interpretable manner. Utilizing tools like Matplotlib, the project generates visualizations of the network graph, highlighting key nodes and sentiment trends. These visualizations serve as valuable assets for understanding the complex dynamics of sentiment propagation and user interactions surrounding "ISIS" on Twitter.

OUTPUTS

```
In [156]: print("Top 5 Positive Users:")
          for user, count in top_five_positive_users.items():
              print(f"@{user[0]}: {count} mentions")

          print("\nTop 5 Neutral Users:")
          for user, count in top_five_neutral_users.items():
              print(f"@{user[0]}: {count} mentions")

          print("\nTop 5 Negative Users:")
          for user, count in top_five_negative_users.items():
              print(f"@{user[0]}: {count} mentions")

          Top 5 Positive Users:
          @RamiAlLolah: 104 mentions
          @Nidalgazaui: 28 mentions
          @WarReporter1: 26 mentions
          @sparksofirhabi3: 23 mentions
          @7layers_: 21 mentions

          Top 5 Neutral Users:
          @RamiAlLolah: 139 mentions
          @Nidalgazaui: 86 mentions
          @sparksofirhabi3: 31 mentions
          @sparksofirhabi5: 27 mentions
          @DidyouknowVS: 27 mentions

          Top 5 Negative Users:
          @RamiAlLolah: 277 mentions
          @Nidalgazaui: 191 mentions
          @WarReporter1: 74 mentions
          @7layers_: 51 mentions
          @Conflicts: 39 mentions
```

```python
In [15]: print("Unique tweets: {}".format(len(df['tweets'].unique())))
         print("All tweets: {}".format(len(df['tweets'])))

         retweets = []
         actual_tweets = []
         for user, tweet in zip(df['username'], df['tweets']):
             match = re.search(r'^\bRT\b', tweet)
             if match == None:
                 actual_tweets.append([user,tweet])
             else:
                 retweets.append([user,tweet])

         actual_tweets = np.array(actual_tweets)
         retweets = np.array(retweets)

         plt.bar([1,2], [len(actual_tweets[:,1]), len(retweets[:,1])], align='center')
         ax = plt.gca()
         ax.set_xticks([1,2])
         ax.set_xticklabels(['Actual Tweets', 'Retweets'])
```
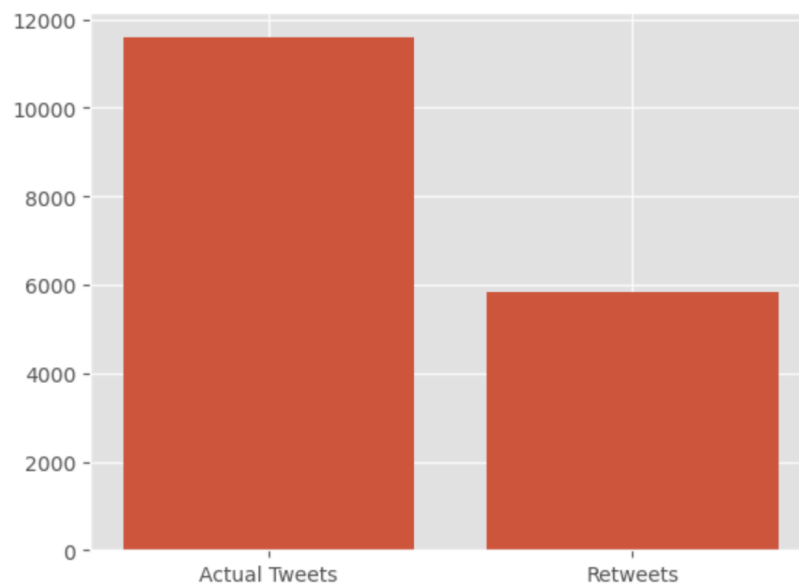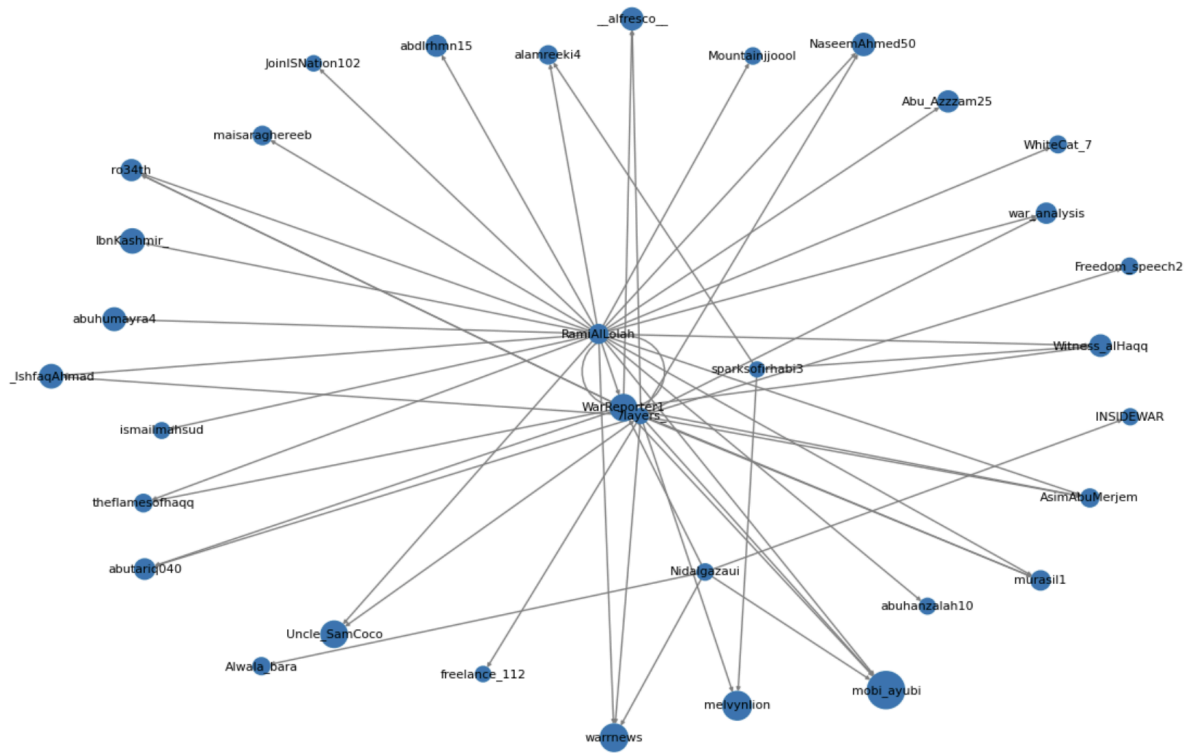
```
Unique tweets: 17410
All tweets: 17410
```
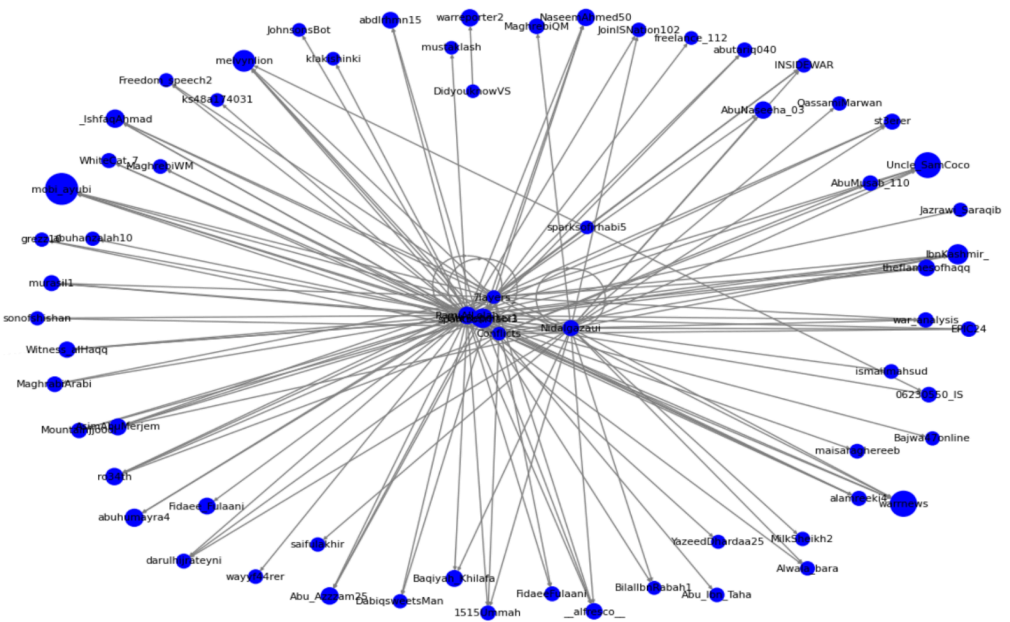
```
Out[15]: [Text(1, 0, 'Actual Tweets'), Text(2, 0, 'Retweets')]
```

Graph of Influential users spreading positive sentiment towards ISIS

Graph of Influential users spreading neutral sentiment towards ISIS

Graph of Influential users spreading negative sentiment towards ISIS

FUTURE SCOPE:

Cross-Platform Analysis: Extending the methodology to encompass other social media platforms beyond Twitter could provide a more comprehensive understanding of sentiment towards "ISIS" across various online communities. Analyzing sentiment dynamics on platforms like Facebook, Instagram, and Reddit would offer insights into how attitudes towards "ISIS" differ across different online spaces.

Temporal Analysis: Incorporating temporal analysis into the methodology would enable the tracking of sentiment trends over time. By analyzing how sentiment towards "ISIS" evolves in response to real-world events or media coverage, researchers can gain deeper insights into the dynamics of public opinion and ideological trends on social media.

Sentiment Intensity Analysis: Enhancing sentiment analysis techniques to incorporate measures of sentiment intensity could provide a more nuanced understanding of user attitudes towards "ISIS." By quantifying the strength of sentiment expressed in tweets, researchers can differentiate between mild support and strong advocacy, enabling more granular analysis of sentiment dynamics.

Influence Identification: Expanding the analysis to identify influential communities or subgroups within the network would offer valuable insights into the dynamics of information dissemination and opinion formation. By identifying clusters of users who exhibit significant influence over others, researchers can better understand the mechanisms driving the spread of positive sentiment towards "ISIS" on social media.

CONCLUSION:

In conclusion, our analysis of sentiment towards "ISIS" on Twitter underscores the significance of social media in shaping contemporary discourse and ideological trends. Through our methodology, we've gained valuable insights into the dynamics of sentiment expression and propagation within the Twitter network. By leveraging sentiment analysis techniques and network analysis tools, we've illuminated the prevalence of positive sentiment towards "ISIS" and traced its spread among users.

Moving forward, our findings have implications for various fields, including social science research, marketing, and public opinion analysis. Understanding the nuances of sentiment expression on social media platforms can inform strategies for engaging with diverse audiences and navigating contentious issues. Moreover, our methodology can serve as a foundation for future studies exploring sentiment dynamics in other online communities and across different platforms.

In summary, our analysis underscores the importance of examining sentiment dynamics in digital spaces to grasp the complexities of contemporary discourse. By combining sentiment analysis with network analysis, we've revealed the intricate interplay between user attitudes and social interactions, shedding light on the propagation of positive sentiment towards "ISIS" on Twitter. This research contributes to a broader understanding of the role of social media in shaping cultural narratives and ideological landscapes in the digital age.