

Twitter Sentiment Analysis



Google and Apple Products

MORINGA SCHOOL PROJECT

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Purpose of the Project

Context

- Google's and Apple's reliance on maintaining customer satisfaction
- Analyze data from data world and classify sentiments

Our goal

- The main objective of this project is to develop a sentiment classification model that analyzes tweets about Apple and Google products and classifies them as positive, negative or neutral.



Business Understanding

Business Overview

The main objective of this project is to develop a sentiment classification model that analyzes tweets about Apple and Google products and classifies them as positive, negative or neutral.

Key questions

1. Which products and services from Apple or Google have the largest negative, positive and neutral feedback?

Data Understanding

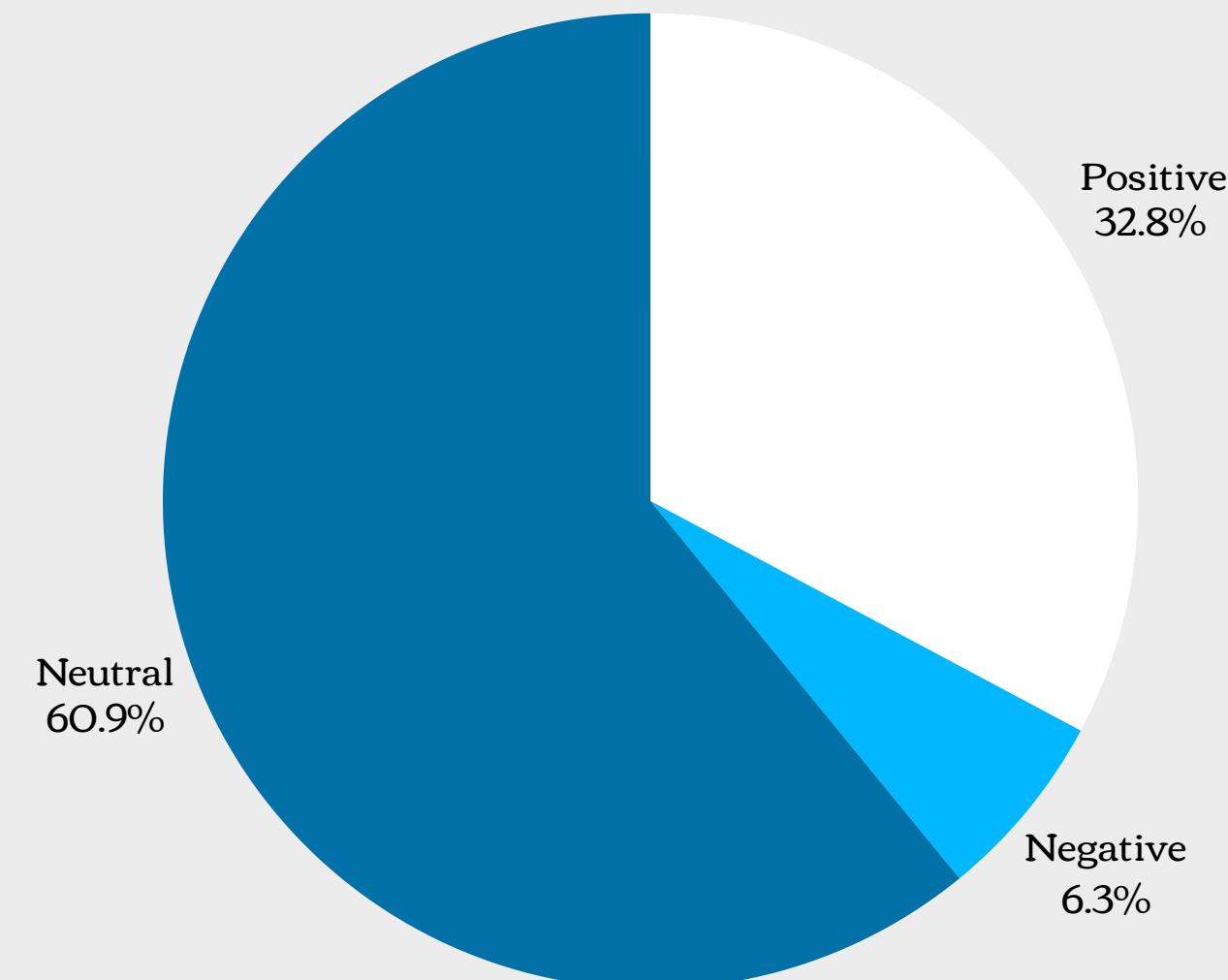


Description of Data:

- Data format: CSV file (judge-1377884607_tweet_product_company.csv).
- Number of records (rows): 9093 rows (varies depending on version of dataset).
- Number of fields (columns): 3 columns (Tweet, tweet_directed_at, sentiment).

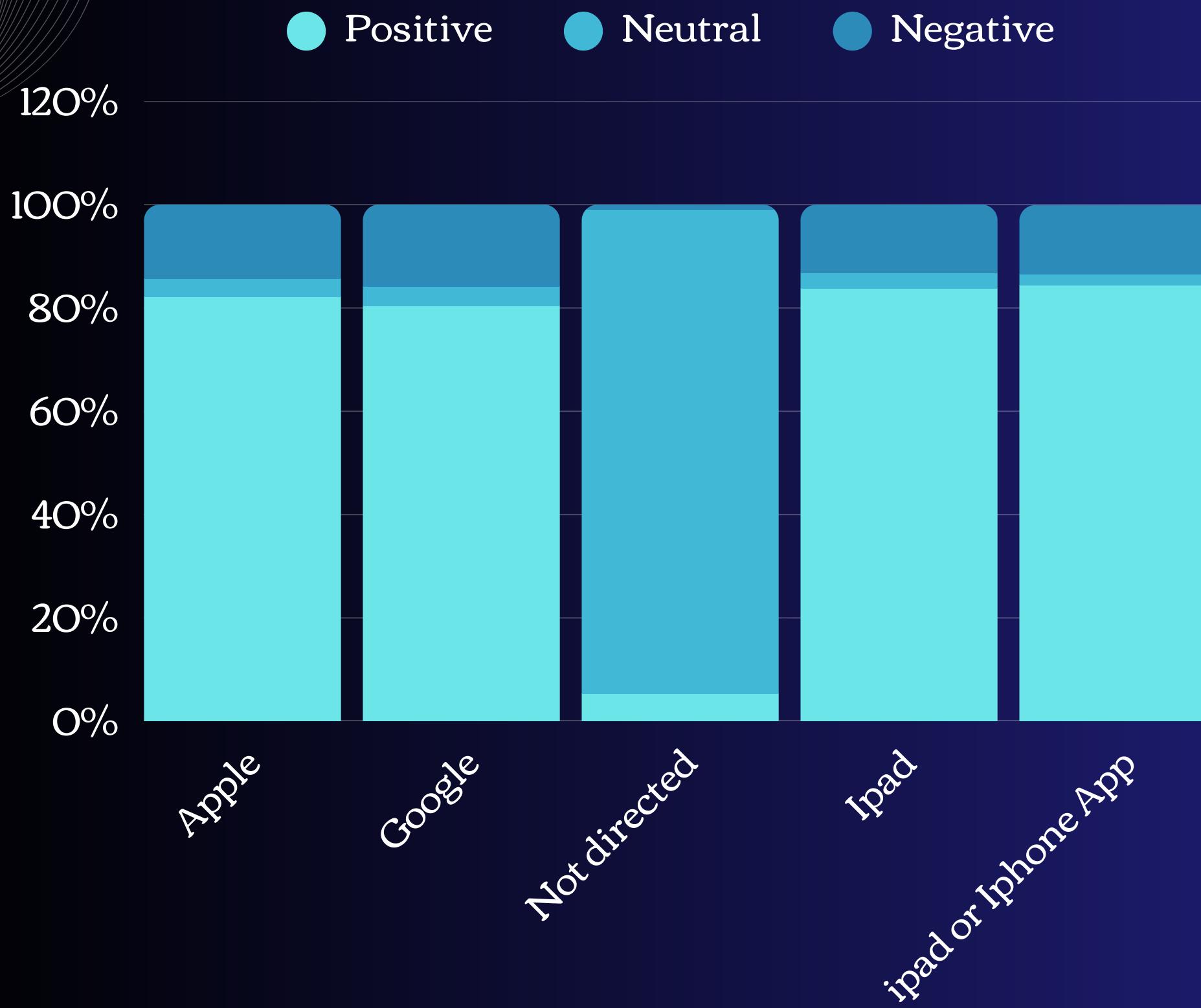
DATA ANALYSIS

SENTIMENT DISTRIBUTION



- Out of the 9070 tweets in the dataset, 5531 tweets express a neutral emotion. This is about 60.98% of the total tweets, 2970 tweets express a positive emotion, which is about 32.75% of the total tweets and 569 tweets express a negative emotion, which is about 6.27% of the total tweets.

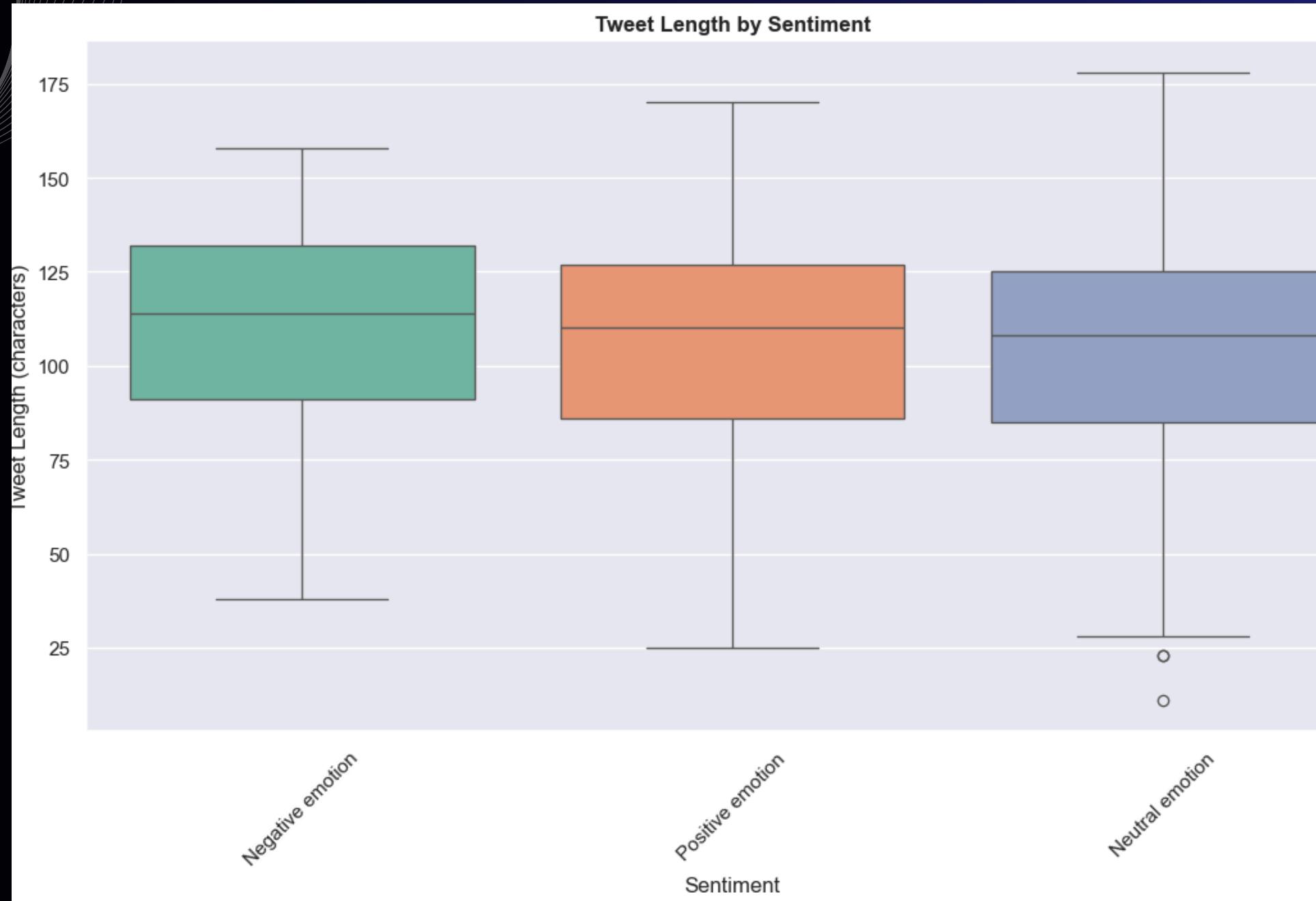
Sentiment proportions by top 5 destinations



This plot shows the percentage distribution of positive, neutral and negative sentiments across the top five tweet destinations:

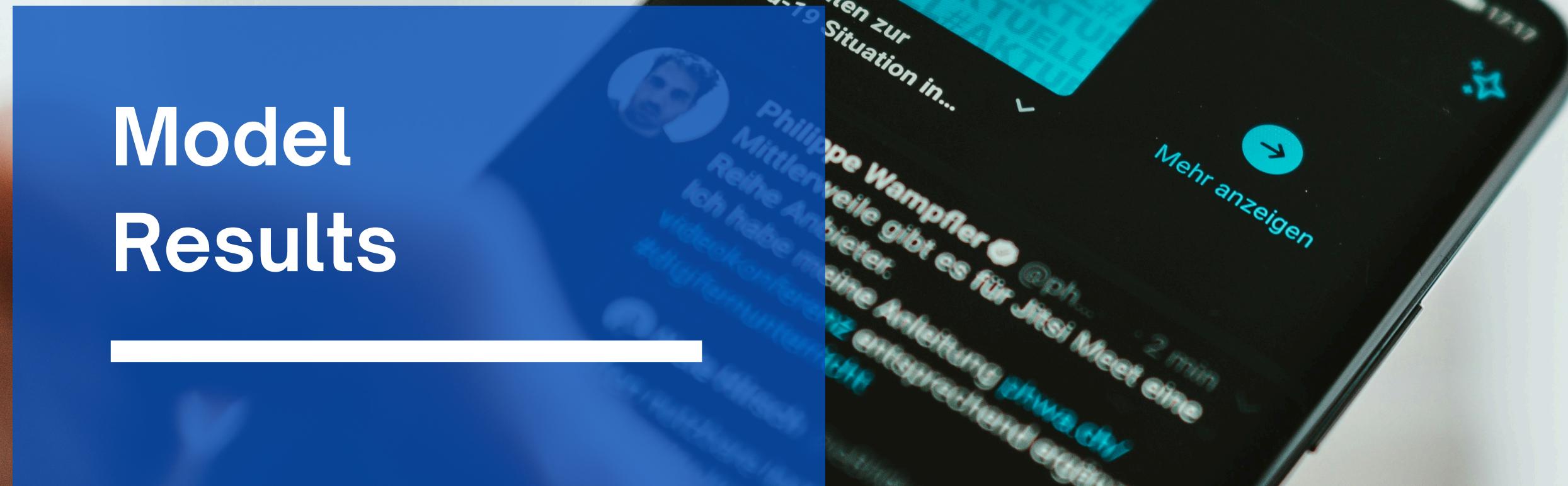
- Apple, iPad, and iPad or iPhone App show strong positive sentiment, exceeding 80%.
- Google also records high positivity at about 80% but slightly higher negative and neutral shares than Apple destinations.
- Not directed tweets are mostly neutral at 93.8%, showing minimal sentiment variation.
- This shows that tweets targeting Apple and Google products highlight favourable public perception, while non-targeted tweets remain mostly neutral.

Tweet Length Distribution by Sentiment



- Neutral tweets has a wider range of lengths. The median length remains consistent across all sentiment groups.
- Outliers with longer tweet lengths are present within each sentiment category.
- The tweet length shows little variation across sentiments. This shows that sentiment type is not strongly associated with tweet length in this dataset.

Model Results



Best Model

For Binary Classification, LinearSVC had the best accuracy score of 87.58% compared to Logistic Regression with 84.81% and Naives Bayes 84.62%

Confusion Matrix

Observation for LinearSVC

- The model has a high True positive rate(860) indicating it correctly identified positive emotions.
- The model has a low False positive rate(111) and low False negative rate(19)
- Indicating the model wrongly identified negative emotions as positive and correctly identified positive emotions.

MULTI-CLASS CLASSIFICATION

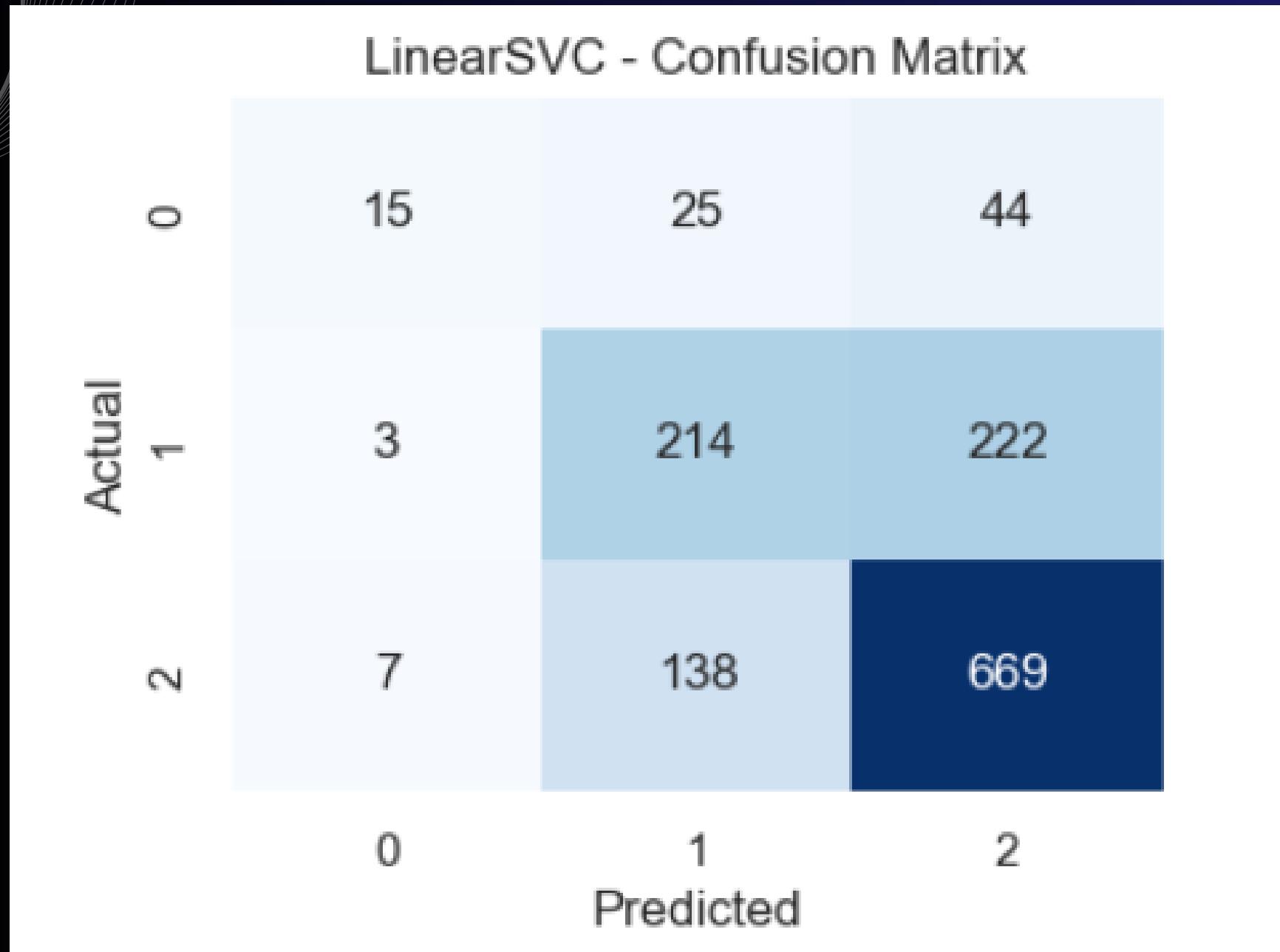
Accuracy

Linear SVC has the best Validation accuracy with an accuracy of 67.2%

Classification Report

- The True positive total is 898 these are the values the model correctly predicted for each and every class
- The False positive and False negative for the negative class is (10) and (69) respectively.

Confusion Matrix on LinearSVC Model



- The True positive total is 898. These are the values the model correctly predicted for each and every class. -
- The False positive and False negative for the negative class is (10) and (69) respectively. -
- The False positive and False negative for the positive class is (163) and (225) respectively.
- -The False positive and False negative for the neutral class is (266) and (145) respectively.

Model evaluation overview

In binary classification:

1. We made use of classification report to show the precision, recall and f1 score of the three classification models.
2. We also evaluated the models using accuracy score where the LinearSvc had the best test accuracy score of 87.58%

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In Multi-class classification:

1. We made use of a pipeline to iterate over the different models and give us the training accuracy, validation accuracy, f1 score and ROC.
2. All the classification models had a good validation accuracy with LinearSVC having the best validation accuracy of 67.2%
3. We also evaluated the models using f1 score with LinearSvc having the best f1 score of 52.2%,Naive bayes(42.6%) and Logistic Regression (50.1%) following closely behind.
 4. The logistic Regression model had the best ROC curve.
5. Our random forest ensemble had a training accuracy of 99% indicating it memorized the data too well. It overfitted, this could be due to having a small dataset.

CONCLUSION:

This Twitter sentiment analysis project has provided valuable insights into the challenges and opportunities of automated sentiment classification for Apple and Google products. The analysis encompassed both binary and multi-class classification approaches, revealing important patterns about social media sentiment and model performance.

In both the binary and multi-class approach linear Support Vector Classifier emerged as the best performing model, delivering the highest accuracy on unseen data with balanced errors across classes. This model can therefore be used to make new predictions.

THANK YOU

presented by:
group 3