# TWITTER DATA SENTIMENT ANALYZER iOS APP

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# Contents


0.1 Executive Summary . . . . . 2
0.2 Introduction . . . . . 2
0.3 Methodology . . . . . 3
0.4 Results . . . . . 4
0.4.1 How to Use TweetSentiment App . . . . . 4
0.4.2 TweetSentiment App Functionality . . . . . 5
0.5 Conclusion and Future Work . . . . . 6
0.6 References . . . . . 7

## 0.1 EXECUTIVE SUMMARY

Twitter Data Sentiment Analyzer iOS App "TweetSentiment" is built for iPhone version 6 and up as well as Apple iPads for iOS 12.0 deployment. The App is designed to extract authors' tweets from Twitter Application Programming Interface(API) and predict their opinions/mood regarding a particular individual or a company or a ticker symbol. TweetSentiment App predicts the author's opinions/mood by using Apple Core ML framework-based machine learning model, which performs sentiment analysis technique on texts of tweets.

The main objective of the TweetSentiment App is to save the user a substantial amount of valuable time that would be spent while reading and analyzing hundreds of tweets on a particular company of interest by simply using one click with an accuracy of around 80 %. Thousands of characters are processed for sentiment in seconds, compared to the hours that it would take a person to manually complete the same task.

Note that the TweetSentiment App is currently using a free standard search Tweet API account that fetches recent 100 Tweets published in the past seven days, but it can be extended to having access to a Tweet search API premium account that gives access to thousands of tweets for a fee. Furthermore, the same approach used in this App can also be extended to include News headlines Data from different online sources.

Moreover, the TweetSentiment App can be extended by feeding its machine learning model a time-series dataset and predict stock-price movements, Mittal Anshul, and Arpit Goel.

## 0.2 INTRODUCTION

For the past decade, since Twitter was launched, Twitter has provided access to its API Application Programming Interface, which stores tweets that may be accessed by researchers to explore its potential use beyond that of a social network.

In addition to news data feeds, nowadays, most of the public opinions are becoming largely expressed on social networks such as Twitter, etc. And, several tweets have shown an impact on some stock-price movements in the past. Several studied have shown that the aggregate public mood collected from Twitter may well be correlated with Dow Jones Industrial Average(DJIA) and investors behavior in the short term, Johan Bollen; however, the relationship is not yet determined as statistically significant.

Twitter Data Sentiment Analyzer iOS App "TweetSentiment" was created using XCode 10 and Swift 4.0 programming language on iOS 12.0, and the state-of-the-art of Core ML2 machine learning framework provided by Apple, Inc. The machine learning model was first written, trained and tested using Python, and then converted into Core ML2 framework,

that Xcode 10 supports. The Core ML2 provided easy pre-trained machine learning model integration into the Twitter Data Sentiment Analyzer iOS App to make a prediction of sentiment on Twitter Dataset. The Natural Language Processing (NLP) framework was mainly used to analyze natural language text fetched from the Twitter search API and deduce its language-specific metadata.

## 0.3 METHODOLOGY

The objective is to classify a tweet as positive(1), neutral(0) or negative(-1), then compute net sentiment score to get the overall general opinion on a particular stock or a company. Given a training sample of tweets and labels(i.e., positive, neutral or negative), the machine learning model has to predict the labels or sentiment score on the given test and real Twitter dataset.

There are several steps to get to the level of making prediction on Twitter dataset including, text pre-processing and cleaning, such as removing Twitter handles and hashtags, removing punctuation and short words, numbers, and special characters, tokenization, and stemming, extract features from cleaned Tweets, and finally model building and its conversion. Model training and testing is performed as shown in Figure 1.

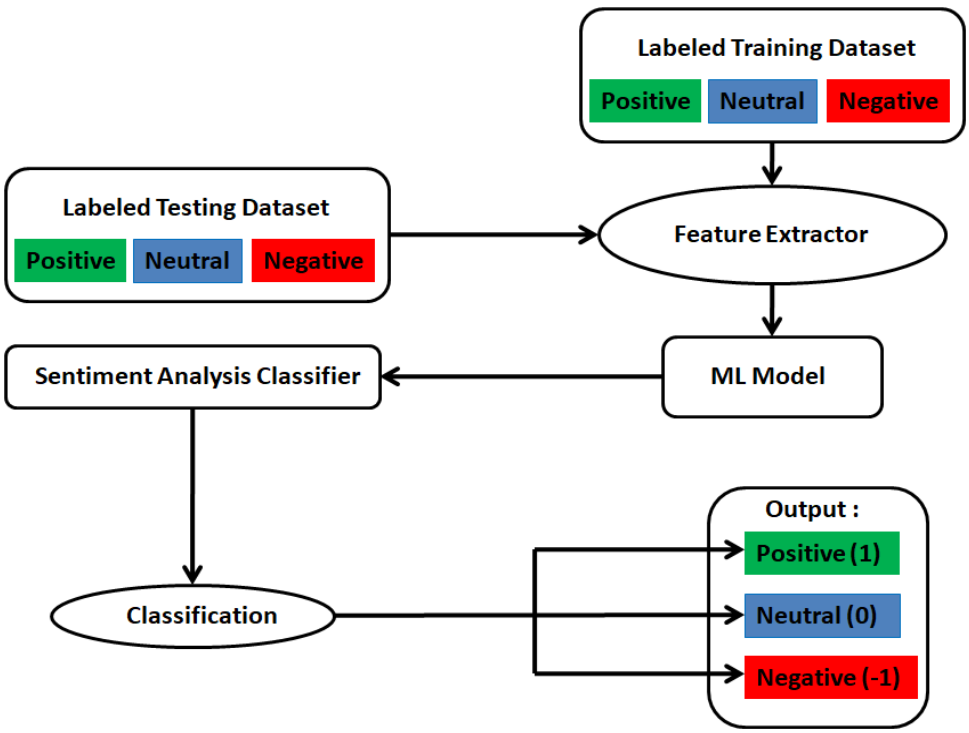


**Figure 1:** Flow-chart of model training and testing of Tweets

Core ML was used to integrate trained a machine learning model into TweetSentiment App, where the trained model is the result of applying a machine learning algorithm to a

set of training tweets dataset. And, the model makes predictions based on new input tweet dataset. The model was tested with an accuracy of around 80 %. The creation and integration of the model into TweetSentiment App is illustrated in Figure 2.

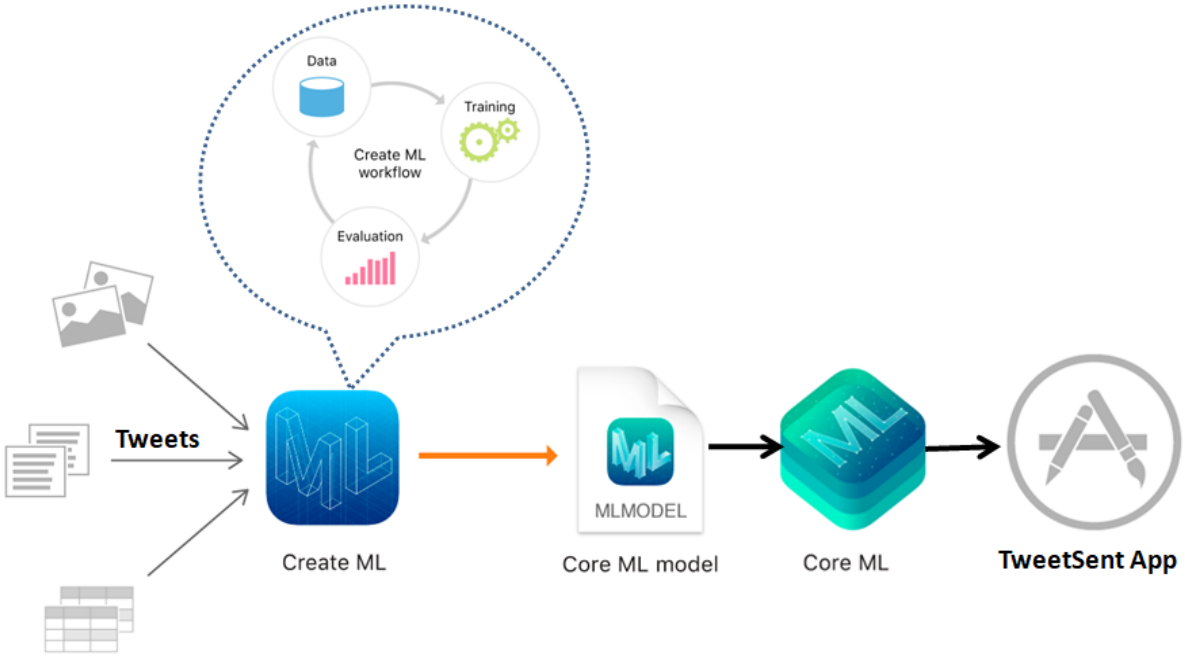


**Figure 2:** Integration of our model into TweetSentiment App

## 0.4 RESULTS

### 0.4.1 How to Use TweetSentiment App

TweetSentiment App has three pages. The search with keyword such as a company name starting with @, # (i.e., @Apple or #Apple) fetches tweets that are related to the specified company, in addition, the search with keyword such as a Ticker symbol of a company of interest starting with a $ fetches tweets that are related to the company's stock opinions(e.g., $aapl).

- **Launch Screen**: The first page is a storyboard launch page, as shown in Figure 3.
- **Twitter Data Sentiment Analyzer**: The second page contains a text field where to type keywords(i.e, company name or its ticker), Get Sentiment button, a sentiment indicator and a pie chart to plot Positive and Negative scores. Also, its description shows numerical values of the overall sentiment results (Sentiment Score:, Positive(%), Neutral(%) and Negative(%)). The user has three choices of how to search for keywords either by using @, # and $(see Figure 4).

- **Sentiment Indicator**: The third page illustrated how the sentiment indicator is constructed.

### 0.4.2 TweetSentiment App Functionality

The following pages are accessible once the user clicks the TweetSentiment App icon on her/his iPhone or iPad device.

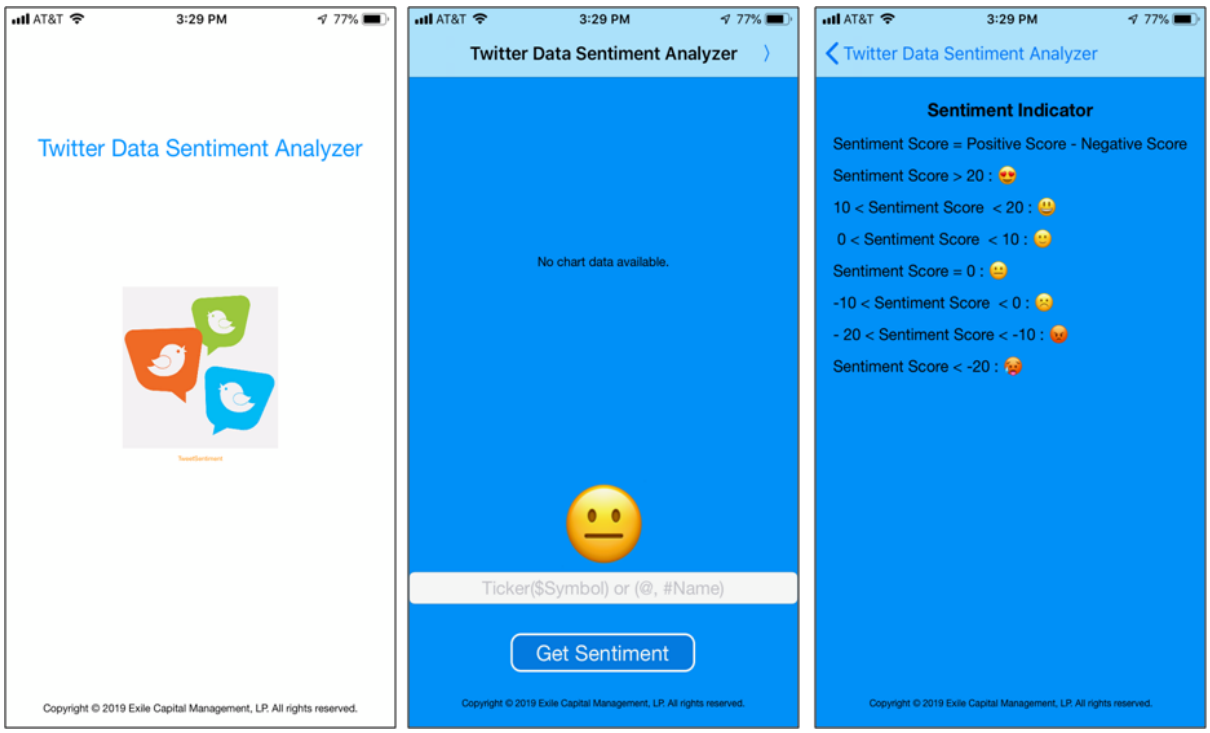


**Figure 3:** Twitter Data Sentiment Analyzer pages

Sentiment indicator was constructed based on the overall sentiment score of fetched tweets.

- **Sentiment score**: : Total sentiment positive score - Total Negative Sentiment score
- **Amazing**: Sentiment score > 20
- **Delightful**: 10 < Sentiment score < 20
- **Happy**: 0 < Sentiment score < 10
- **Neutral**: Sentiment score = 0
- **Sad**: -10 < Sentiment score < 0
- **Angry**: -20 < Sentiment score < -10

- **Very Angry**: Sentiment score < -20

Figure 4 shows an example of sentiment score of a Pie Chart illustrating sentiment Score of Apple, Inc and its ticker.


**Figure 4:** Pie Chart illustrating sentiment Score of Apple, Inc and its ticker.(User can rotate the chart with zoom in and zoom out capability)

## 0.5 Conclusion and Future Work

Core ML 2 machine learning framework is used to integrate a trained machine learning model written in Python into TweetSentiment App developed in XCode 10 and Swift 4.0 playground. Machine learning model was trained using Twitter Sentiment Analysis Training Corpus (Dataset). It was found to have an accuracy of around 80 %. The TweetSentiment App is intended to be used in order to save the user a substantial amount of valuable time that would be spent while reading and analyzing hundreds of tweets on a particular company of interest by simply one click.

This demo App can be extended by adding news headlines data in order to capture more precise sentiment score of a particular company or its ticker by feeding the machine learning model a large time series dataset and predict stock-price movements.

## 0.6 REFERENCES

Bollen J., Mao H.,Zeng X. (2010). "Twitter Mood Predicts the Stock Marker," arXiv: http://arxiv.org/abs/1010.3003

Mittal, A., Goel, A. (2012). "Stock prediction using twitter sentiment analysis," Standford University, CS229 (2011 http://cs229. stanford. edu/proj2011/GoelMittal-StockMarketPredictionUsingTwitterSentimentAnalysis. pdf), 15.

Nisar M. T., Yeung M.,(2018) " Twitter as a tool for forecasting stock market movements: AÂăshort-window event study," The Journal of Finance and Data Science, (4)2, pp 101-119,

https://developer.twitter.com/en/premium-apis

https://developer.apple.com/documentation/coreml

https://pageperso.lis-lab.fr/benoit.favre/dl4nlp/tutorials/03-sentiment.pdf

http://www.sananalytics.com/lab/twitter-sentiment/