Analyzing Public Sentiment on Apple and Google Through Tweets

Phase 4 Project - Group 2

Business Understanding

- **Understanding Consumer Sentiment:**
  Apple and Google, being global tech leaders, receive vast amounts of user feedback on platforms like Twitter. Analyzing this sentiment provides valuable insights into how their products are perceived by the public.

- **Leveraging NLP for Brand Monitoring:**
  By applying Natural Language Processing (NLP) techniques to social media data, businesses can automatically classify tweet sentiments into categories such as positive, negative, or neutral—eliminating the need for manual monitoring.

- **Real-Time Market Insights:**
  Automated sentiment analysis allows businesses to capture real-time public opinion, enabling timely decision-making for marketing, product development, and customer engagement strategies.

Problem Statement

Apple and Google receive massive volumes of social media feedback, making manual sentiment tracking impractical and inefficient. To gain timely and accurate insights, a scalable NLP-based solution is needed to automatically classify tweet sentiments in real time.

Objectives

- **Analyze Tech Brand Sentiment**
  Assess public opinion on Apple and Google through tweet analysis.

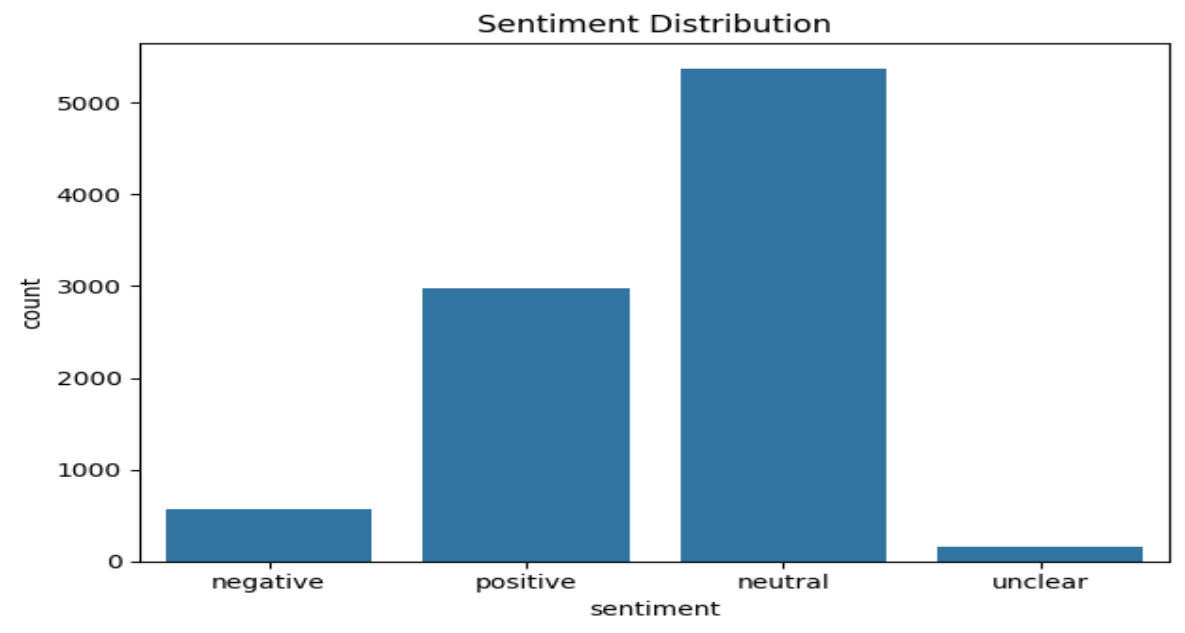
- **Automate Sentiment Detection with NLP**
  Use NLP to classify tweets by sentiment without manual effort.

- **Capture Real-Time Market Insights**
  Track public opinion instantly to guide business decisions.

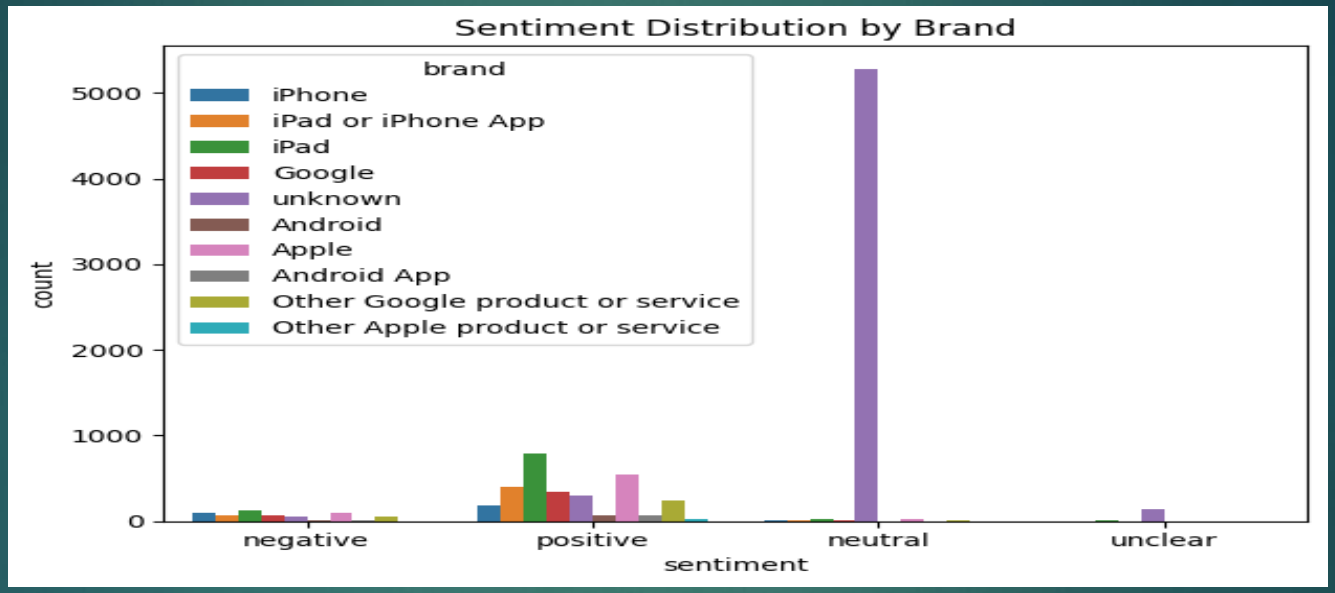
- **Evaluating model performance**
  Evaluate using Accuracy, Precision, Macro F1-score, Weighted Accuracy, and per-class metrics for binary and multiclass tasks.

Comprehending sentiment patterns

The majority of tweets are neutral, with fewer expressing negative sentiment. This class imbalance can make it challenging for the model to accurately learn and predict the minority classes, particularly negative sentiments.

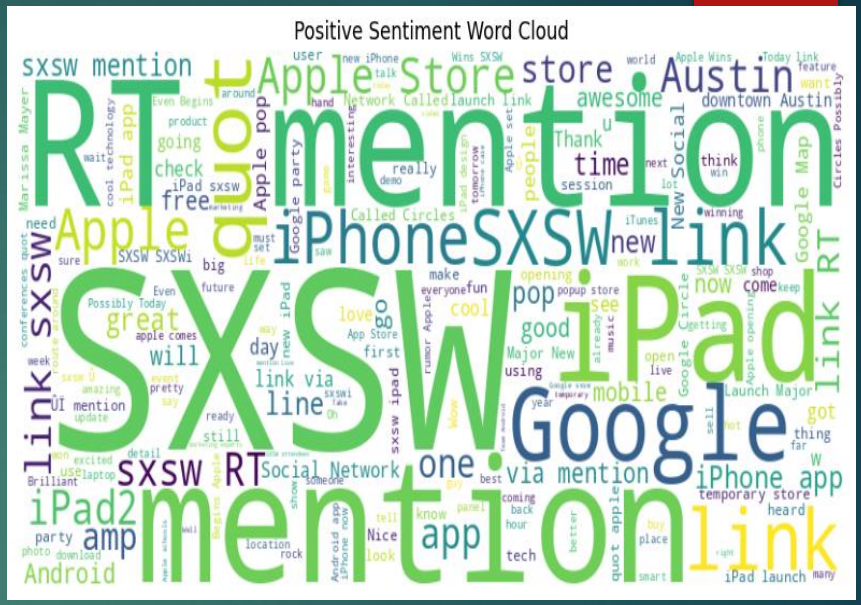


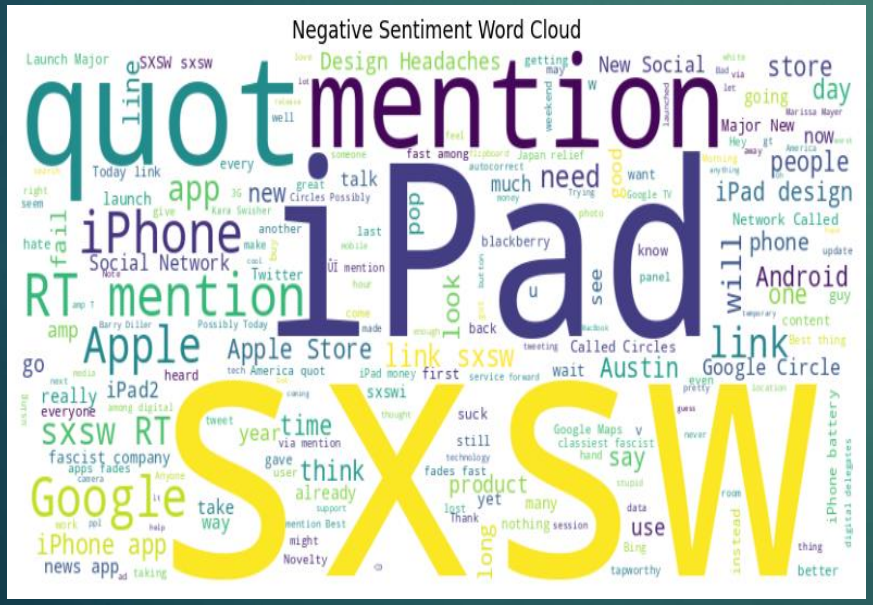
Sentiment breakdown by brand



Neutral sentiments dominate the dataset, particularly within tweets from unknown brands. Among the known brands, iPad and Apple receive the most positive sentiment. Notably, no brand shows a significant negative trend which is an encouraging sign for all brands represented.

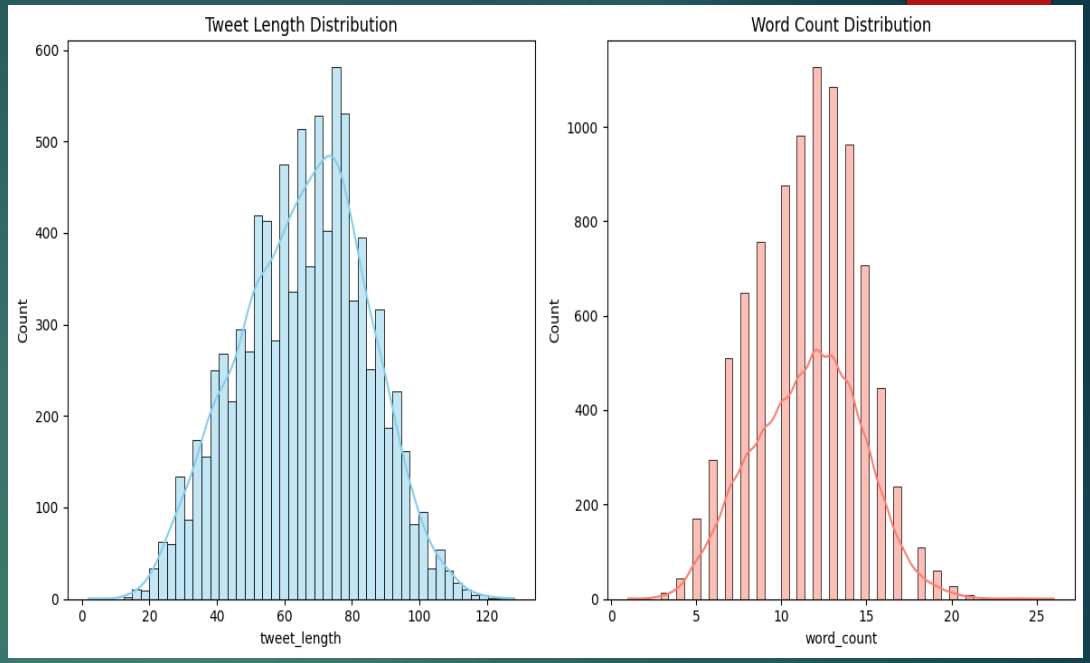
Visualization of term frequency



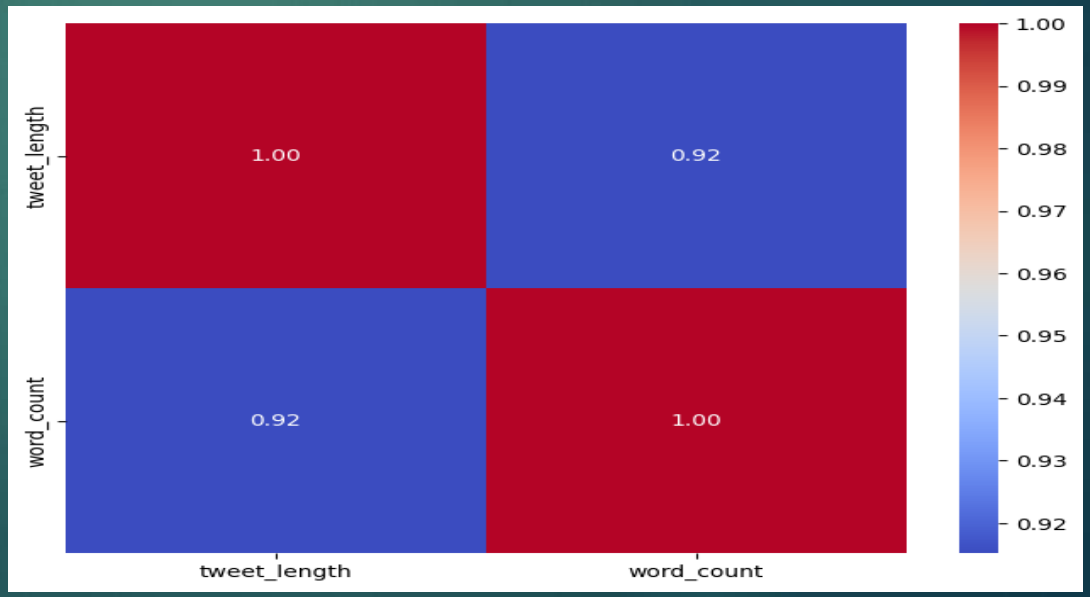


The plot shows word frequency and sentiment in tweets, with larger, bolder words indicating higher mention. Terms like 'iPhone', 'iPad', 'Apple', and 'SXSW' appear prominently in both positive and negative contexts, suggesting they are widely discussed and potentially polarizing topics.

Quantifying Tweet Length: A Correlation Analysis



A strong positive correlation (r = 0.91) between word count and tweet length suggests either can serve as a proxy for the other in analysis.



Key Findings from Model Evaluation

- **Logistic Regression**: Achieved reasonable accuracy; performance improved with SMOTE to handle class imbalance.
- **Multinomial Naive Bayes**: Best for binary classification; accuracy and F1-score improved with hyperparameter tuning.
- **ANN (Sigmoid)**: Shows solid binary classification performance across all key metrics.
- **ANN (Softmax)**: Handles multiclass classification well; evaluated using macro-averaged metrics and detailed per-class performance.
- **LSTM**: Best for multiclass classification; excels at capturing sequential features, as shown in classification metrics.

Conclusions

•Neutral sentiment is dominant in the dataset, indicating a lack of strong opinions, which might imply a need for more engaging or polarizing content from brands.

•Positive sentiment for well-established brands like Apple and iPad is a good sign, suggesting strong brand loyalty and customer satisfaction.

•The absence of significant negative sentiment across all brands could indicate a generally favorable perception, but the dataset's neutrality suggests that there may be a gap in passionate customer advocacy or brand differentiation.

•The word frequency plot offers valuable insights into both sentiment trends and the relevance of specific words, which can guide further analysis or marketing efforts.

Recommendations

- **Focus on unknown brands**:
  Analyze why sentiment is mostly neutral to improve brand awareness and engagement.

- **Leverage positive sentiment for Apple and iPad**:
  Highlight strengths from positive tweets to boost loyalty and reach.

- **Monitor for emerging negative trends**:
  Track sentiment regularly to catch and respond to potential issues early.

- **Use word frequency analysis**:
  Identify key themes and guide content using high-frequency and sentiment-linked terms.

- **Google**:
  Google should increase social media engagement through targeted campaigns or product spotlights to boost brand mentions and encourage more user-generated content, as it did not receive many mentions.

Thank you