

Impact of Brand Subreddit's Sentiment on Stock Performance

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Research Question: Does the sentiment towards a brand on their subreddit affect the brand's stock performance?

Objective: Investigate whether the sentiment towards a brand on their subreddit affects the stock performance of GameStop, Tesla, and Nvidia.

Importance: Understanding the influence of online communities on stock prices can help investors and analysts make more informed decisions. The meteoric fluctuations in price and popularity of the three selected stocks will provide a good model for these insights.

Methodology:

Data Collection

- **Reddit Data:** Use Reddit API (praw) to collect posts from r/GameStop, r/Tesla, and r/Nvidia from 2022-2024.
- **Stock Data:** Obtain historical stock prices from Yahoo Finance (yfinance) for GameStop, Tesla, and Nvidia from the same 2022-2024 window.

Data Preprocessing

- **Reddit Data Cleaning:** Remove URLs, mentions, special characters, and irrelevant posts. Remove useless fields and those not needed for sentiment analysis.
- **Stock Data Cleaning:** Ensure stock price data is consistent and reflects actual market activity.

Sentiment Analysis

- **VADER Sentiment Analysis:** Use NLTK's VADER to analyze the sentiment of each Reddit post.
- **Sentiment Scores:** Calculate daily average sentiment scores for posts about each stock.

Time Series Analysis

- **Data Aggregation:** Combine daily sentiment scores with corresponding daily stock prices for each stock.
- **Trend Analysis:** Visualize trends in sentiment scores and stock prices over time.

Impact Assessment

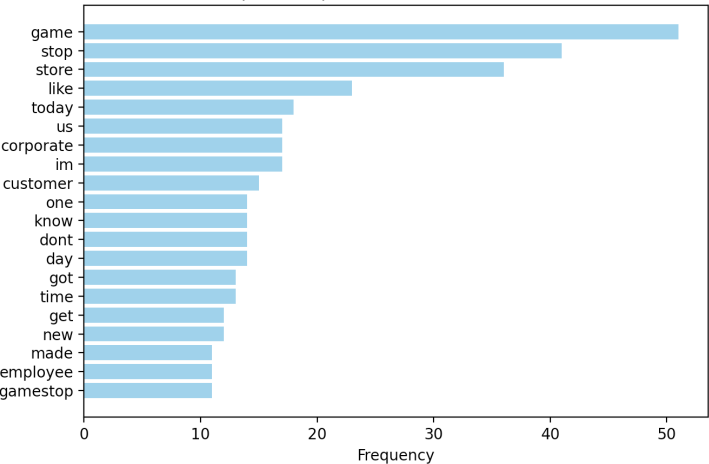
- **Correlation Analysis:** Calculate the correlation between sentiment scores and stock price movements for each stock.
- **Causality Test:** Determine if sentiment scores can predict stock price changes.

Preliminary Findings:

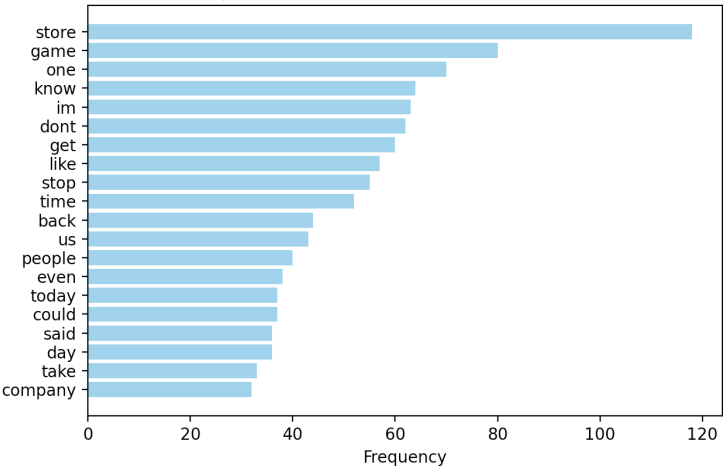
- **Volatility in Stock Prices**
 - The stock prices of GameStop, Tesla, and Nvidia have shown significant volatility, particularly around major news events and social media trends. This volatility suggests a potential influence of public sentiment and online discussions on stock prices.
- **Social Media Influence**
 - There has been a notable increase in the volume of posts and discussions on subreddits like r/GameStop, r/TeslaMotors, and r/Nvidia during key stock movements. This correlation between online activity and stock price changes indicates that social media sentiment might play a role in influencing investor behavior.
- **Sentiment Analysis Relevance**
 - Preliminary sentiment analysis of posts on these subreddits shows a mix of positive, negative, and neutral sentiments that seem to align with significant stock price changes. Analyzing sentiment trends over time can provide valuable insights into how public perception affects stock performance.
- **Insights for Each Stock**
 - **GameStop:** The surge in GameStop's stock price in early 2021 was accompanied by a significant increase in positive sentiment and discussions on r/GameStop.
 - **Tesla:** Key events, such as product launches and earnings reports, have triggered spikes in sentiment on r/TeslaMotors, which coincide with stock price movements.
 - **Nvidia:** Major announcements, like new product releases, have been followed by heightened activity and sentiment shifts on r/Nvidia, correlating with stock price fluctuations.

EDA for r/GameStop (top 500 posts)

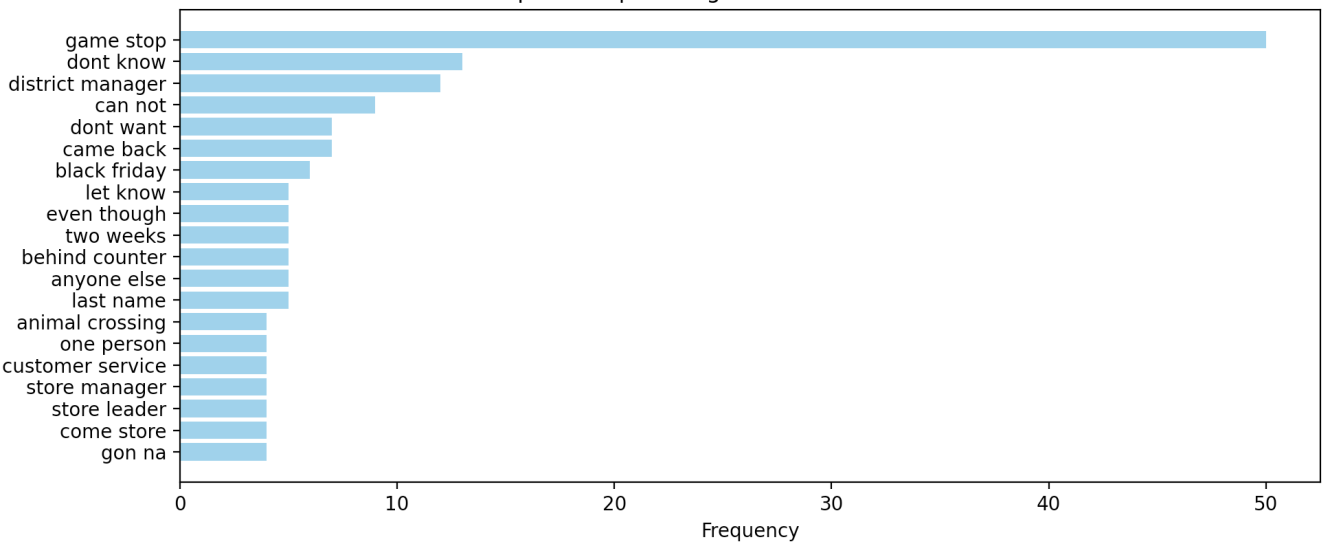
Top 20 Frequent Words in column: title



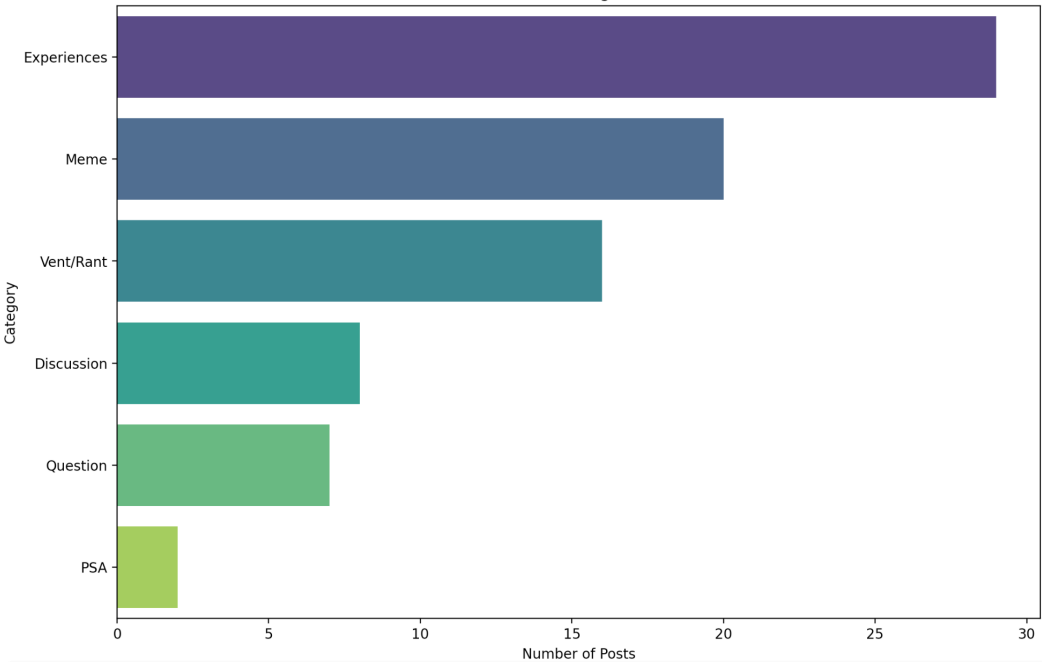
Top 20 Frequent Words in column: selftext



Top 20 Frequent Bigrams in Column 'selftext'

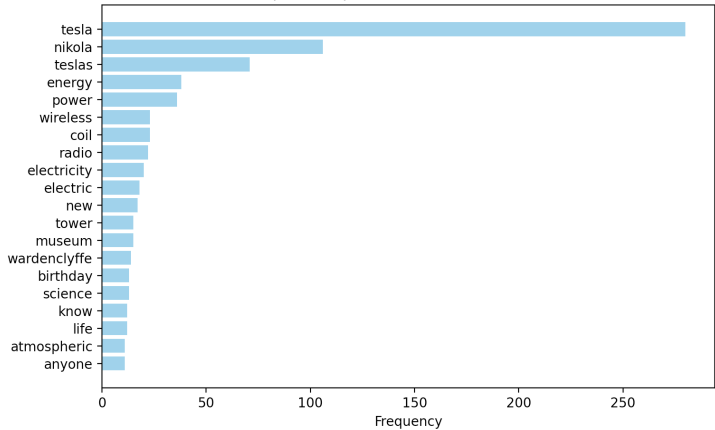


Distribution of Categories in Posts

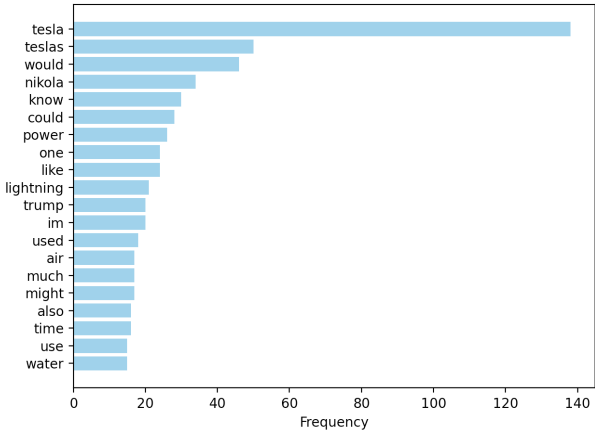


EDA for r/Tesla (top 500 posts)

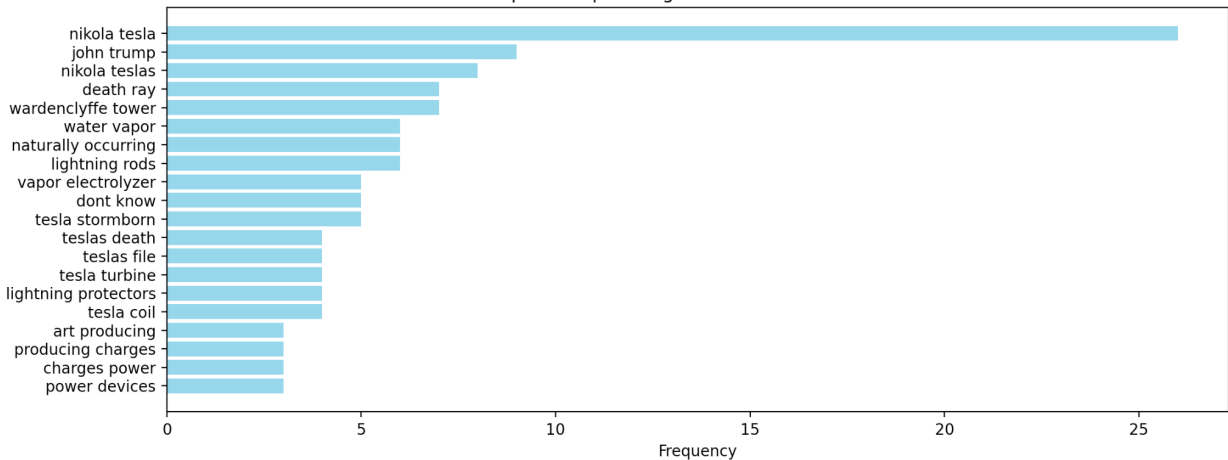
Top 20 Frequent Words in column: title



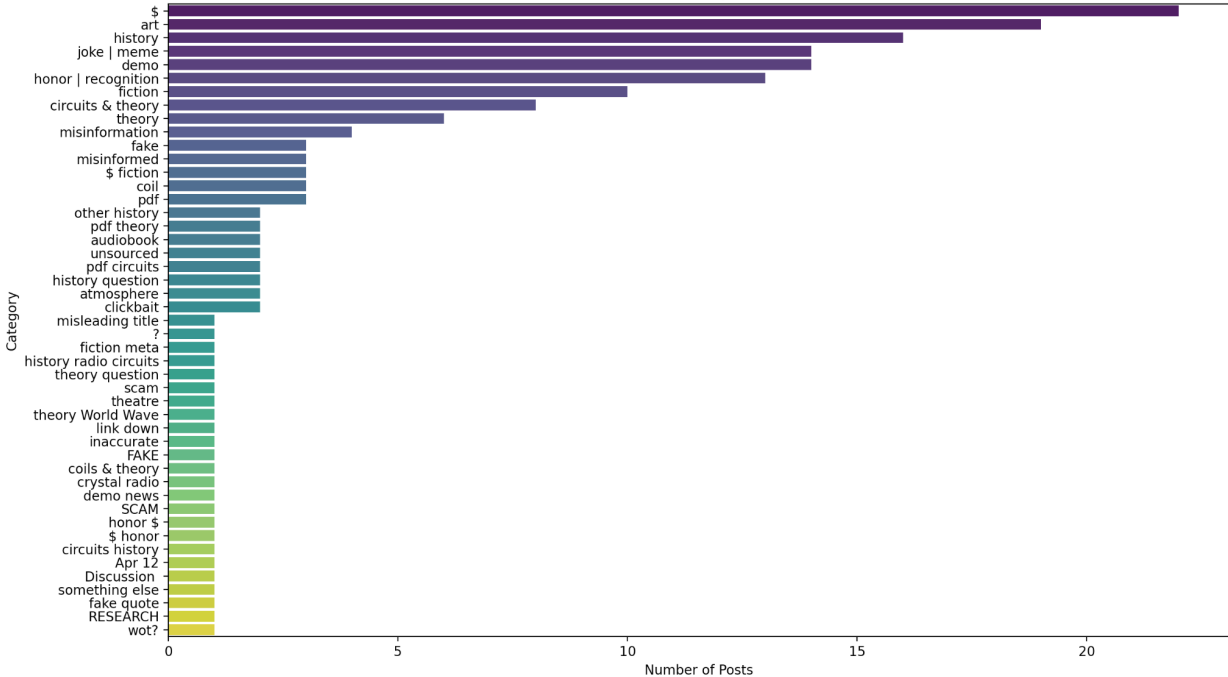
Top 20 Frequent Words in column: selftext



Top 20 Frequent Bigrams in Column 'selftext'



Distribution of Categories in Posts



EDA for r/nvidia (top 500 posts)

