

# **SENTIMENT ANALYSIS**

**15CS68C PRODUCT DEVELOPMENT LABORATORY**

## **A TECHNICAL LAB REPORT**

**Submitted by**

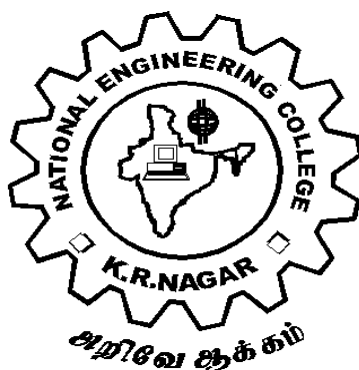
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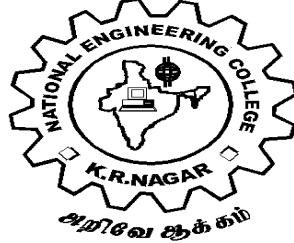
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**BONAFIDE CERTIFICATE**

Bonafide record of work done in the **15CS68C – PRODUCT DEVELOPMENT LABORATORY** of the **NATIONAL ENGINEERING COLLEGE, K.R.Nagar, Kovilpatti** during the year **2018 – 2019** by **AL SAMEEMA.A(REGISTER NO:1612007)** and **DHANALAKSHMI.R(REGISTER NO: 1612025)**

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## **ABSTRACT**

Sentiment analysis is a type of natural language processing for tracking the mood of the public about a particular product or topic. Sentiment analysis, which is also called opinion mining, involves in building a system to collect and examine opinions about the product made in blog posts, comments, reviews or tweets. Sentiment analysis can be useful in several ways. In fact, it has spread from computer science to management sciences and social sciences due to its importance to business and society as a whole. In recent years, industrial activities surrounding sentiment analysis have also thrived. Numerous startups have emerged. Many large corporations have built their own in-house capabilities. Sentiment analysis systems have found their applications in almost every business and social domain. Social media has received more attention nowadays. Public and private opinion about a wide variety of subjects is expressed and spread continually via numerous social media. Twitter is one of the social media that is gaining popularity. Twitter offers organizations a fast and effective way to analyze customers' perspectives toward the critical to success in the market place. Developing a program sentiment analysis is an approach to be used to computationally measure customers' perceptions. This paper focuses on the design of sentiment analysis, extracting a vast amount of tweets. Our project aims to analyze these tweets and to classify them as positive, weakly positive, strongly positive, weakly negative, strongly negative, negative and for neutral based on polarity values of tweets. One can able to analyze any trend which is occurring nowadays around the world. It is capable of collecting the recent trends all over the world and across using the where on earth identifier designed by Yahoo. The tweets are cleaned and pre-processed and the analysis based on sentiment polarity values is performed. The overall report and a detailed report are generated. The result is stored in a CSV file to manually analyze later and for future use. By using this analysis one can improve their business and marketing strategy.

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# **CHAPTER I**

## **INTRODUCTION**

The project of analyzing sentiments of tweets comes under the domain of "Pattern Classification" and "Data Mining". Both of these terms are very closely related and intertwined, and they can be formally defined as the process of discovering "useful" patterns in the large set of data, either automatically (unsupervised) or semi-automatically (supervised). The project would heavily rely on techniques of "Natural Language Processing" in extracting significant patterns and features from the large data set of tweets and on "Machine Learning" techniques for accurately classifying individual data samples (tweets) according to whichever pattern model best describes them. Language-based features are those that deal with formal linguistics and include prior sentiment polarity of individual words and phrases, and parts of speech tagging of the sentence. For example, the word "excellent" has a strong positive connotation while the word "evil" possesses a strong negative connotation. So whenever a word with a positive connotation is used in a sentence, chances are that the entire sentence would be expressing a positive sentiment. Twitter-based features are more informal and relate to how people express themselves on online social platforms and compress their sentiments in the limited space of 140 characters offered by Twitter. They include Twitter hashtags, retweets, word capitalization, question marks, the presence of url in tweets, exclamation marks, internet emoticons, and internet shorthand/slangs.

Opinion and sentiment mining is an important research area because due to the huge number of daily posts on social networks, extracting people's opinion is a challenging task. About 90 percent of today's data has been provided during the last two years and getting insight into this large scale data is not trivial. Sentiment analysis has many applications for different domains for example in businesses to get feedbacks for products by which companies can learn user's feedback and reviews on social media. Opinion and sentiment mining have been well studied in this reference and all different approaches and research fields have been discussed. There are also some works have been done on Facebook sentiment analysis however this project focuses on the Twitter sentiment analysis. Two fundamental approaches to extract text summarization are an extractive and abstractive method. In the extractive method, words and word phrases are extracted from the original text to generate a summary. In an abstractive method, tries to learn an internal language representation and then generates a summary that is more similar to the summary done by the

human. Text understanding is a significant problem to solve. Some machine learning techniques, including various supervised and unsupervised algorithms, are being utilized. In some domain like image recognition, speech recognition, language translation, and question-answering, the end-to-end method performs better. Since tweets in Twitter is a specific text not like a normal text there are some works that address this issue like the work for short informal texts. Sentiment analysis has many applications in the news. This project discuss about social network analysis and the importance of it and it takes on Twitter as a rich resource for sentiment analysis. Naive Bayes Classifier is used to classify the tweets.

**Naive Bayes Classifier:** It is used to predict the probability for given words that belong to a particular cleans the unstructured textual data into a structured textual class. It is used because of its easiness in both training and classifying steps. Pre-processed data is given as input to train input set using Naive Bayes classifier and that trained model is applied on the test to generate the sentiment. The Bayes theorem is as follows.

$$P(H/X) = \frac{P(X/H).P(H)}{P(X)}$$

where X- Tuples, H-Hypothesis, P(H|X) Posterior probability of H conditioned on X i.e. the Probability that Hypothesis holds true given the value of X, P(H) represents Prior probability of H i.e the Probability that H holds true irrespective of the tuple values, P(X|H) represents posterior probability of X conditioned on H i.e. tested based on Chi-square method. It creates a list of all the Probability that X will have certain values for a given positive and negative words. Then build frequency Hypothesis, P(X) represents Prior probability of X i.e the distribution Probability that X will have certain values. An experiment result of accuracy is evaluated using following information retrieval matrices. Accuracy is the result for both positive and negative classes and it is a performance evaluation parameter and it is calculated by the number of correctly selected positive and negative words word scores are found and the best number of words divided by the total number of words present in the corpus.

## **CHAPTER II**

### **EXISTING SYSTEM**

Sentiment analysis is a growing area of Natural Language Processing with research ranging from document level classification to learning the polarity of words and phrases. Given the character limitations on tweets, classifying the sentiment of Twitter messages is most similar to sentence-level sentiment analysis, however, the informal and specialized language used in tweets, as well as the very nature of the micro blogging domain, make Twitter sentiment analysis a very different task. Classifiers were made less and the polarities were not very accurate and the use of language at the backend was not so efficient with the existing system. Also, the system was not capable of displaying what tweets were positive and what was negative and so on. The social network is a rich platform to learn about people's opinion and sentiment regarding different topics as they can communicate and share their opinion actively on social media including Facebook and Twitter. There are different opinion oriented information gathering systems which aim to extract people's opinion regarding different topics.

The sentiment-aware systems these days have many applications from business to social sciences. Since social networks, especially Twitter, contains small texts and people may use different words and abbreviations which are difficult to extract their sentiment by current Natural Language processing systems easily, therefore some researchers have used deep learning and machine learning techniques to extract and mine the polarity of the text [. Some of the top abbreviations are FB for Facebook, B4 for before, OMG for oh my god and so on. Therefore sentiment analysis for short texts like Twitter's posts is challenging. The Twitter tweets in the existing system are not well categorized and the usage of languages such as java at the back end does not consist of well-classifying methods and also it is more memory and space inefficient.

## **CHAPTER III**

### **PROPOSED SYSTEM**

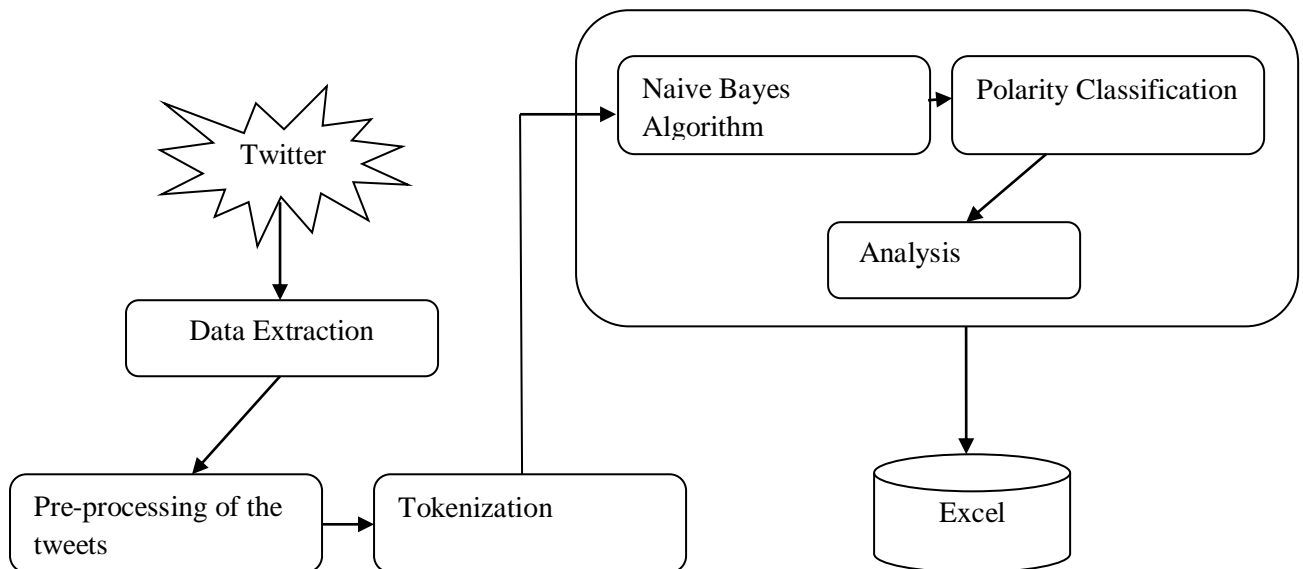
The idea behind the project is based on developing a GUI which allows the user can enter their wished hashtag/keyword for that they need to find the impact on the people's view on the society by analyzing the tweets the people tweeted in the social media, twitter. The project uses python at the backend. Python is a high-level, interpreted and general-purpose dynamic programming language that focuses on code readability. The syntax in Python helps the programmers to do coding in fewer steps as compared to Java. The language founded in the year 1991 by the developer Guido Van Rossum made the programming easy and fun to do. The Python is widely used in bigger organizations because of its multiple programming paradigms. They usually involve imperative and object-oriented functional programming. It has a comprehensive and large standard library that has automatic memory management and dynamic features. The project is built on anaconda navigator which is a graphical environment. Navigator isn't an IDE, but rather a convenient GUI front end for Anaconda features including the Conda package manager and user-configured virtual environments. The Anaconda distro provides, first and foremost, a Python distribution outfitted with easy access to the packages often used in data science: NumPy, Pandas, Matplotlib, and so on. They're not simply bundled with Anaconda, but available via a custom package management system called Conda. Conda-installed packages can include tricky external binary dependencies. It contains tweepy and textblob packages which can be installed using pip command on Anaconda Navigator Prompt. An Application is created using Twitter developers.com to gain OAuth Authentication. OAuth provides access tokens and secret keys to fetch data from Twitter. Based on the hashtag and the count the user enters, the tweets are fetched from Twitter. The tweets are cleaned and the unwanted symbols are removed and preprocessed. Textblob package is used to analyze based on the sentiment polarity value of words in the tweet. The percentage of classifiers has been calculated that indicates how people are reacting on the specific tweet. General Report defines the overall score and sentiment of the tweet. Detailed Report defines how much percentage of polarity is assigned for each and every classifier used. Differentiation of tweets according to its best suitable sentiment has been arranged. A CSV file for storing the tweets is created for every time the code runs for a future end survey.



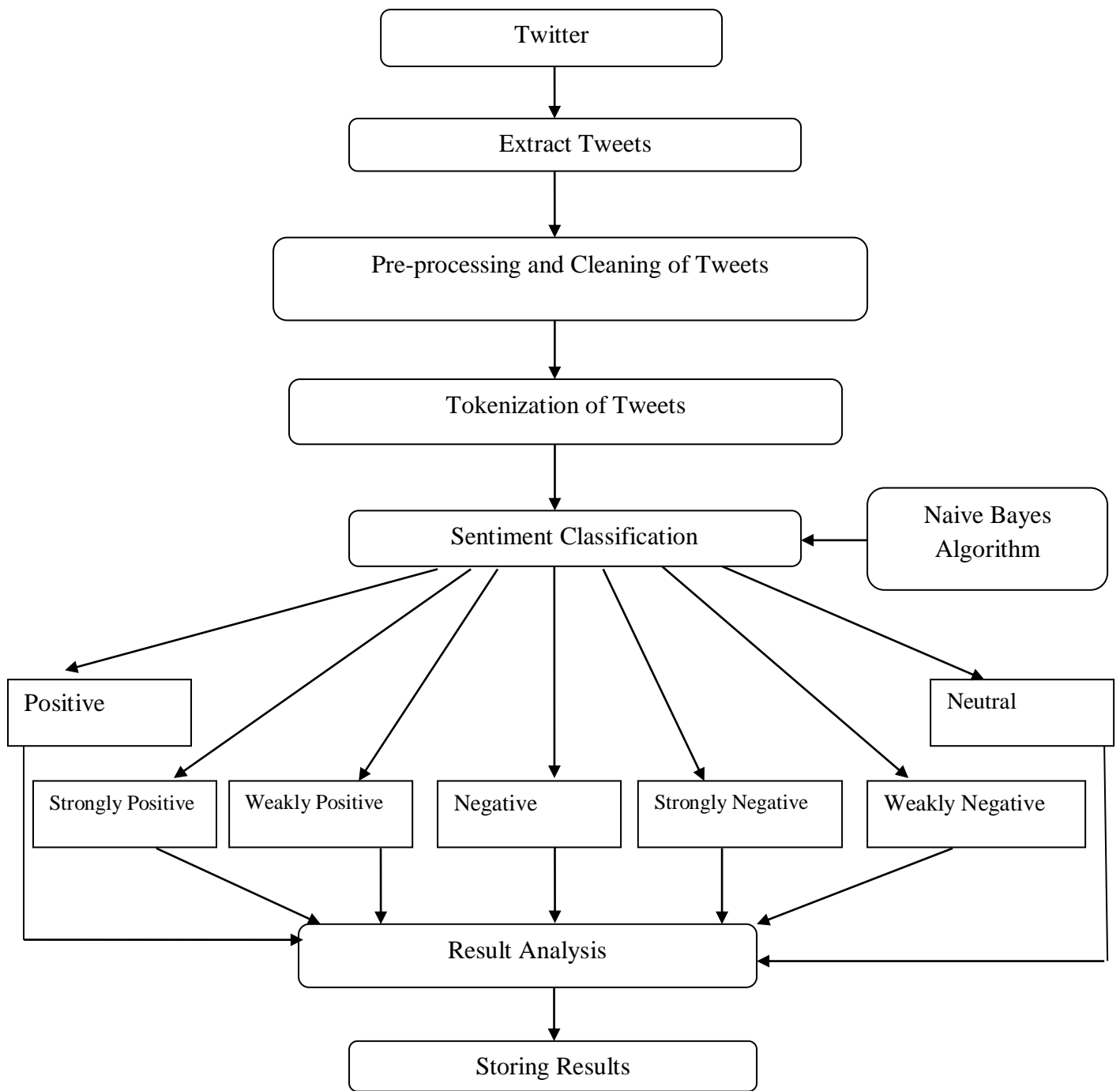
## APPLICATIONS

- **Business:** In marketing field companies use it to develop their strategies, to understand customers' feelings towards products or brand, how people respond to their campaigns or product launches and why consumers don't buy some products.
- **Politics:** In the political field, it is used to keep track of political view, to detect consistency and inconsistency between statements and actions at the government level. It can be used to predict election results as well!
- **Public Actions:** Sentiment analysis also is used to monitor and analyze social phenomena, for the spotting of potentially dangerous situations and determining the general mood of the blogosphere

### 3.1 ARCHITECTURE DIAGRAM



### 3.2 DATA FLOW DIAGRAM



### 3.3 PROJECT REQUIREMENTS

- FOR DATA EXTRACTION
  - Twitter account
  - Twitter API connection via open authentication application using the link:
    - -<https://developer.twitter.com/>
- FOR CLASSIFICATION
  - Anaconda Navigator tool
  - Python packages such as tweepy, textblob
- FOR GUI
  - Kivy Python GUI Framework

### Twitter

Twitter is a free social networking micro blogging service that allows registered members to broadcast short posts called tweets. Twitter members can broadcast tweets and follow other users' tweets by using multiple platforms and devices. Tweets and replies to tweets can be sent by cell phone text message, desktop client or by posting at the Twitter.com website. The default settings for Twitter are public. Unlike Facebook or LinkedIn, where members need to approve social connections, anyone can follow anyone on public Twitter. To weave tweets into a conversation thread or connect them to a general topic, members can add hashtags to a keyword in their post. The hashtags, which acts as a meta tag, is expressed as #keyword. Tweets, which may include hyperlinks, are limited to 140 characters, due to the constraints of Twitter's Short Message Service delivery system. Because tweets can be delivered to followers in real time, they might seem like instant messages to the novice user. But unlike IMs that disappear when the user closes the application, tweets are also posted on the Twitter website. They are permanent, they are searchable and they are public. Anyone can search tweets on Twitter, whether they are a member or not. Twitter uses an open-source Web framework called Ruby on Rails (RoR). The API is open and available to application developers.

## OAuth

OAuth is an open-standard authorization protocol or framework that describes how unrelated servers and services can safely allow authenticated access to their assets without actually sharing the initial, related, single login credential. In authentication parlance, this is known as secure, third-party, user-agent, delegated authorization. When trying to understand OAuth, it can be helpful to remember that OAuth scenarios almost always represent two unrelated sites or services trying to accomplish something on behalf of users or their software. All three have to work together involving multiple approvals for the completed transaction to get authorized.

## Anaconda

Anaconda is a data science and machine learning platform for the Python and programming languages. It is designed to make the process of creating and distributing projects simple, stable and reproducible across systems and is available on Linux, Windows, and OS X. Anaconda is a Python-based platform that curates major data science packages including pandas, scikit-learn, SciPy, NumPy and Google's machine learning platform, Tensor Flow. It comes packaged with conda (a pip like an install tool), Anaconda navigator for a GUI experience, and spyder for an IDE. Anaconda includes a GUI based navigator application that makes life easy for development. It includes the Spyder IDE and jupyter notebook as preinstalled projects. This allows one to fire up a project from our GUI desktop environment quickly.

## Textblob

TextBlob is a Python (2 and 3) library for processing textual data. It provides a consistent API for diving into common natural language processing (NLP) tasks such as part-of-speech tagging, noun phrase extraction, sentiment analysis, and more. **Tokenization** is the process of replacing sensitive data with unique identification symbols that retain all the essential information about the data without compromising its security. Tokenization refers to dividing text or a sentence into a sequence of tokens, which roughly correspond to "words". This is one of the basic tasks of NLP. To do this using TextBlob, follow the two steps:

1. Create a **textblob** object and pass a string with it.
2. Call **functions** of textblob in order to do a specific task.

## **Tweepy**

Tweepy supports accessing Twitter via Basic Authentication and the newer method, OAuth. Twitter has stopped accepting Basic Authentication so OAuth is now the only way to use the Twitter API. Tweepy provides access to the well documented Twitter API. With tweepy, it's possible to get an object and use any method that the official Twitter API offers. Main Model classes in the Twitter API are Tweets, Users, Entities and Places. Access to each returns a JSON-formatted response and traversing through information is very easy in Python.

## **Kivy**

Kivy is a python UI framework, it's done mainly in python, not a wrapper around a UI library done in another language, that makes it really easy to extend from python, and customize exactly how one wants it. It's also very different by being thought from the ground up with multi touch in mind, that means that if one happens to use it on a computer with a mouse, that's only by accident, and the interface one build in these conditions should work equally well in a multi touch environment. It's done using OpenGL, and it actually gives a pretty raw access to it if one wants it, that makes it usable for a lot of usages where other libraries may be constraining a lot more. It makes it very easy to build custom interfaces using a DSL that really matches the logical relationships between parts of our UI, and plugging both ways with python is really easy.

### **3.4 MODULES**

- OAuth Authorization
- Retrieving Trends
- Generating Reports
- Classification Of Tweets
- Storing The Tweets

## **3.5 MODULE DESCRIPTION**

### **3.5.1 OAUTH AUTHORISATION**

Log in to the Twitter Account if u don't have an account then Create a new Twitter Account using the link <https://twitter.com->Sign> up. Fill the required fields and then sign in. Create an application as part of OAuth authorization to make any API requests to Twitter. Open <https://developer.twitter.com->Click> on Create app->Fill Details->Submit Application. Now, there will be Four Keys Consumer key, Consumer Secret key, Access Token, Access token secret generated. Using these one can fetch the twitter tweets. Creating an application is the standard way for developers to gain API access and for Twitter to monitor and interact with third-party platform developers as needed. The process for creating an application is pretty standard, and all that's needed is read-only access to the API.

### **3.5.2 RETRIEVING TRENDS**

The device for constraining queries is via Yahoo! Geo Planet's Where On Earth (WOE) ID system, which is an API unto itself that aims to provide a way to map a unique identifier to any named place on Earth (or theoretically, even in a virtual world). Instantiate the Twitter class with an object chain corresponding to a base URL and then invoke methods on the object that corresponds to URL contexts. The `twitter_api._trends.place (WORLD_WOE_ID)` method initiates a HTTP call to GET `https://api.twitter.com/1.1/trends/place.json?id=1`. Note the URL mapping to the object chain that's constructed with the twitter package to make the request and how query string parameters are passed in as keyword arguments. Like that, one can also retrieve the trends for India.

### **3.5.3 GENERATING REPORTS**

The user is allowed to enter the hashtag and the tweets count based on their interest. Then after they click the click me button the general and detailed report will be generated. For that, one need to connect our API to Twitter by passing the four tokens one got from Twitter developers. By using the tweepy package, one can establish the connection with the API. The general report will contain the overall score of the tweet by which it shows the apt sentiment of the hashtag. The tweets are mined, preprocessed and analyzed. The sentiment is calculated based on the polarity value. TextBlob module will clean the tweets by removing unwanted characters, special symbols and analyze the polarity amount of the words in the

tweet. The Detailed Report will show how much percentage of people think of a specific sentiment.

### **3.5.4 CLASSIFICATION OF TWEETS**

The Analysed Tweets are classified based on the sentiment they possess. The classifiers are declared as a list. By analyzing each tweet, the tweet got appended on to the specific classifier. By that, one can uniquely identify which tweets are called as positive, negative, strongly positive, strongly negative, weakly positive, weakly negative and neutral. The particular tweets which are retrieved can be manually analyzed later. This tweet is exactly the same what the people tweeted. It contains special characters, symbols, hashtags, conjunctions. The original tweets which are retrieved will be displayed.

### **3.5.5 STORING THE TWEETS**

The analyzed tweets data are stored in a CSV file. Open the CSV file in append mode and call the writer class to store the tweets. The tweets are stored in a row-wise manner. When the user runs the application, the tweets are added to the file automatically, it can be later reviewed by anyone. Based on the hashtag count the user enters, the rows will be generated automatically. This storing of data will be very useful in business, educational institutions and marketing fields because they may analyze the data at any time and it helps to improve themselves which can make a great impact on the society.

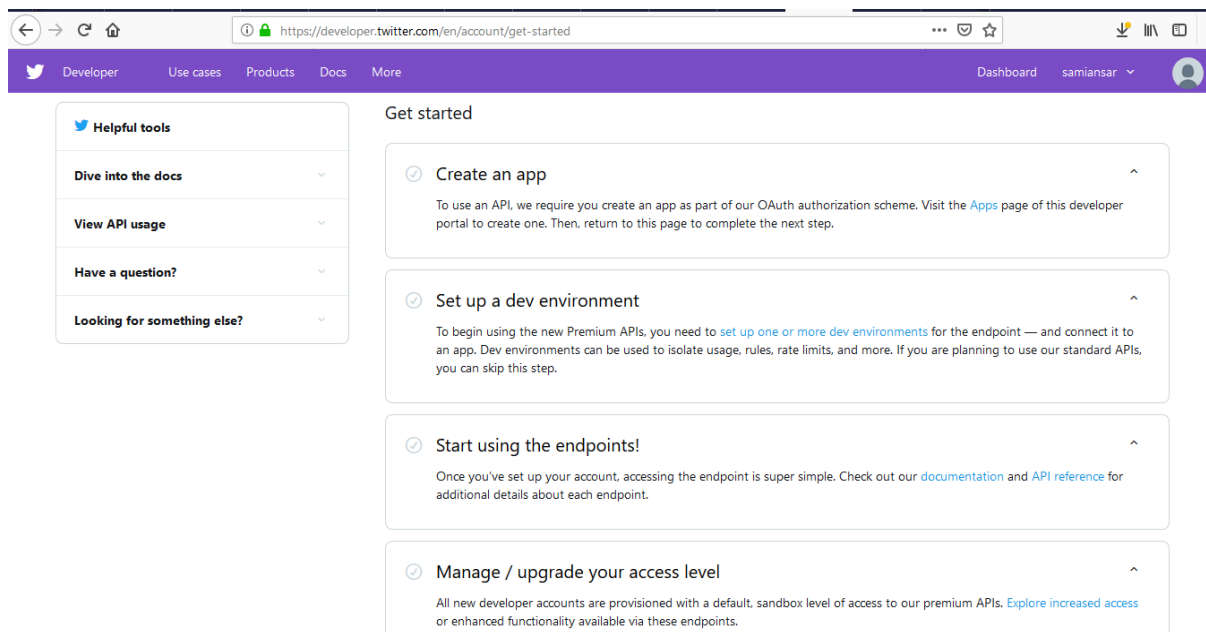
## CHAPTER IV

### RESULT

The proposed system of creating a GUI for sentiment analysis has been completed successfully. The API connection has been made with twitter and the tweets are retrieved from Twitter using OAuth credentials. Using this system, one can retrieve as many numbers of tweets based on our wish. There is no limit for tweets retrieval. The GUI is developed using Kivy Framework. The overall general and detailed report of the sentiment analysis is generated. The tweets are displayed as per its type of sentiment category. The results are stored in a CSV file for future analysis.

#### 4.1 SCREENSHOTS

##### 4.1.1 OAUTH AUTHORIZATION

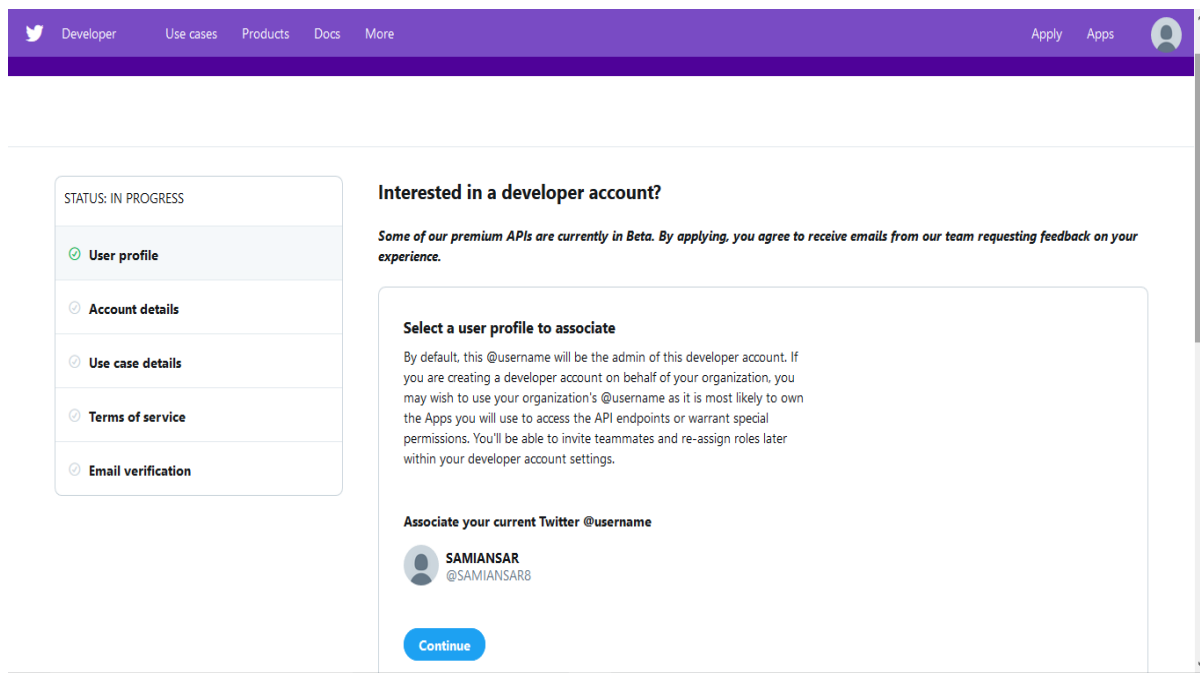


**FIG 4.1.1(a) Creation of App in Twitter Developers**

**Step 1:** Open <https://twitterdevelopers.com> and click on Create an app as shown in

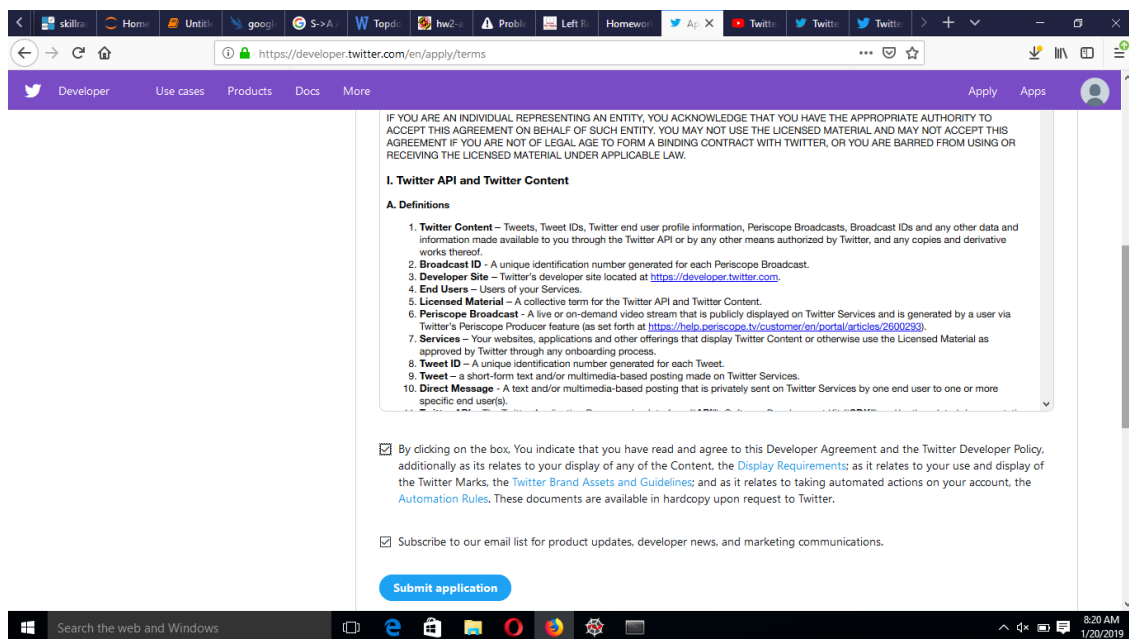
Fig 4.1.1(a).





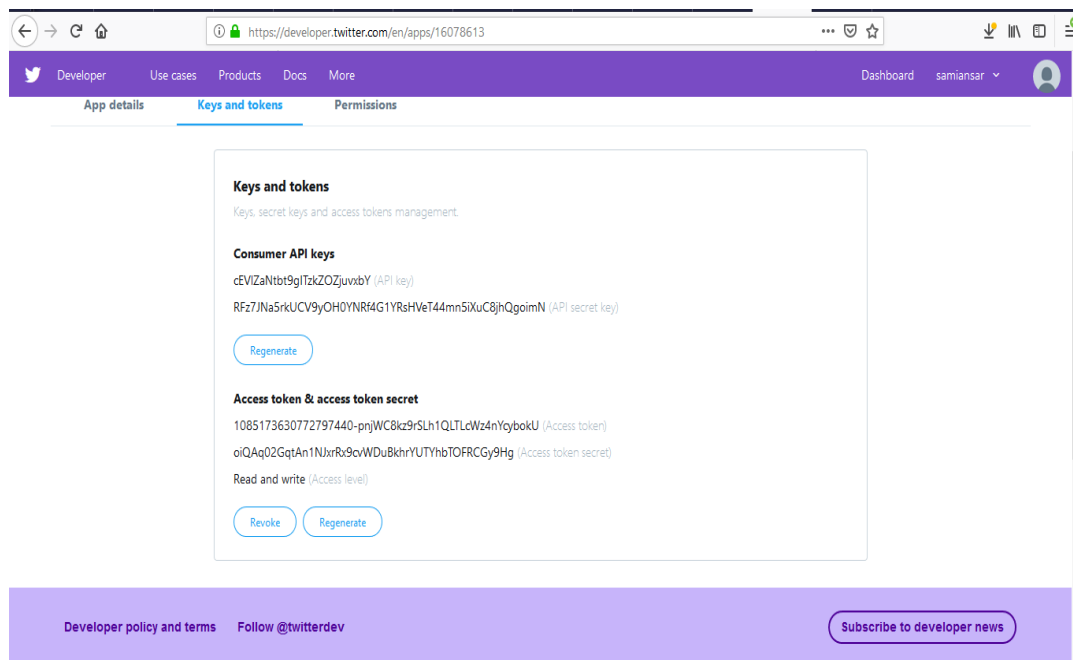
**FIG 4.1.1(b) Setting up user Profile**

**Step 2:** Create a user Profile for your Application as shown in Fig 4.1.1(b).



**FIG 4.1.1(c) Submitting the Application**

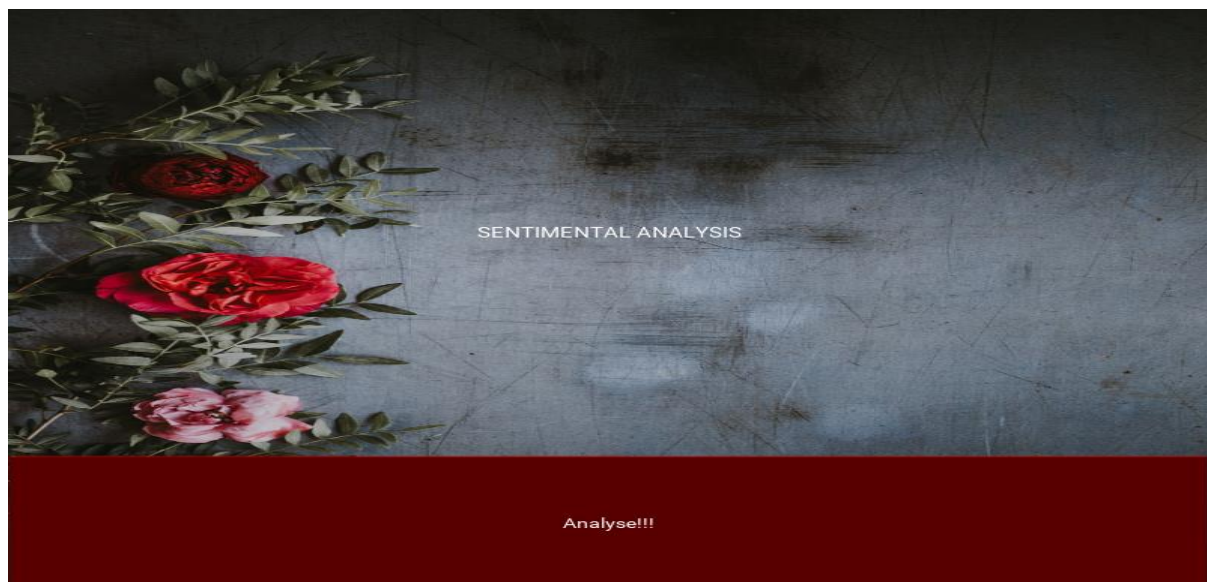
**Step 3:** Fill the mandatory Fields and agree with the terms and conditions of Twitter Developer Policy and click on Submit Application as shown in Fig 4.1.1(c).



**FIG 4.1.1(d) OAUTH CREDENTIALS**

**Step 4:** Click on the field Keys and Tokens to see the Consumer API keys and Access Token and Access Token Secret Keys as shown in Fig 4.1.1(d).

#### 4.1.2 RETRIEVING TRENDS



**FIG 4.1.2(a) Sentiment Analysis GUI**

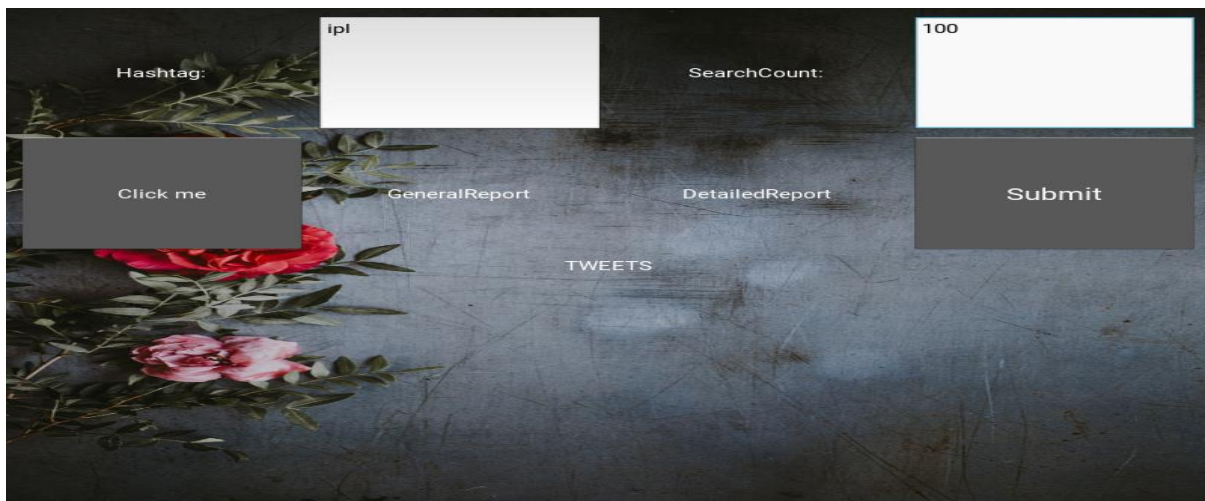
**Step 5:** The Home page of the proposed system is shown in Fig 4.1.2(a). The user can click over the Analyse Button in order to initiate the analysis of trends in terms of sentiment categories



**Fig 4.1.2(b) Retrieving Trends**

**Step 6:** The user can click on Find Trends Button to find out the recent trends across worldwide and India. The recent trends are shown in Fig 4.1.2(b). To find out the sentiment of a particular hashtag the user can click on Let's Analyze Button.

#### **4.1.3 GENERATING REPORTS**



**FIGURE 4.1.3(a) User Input**

**Step 7:** The user can give the input in hashtag textbox and the number of tweets to be searched in search count textbox and click on Click me button as shown in Fig 4.1.3 (a) to find the overall and detailed sentiment of the hashtag and the user can also see the tweets based on its sentiment category.



**FIGURE 4.1.3(b)-GENERAL REPORT, DETAILED REPORT**

**Step 8:** The user can see the Emotion of the particular hashtag and the Detailed Report of how many percentages of each emotion the hashtag possess are displayed in Fig 4.1.3(b).

#### **4.1.4 CLASSIFICATION OF TWEETS**



**FIGURE 4.1.4 (a)-Tweets Based On Negative Sentiment**

**Step 9:** The user can see the Tweets which possess the negative type of sentiment as shown in in Fig 4.1.4(a).





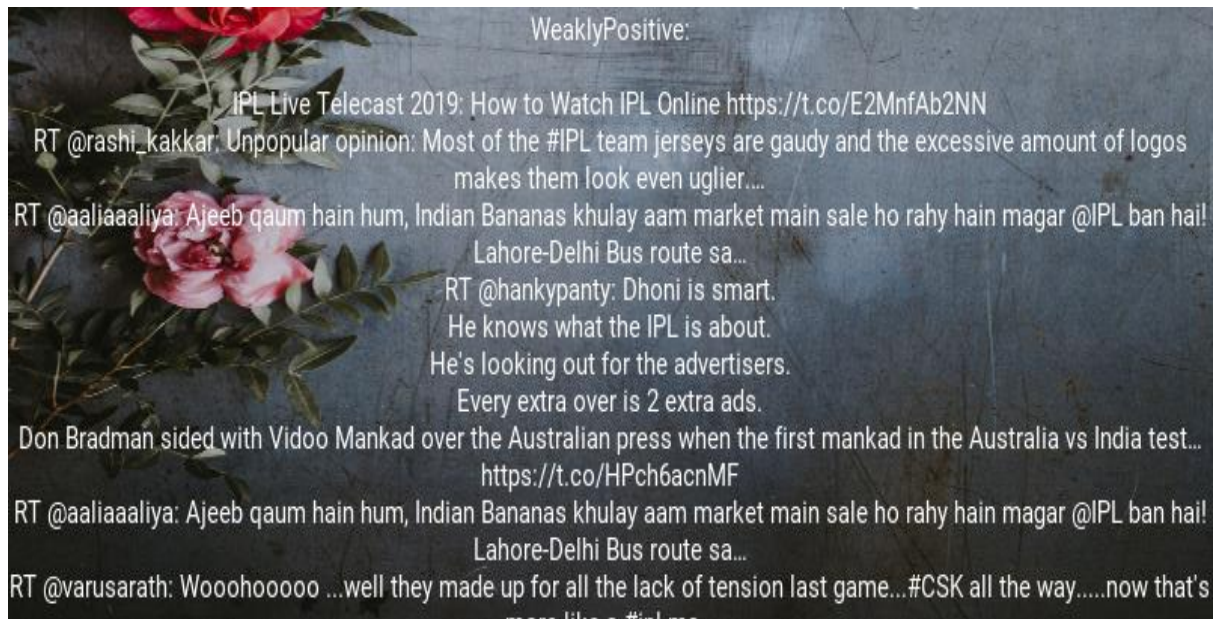
**Figure 4.1.4(b) Tweets Based On Strongly Positive Sentiment**

**Step 10:** The user can see the Tweets which possess the strongly positive type of sentiment as shown in in Fig 4.1.4(b).



**FIGURE 4.1.4(c) Tweets Based On Positive Sentiment**

**Step 11:** The user can see the Tweets which possess the positive type of sentiment as shown in in Fig 4.1.4(c).



**FIGURE 4.1.4 (d) Tweets Based On Weakly Positive Sentiment**

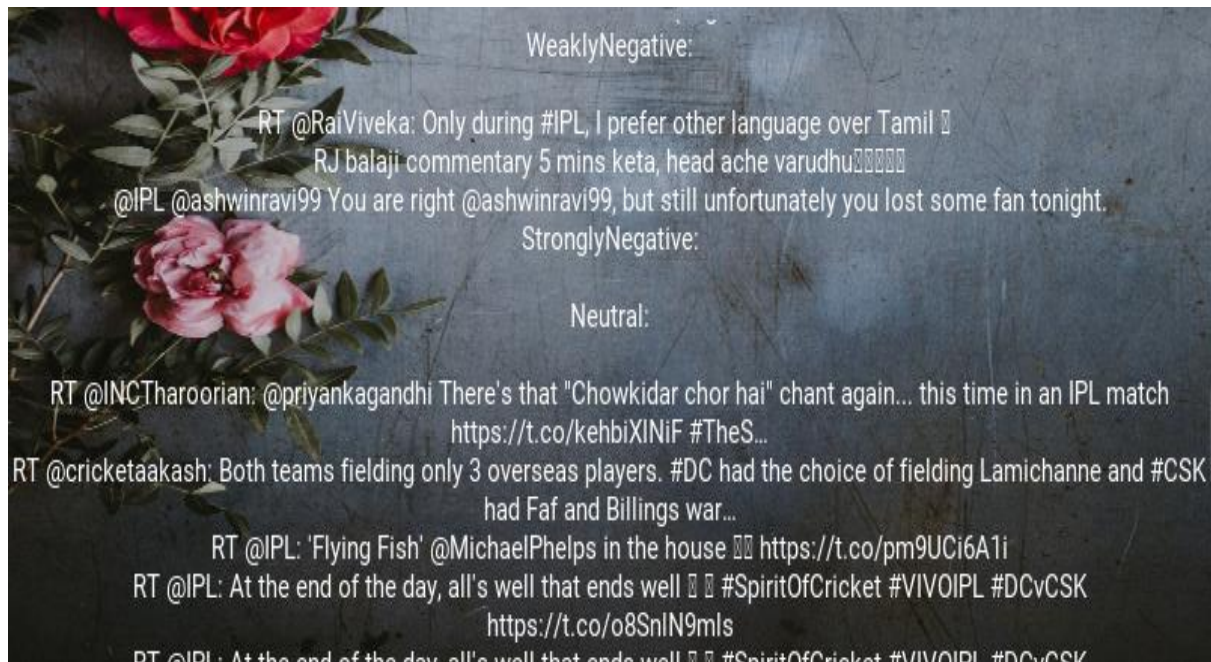
**Step 12:** The user can see the Tweets which possess the weakly positive type of sentiment as shown in in Fig 4.1.4(d).



**FIGURE 4.1.4 (e) Tweets Based On Strongly Negative Sentiment**

**Step 13:** The user can see the Tweets which possess the strongly negative type of sentiment as shown in in Fig 4.1.4(e).

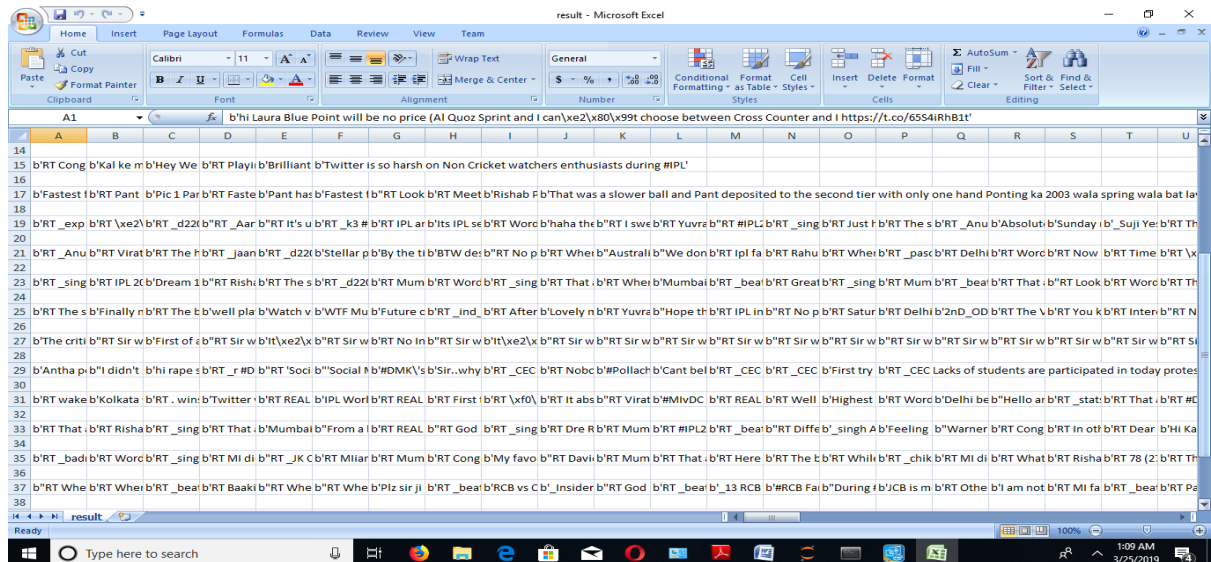




**FIGURE 4.1.4 (f)-Tweets Based On Weakly Negative and Neutral Sentiments**

**Step 14:** The user can see the Tweets which possess the weakly negative type of sentiment as shown in in Fig 4.1.4(f).

#### 4.1.5 STORING THE TWEETS



**FIGURE 4.1.5 STORING TWEETS IN CSV**

**Step 15:** The user can see the analyzed Tweets which are stored in a CSV File as shown in Fig- 4.1.5.

## **CHAPTER V**

### **CONCLUSION**

Twitter sentiment analysis comes under the category of text and opinion mining. It focuses on analyzing the sentiments of the tweets and feeding the data to a machine learning model in order to train it and then check its accuracy so that one can use this model for future use according to the results. It comprises of steps like data collection, text pre-processing, sentiment detection, sentiment classification, training and testing the model. This research topic has evolved during the last decade with models reaching the efficiency of almost 85%-90%. But it still lacks the dimension of diversity in the data. Along with this, it has a lot of application issues with the slang used and the short forms of words. Many analyzers don't perform well when the number of classes is increased. Also, it's still not tested how accurate the model will be for topics other than the one in consideration. Hence sentiment analysis has a very bright scope of development in the future. The proposed system provides a new way of analyzing and classifying with any numbers of classifiers and is playing operations with responsive and attractive user-interface to suit all kinds of people. Thus, on the basis of literature survey and by analyzing the existing system, one can come to a conclusion that the proposed system will improve the accuracy of the sentiment polarity and provides a better role in marketing strategy to improve the quality of products based on understanding user's need without personally interacting them. It has various social impacts such as it helps in developing the quality of products, it helps to Track trends over time by which one can Improve Customer Service. It also helps to know about Political opinion of people. It helps to Improve campaign success. Thus this project will be very useful for society in every field such as marketing, educational institutions, politics etc.,



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