



NLP SENTIMENT CLASSIFICATION PROJECT



A Data-Driven Apple & Google Product Sentiment Analysis



Table of contents

1

Introduction

Overview and Business Understanding

2

Methodology

Data summary, Data Cleaning, Feature Engineering, Tools

3

Results

Trends, Statistics and Key Insights

4

Business Recommendations

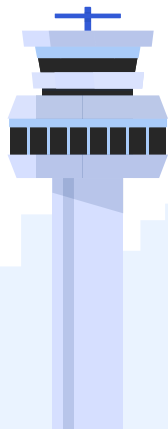
Problems and recommendations





1

INTRODUCTION





Project Overview



Objective: Develop an NLP model that automatically classifies sentiment (Positive, Negative, Neutral) from tweets directed at Apple or Google products.

Data: Apple & Google Tweet Sentiment Dataset on Kaggle

Audience:

Product & Marketing Teams at Apple and Google
Customer Experience & Social Media Teams





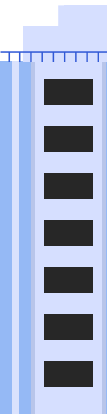
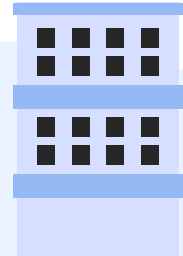
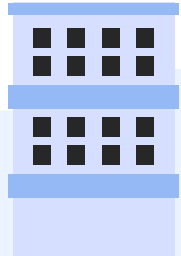
Business Understanding



Stakeholder Need

Product, marketing & customer experience teams require early detection of public sentiment to:

- Track reactions to product launches
- Identify rising dissatisfaction
- Benchmark Apple vs Google perception





Business Understanding

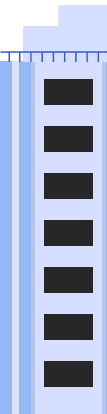
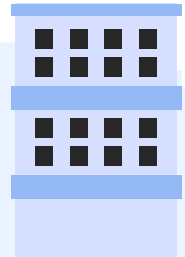
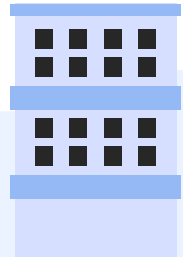


Key Business Questions?

- What emotions dominate across Apple/Google tweets?
- Which products trigger positive or negative emotions?
- What keywords are associated with negative sentiment?

Success Criteria

A scalable and automated system enabling real-time tracking of brand sentiment






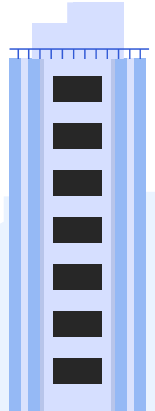
2

METHODOLOGY





Data Source

- The dataset used in this analysis is sourced from the Apple & Google Tweet Sentiment Dataset on Kaggle.
 - It contains information on **9,093 tweets** collected for sentiment analysis.
 - The dataset is structured for a **multiclass classification problem**, with the target variable sentiment label indicating emotion expressed on tweets.
- 
- 



Data Summary

Tweets collected: 9,093 (for sentiment analysis)

Columns: tweet_text, target product, sentiment label

Cleaned dataset: 3,282 samples (duplicates & missing removed)

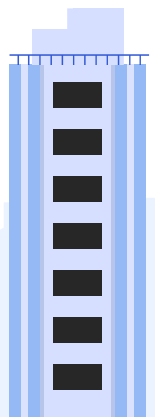
Final sentiment classes:

- Positive: 2,664
- Negative: 518
- Neutral: 100




Key Characteristics

Tweets are short: most between 10–15 words and Apple dominates: 73% Apple vs. 27% Google.





Data Cleaning

- Removed **22 duplicates**
 - Dropped **null rows**
 - Renamed columns for clarity
 - Converted product labels to lowercase
 - Classified products into companies: Apple or Google
 - Merged small class “I can’t tell” → Neutral
 - Normalized text: Removed URLs, mentions, hashtags, removed stopwords and lemmatized words
- 



Modeling






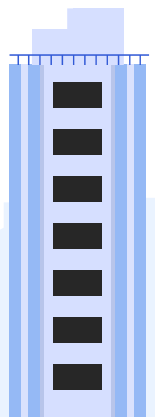
Feature Engineering:

- Text preprocessing
- TF-IDF vectorization (tweets → numerical representation)

Models Trained:

- Logistic Regression
- Random Forest Classifier
- Naive Bayes
- Support Vector Machine (SVM)

Evaluation Metrics:

- Accuracy
 - Precision
 - F1-Score
- 
- 
- 
- 



Tools

Python

Core Programming
Language

Pandas & Numpy

Numerical Analysis & Data
processing

NLP & Modelling

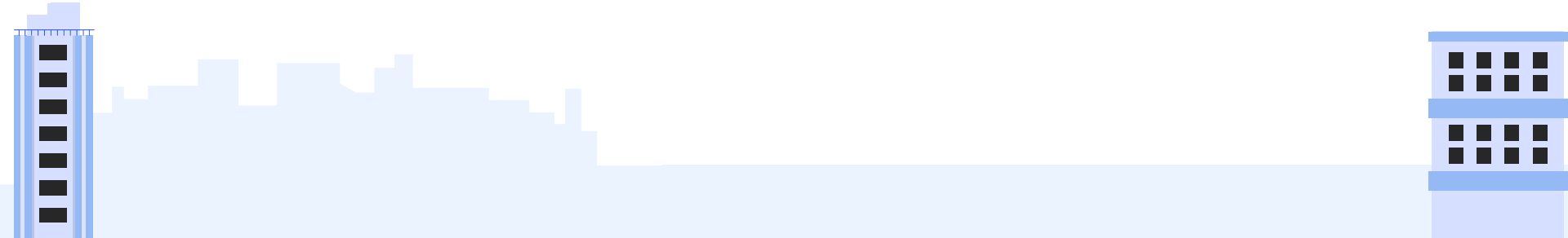
NLTK, TF_IDF, TensorFlow

Seaborn & Matplotlib

Visualization

Jupyter Notebook

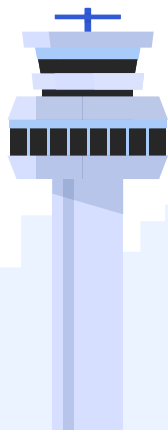
Interactive analysis and
Documentation





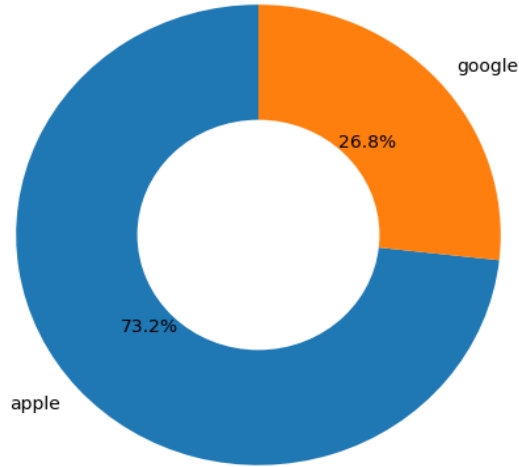
3

RESULTS

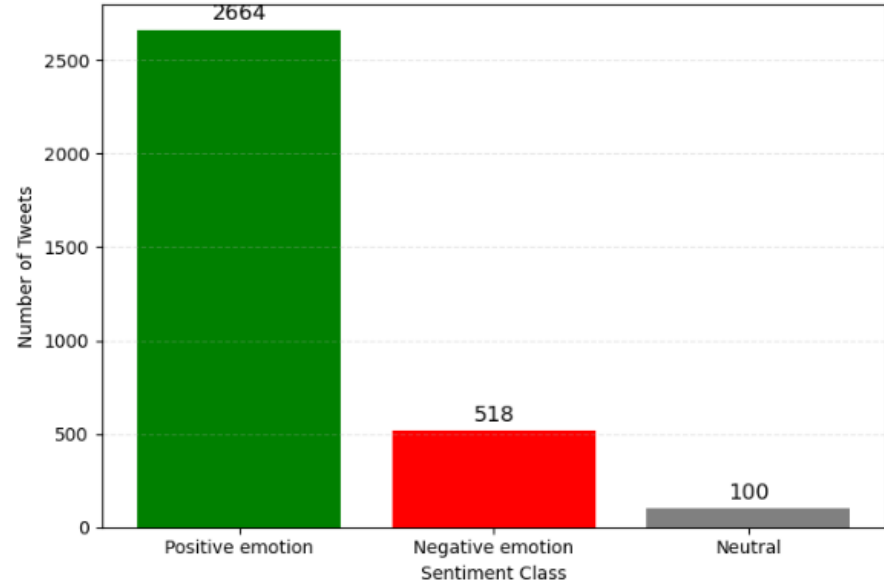


Dataset Distribution

Company Mentions



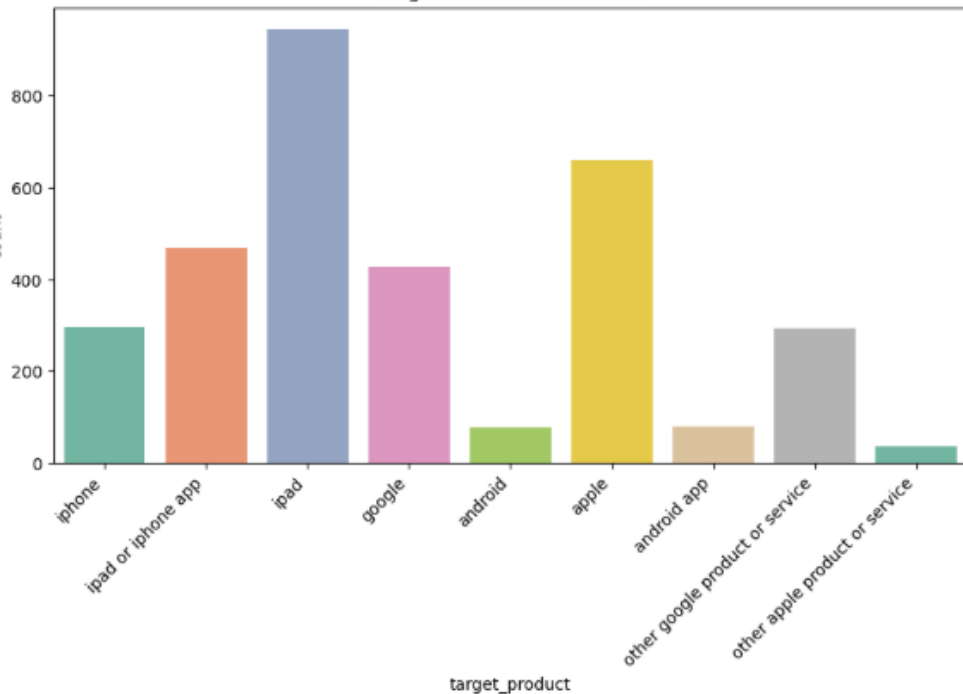
Sentiment Distribution



- Apple dominates conversations, accounting for 73.2% of all tweets, while Google is mentioned in 26.8%.
- Sentiment is strongly skewed toward positivity.
- Overall, users talk far more about Apple, and the majority of tweets across both brands express positive sentiment.

Target Product Distributions

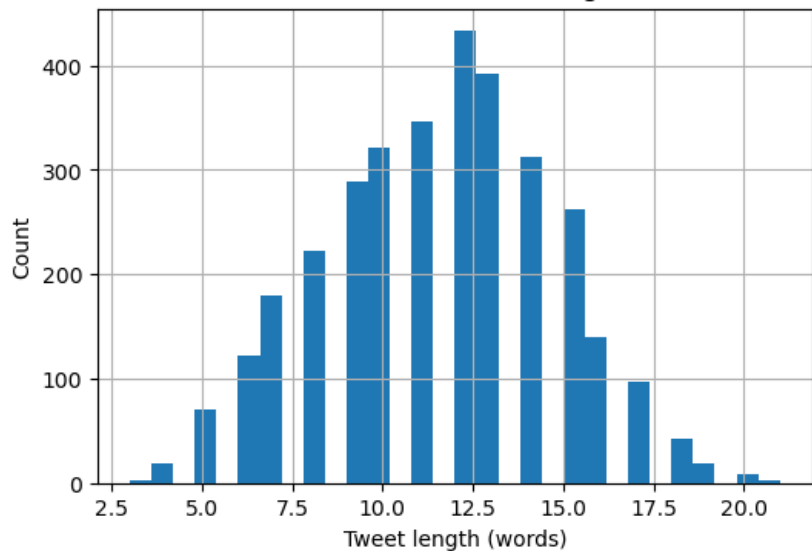
Target Product Distribution



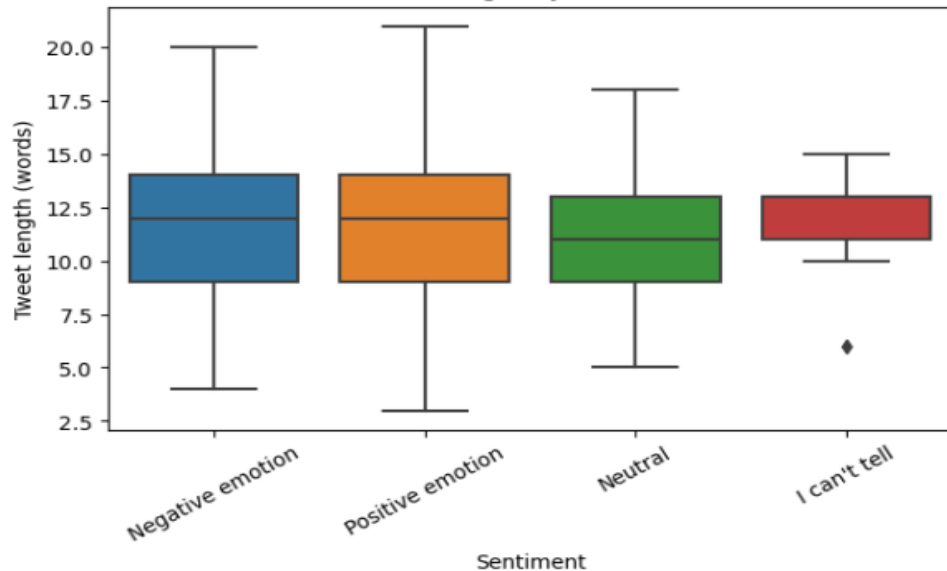
- **Most mentioned:** iPad
- **Followed by:** Apple, iPad/iPhone App, Google
- **Less frequent mentions:** Android, Android App, other Apple/Google services
- **Insight:** User discussions are heavily centered on Apple's core products, with fewer references to Android or secondary services

Tweet Length Analysis

Distribution of tweet lengths

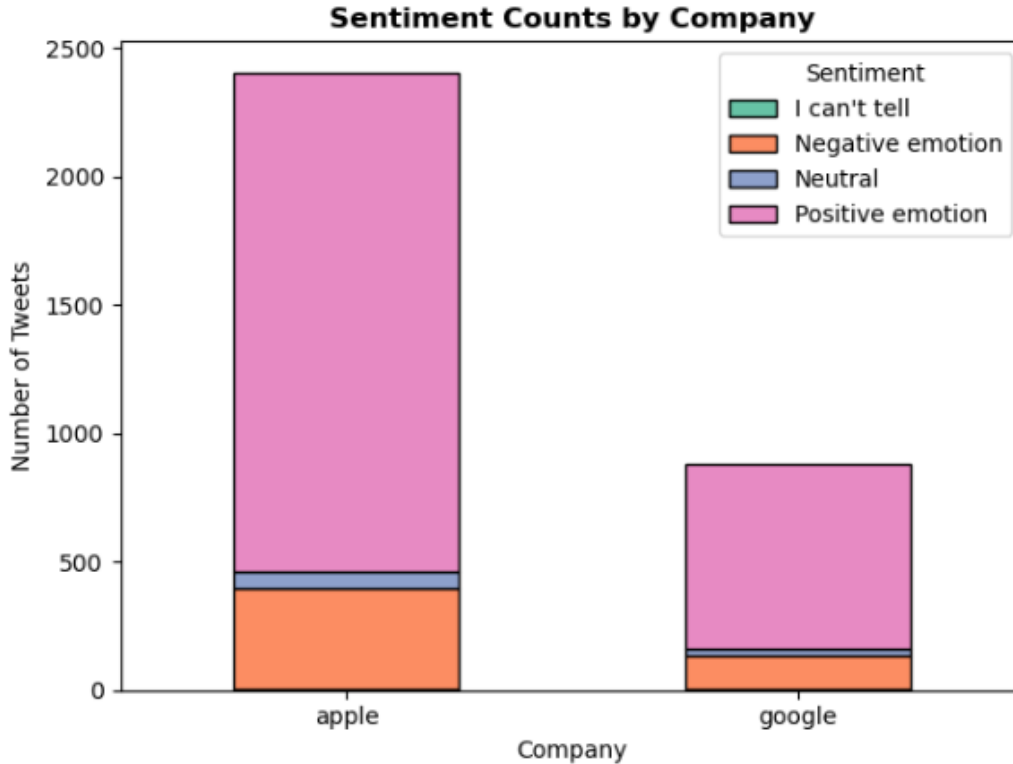


Tweet Length by Sentiment



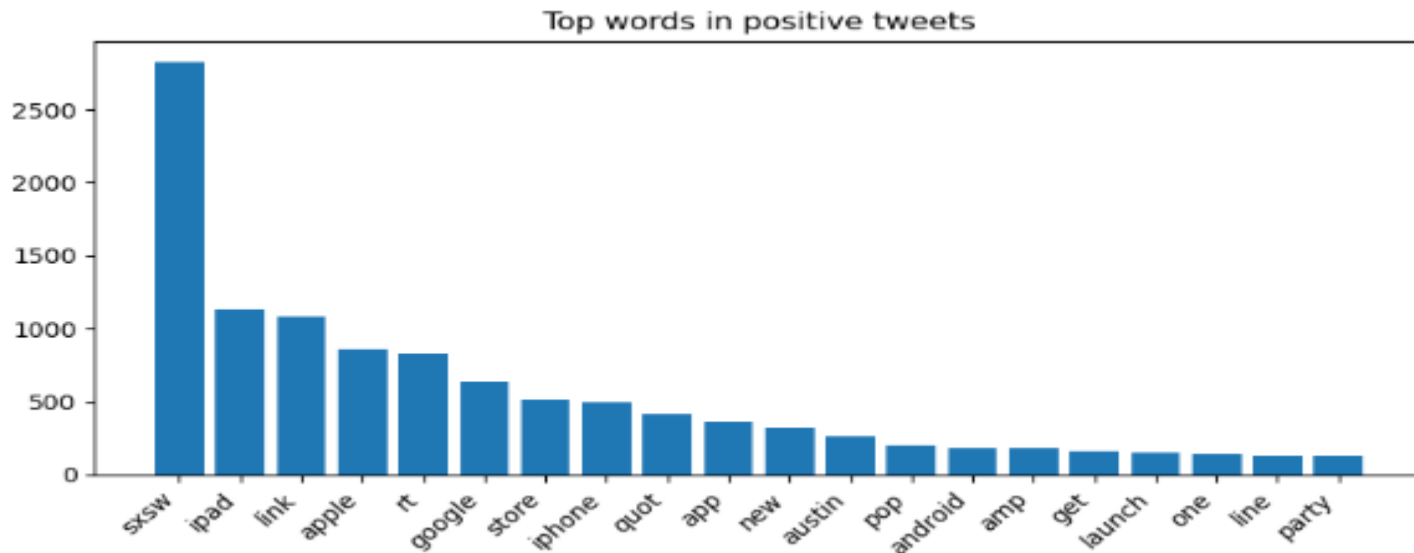
- Tweet lengths are similar across sentiments; **Neutral** tweets slightly shorter, “I can’t tell” most consistent.
- **Sentiment does not strongly affect** how long users’ messages are.
- Most tweets contain **10–15 words**, showing concise user expression
- Distribution is **roughly normal**, centered on medium-length tweets.

Sentiment by Company



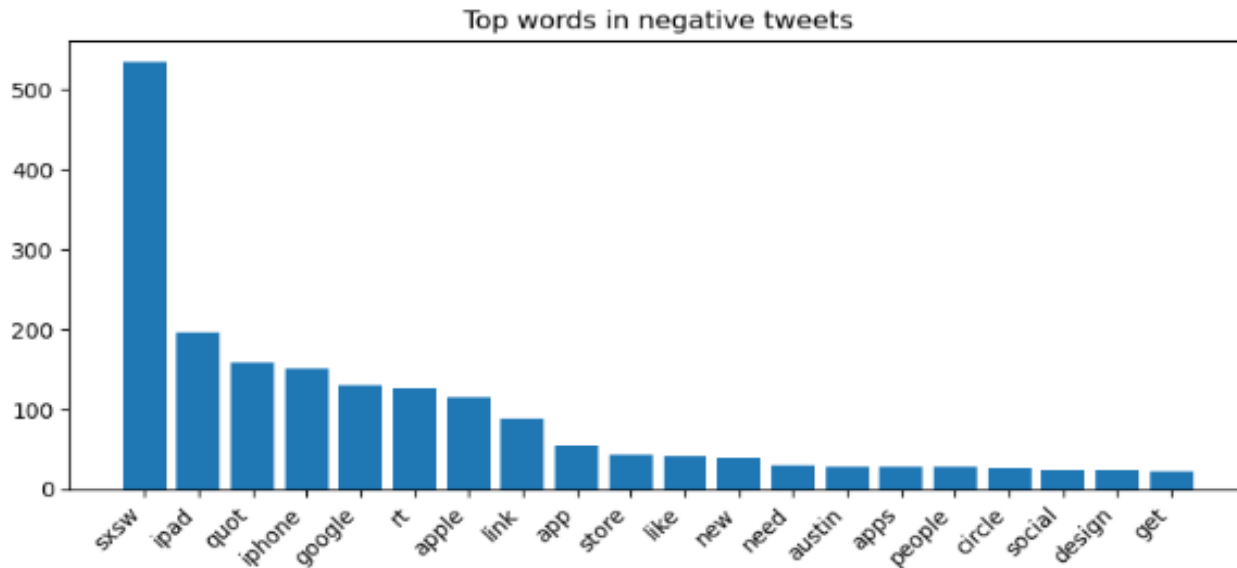
- **Positive sentiment dominates** overall, especially for Apple
- Apple receives **more tweets** than Google, with many favorable messages
- **Negative & neutral** sentiments are lower for both companies
- “I can’t tell” category is minimal → most tweets show a clear emotional tone

Top Words in Positive Tweets



- Positive tweets highlight **sxsw, ipad, link, and apple**
- Indicates excitement around **events, products, and updates**
- Apple-related terms dominate positive discussions.
- Shows users' tendency to **share enthusiasm and news**.

Top Words in Negative Tweets



- Negative tweets also mention ipad, iphone, and store, but in different contexts
- Positive tweets show a **broader variety** of frequent terms.
- Negative tweets have **fewer, more concentrated word patterns**.





Key Insights & Model Comparison



Best Overall Accuracy

- SVM (Combined Features) — 86.45%
- Logistic Regression (TF-IDF, GridSearch) — 86.19%

2 Best Macro F1 (Fairness Across Classes)

- SMOTE + Random Forest — 0.49
 - Tuned Naive Bayes ($\alpha = 0.1$) — 0.48
 - SMOTE + XGBoost — 0.463
- 
- 





Key Insights & Model Comparison



Best Weighted F1 (Majority Performance)

- SVM, Logistic Regression, and Tuned Naive Bayes score ~0.83–0.86
- Strong performance on the dominant Positive



Neutral Class Remains the Weakest

- Recall stays between 0.00–0.10 for all models
 - Caused by very few samples and overlapping language
- 
- 



Final Takeaways

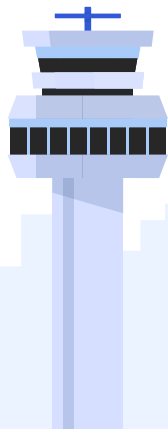


- **Best Overall:** SVM (Combined Features)
 - **Best Class-Balanced Model:** SMOTE + Random Forest
 - **Best Simple Text Baseline:** Multinomial Naive Bayes ($\alpha = 0.1$)
 - **Best Linear Model:** Logistic Regression (TF-IDF Only)
- 
- 



4

RECOMMENDATIONS





Leverage Positive Engagement

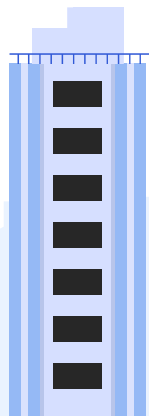
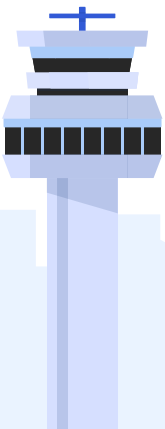
- Amplify themes around iPad/iPhone excitement
- **Use SXSW-style events to boost visibility(aligns with top-word insights).**





Strengthen Product Support

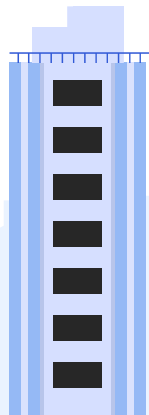
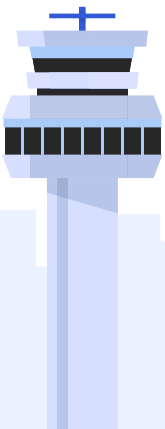
- Negative tweets frequently mention: battery, crash, slow, update issues
- **Improve update rollout, app stability, and troubleshooting guides.**





Monitor High-Risk Topics in Real Time

- Set alerts for spikes in negative words
- Auto-detect trending complaints using bigram analysis





Competitive Benchmarking

- Apple dominates sentiment volume - Google can study Apple-related positive triggers.
- Google should capitalize on its lower negativity levels per tweet.





THANK YOU

Prepared by: Group 7 Members

Brian Kiprop

Michael Mumina

Jeremiah Bii

Dennis Irimu

Emmanuel Kipleting

