

# Twitter Sentiment Analysis



Google and Apple Products

MORINGA SCHOOL PROJECT

1. Elvis Wanjohi
2. Jessica Gichimu
3. Jesse Ngugi
4. Stephen Gachingu
5. Latifa Riziki

# Purpose of the Project

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## Context

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

## Our goal

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- 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

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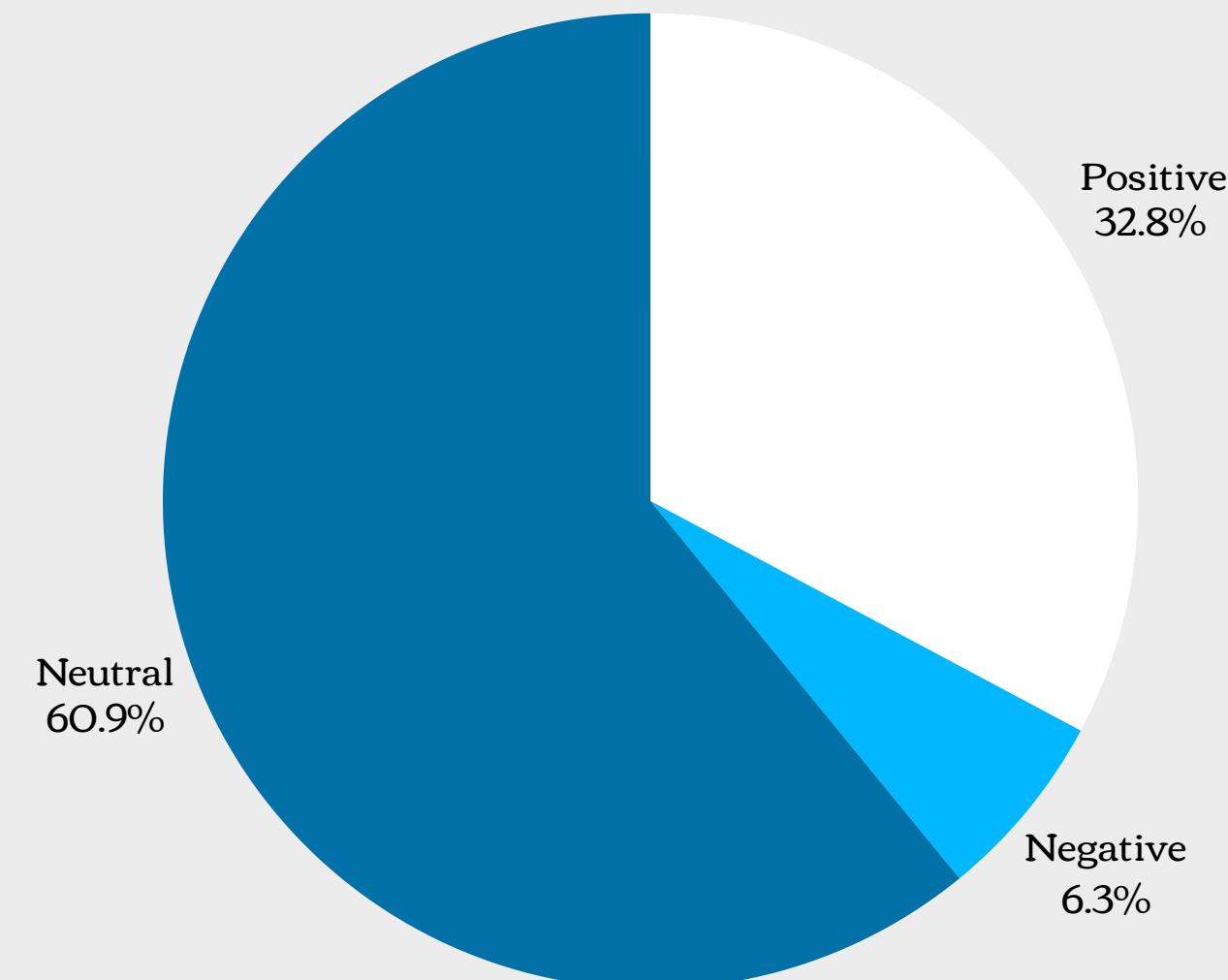


## Description of Data:

- 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).

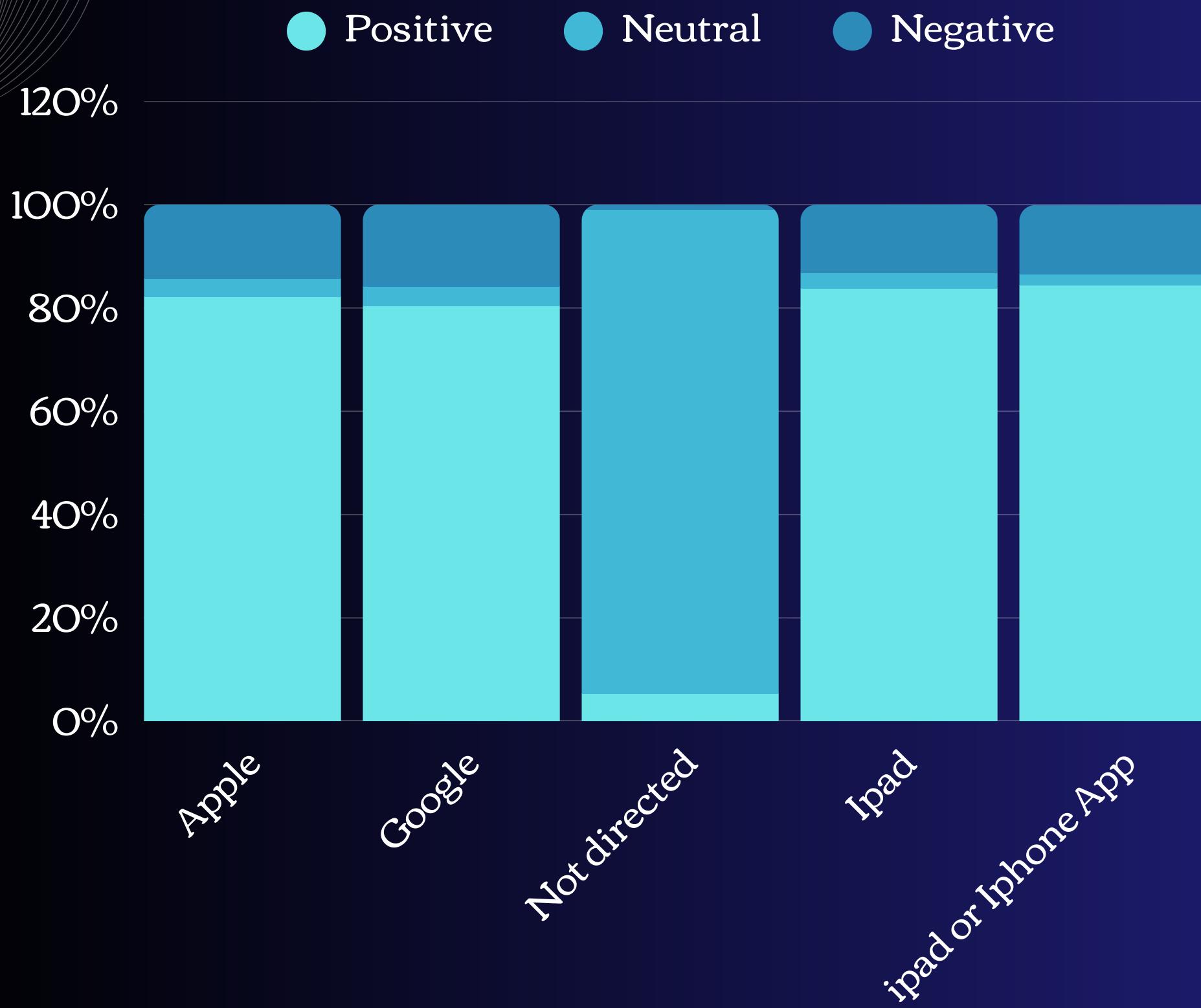
# DATA ANALYSIS

## 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.

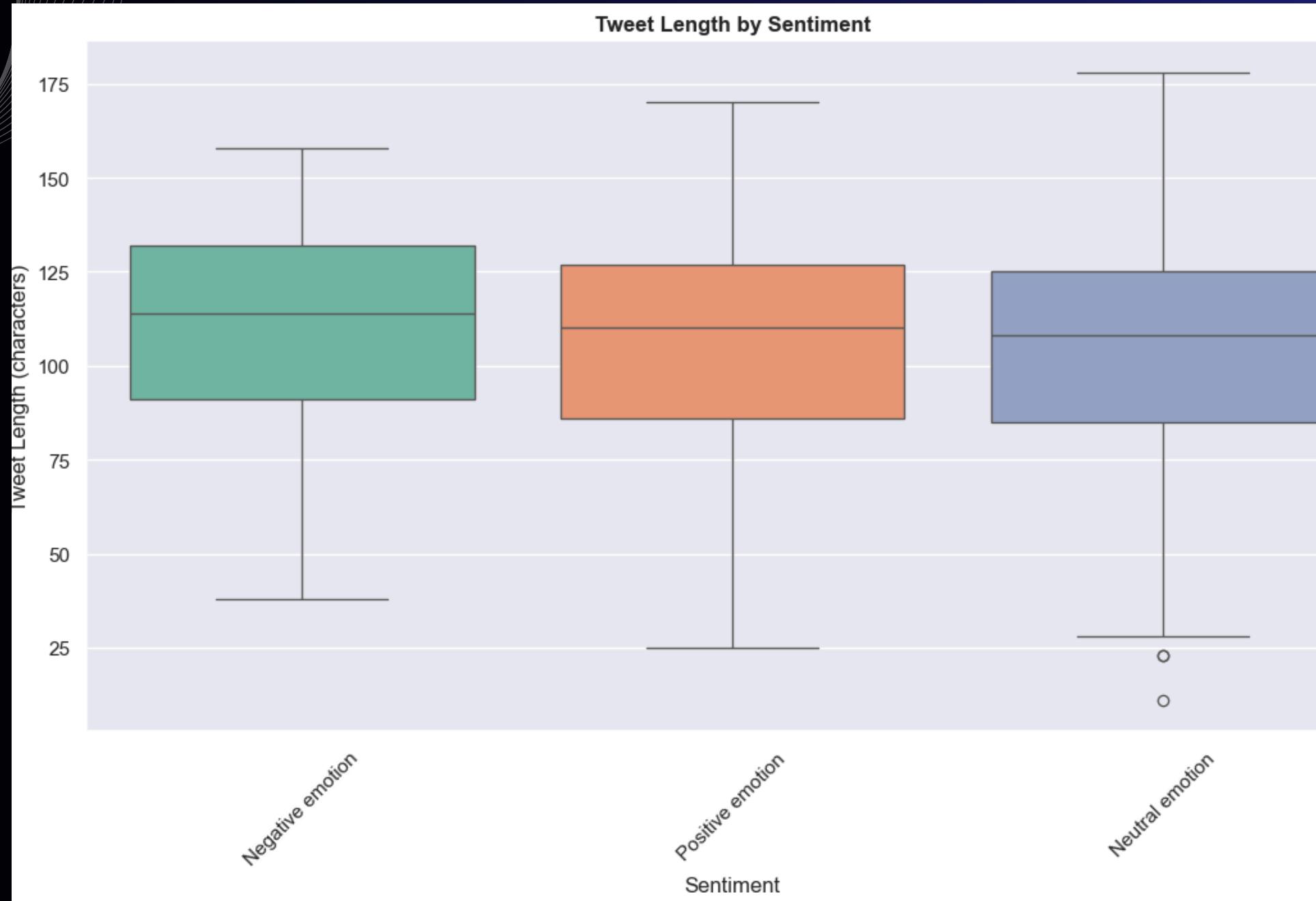
# Sentiment proportions by top 5 destinations



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

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## Best Model

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For Binary Classification, LinearSVC had the best accuracy score of 86.44% compared to Logistic Regression with 0.84 and Naives Bayes 0.80

## Confusion Matrix

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### Observation for LinearSVC

- The model has a high True positive rate(818) indicating it correctly identified positive emotions.
- The model has a low False positive rate(81) and low False negative rate(61) indicating the model was able to make correct predictions on the Negative and positive classes since the False negative rate and False positive rate are low

# MULTI-CLASS CLASSIFICATION

## Accuracy

Linear SVC has the best Validation accuracy with an accuracy of 68%

## Classification Report

- The True positive total is 909 these are the values the model correctly predicted for each and every class
- The False positive and False negative for the negative class is (15) and (74) respectively.

# Tweet Length Distribution by Sentiment

LinearSVC - Confusion Matrix			
Actual	Predicted		
	0	1	2
0	10	56	18
1	9	675	130
2	6	209	224

- The True positive total is 909 these are the values the model correctly predicted for each and every class
- The False positive and False negative for the negative class is (15) and (74) respectively.
- The False positive and False negative for the positive class is (265) and (139) respectively.
- The False positive and False negative for the neutral class is (148) and (215) 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 86%

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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 68%
3. We also evaluated the models using f1 score with LinearSVC having the best f1 score of 50.2%
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.

# THANK YOU

**presented by:**  
**group 3**