PROJECT REPORT ON

Twitter data Sentimental Analysis Using Python

SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE AWARD OF

Degree of Bachelor of Technology in Computer Science & Engineering

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CERTIFICATE

This is to certify that the work embodied in this Project Report entitled "**Twitter Data Sentimental Analysis using Python**" being submitted by ANMOL(17BCS2898), ARJUN(17BCS2910),SATYAM(17BCS28903) 7th Semester for partial fulfillment of the requirement for the degree of " **Bachelor of Engineering in Computer Science & Engineering** " discipline in " **Chandigarh University** " during the academic session July-December 2020 is a record of Bonafede piece of work, carried out by student under my supervision and guidance in the "**Department of Computer Science & Engineering** ", **Chandigarh University**.

APPROVED & GUIDED BY....

DECLARATION

We, student of **Bachelor of Engineering in Computer Science & Engineering, 7th Semester , session: July-December 2020, Chandigarh University**, hereby declare that the work presented in this Project Report entitled "**Twitter Data Sentimental Analysis using Python** " is the outcome of our own work, is bona fide and correct to the best of my knowledge and this work has been carried out taking care of Engineering Ethics. The work presented does not infringe any patented work and has not been submitted to any other university or anywhere else for the award of any degree or any professional diploma.

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I hope that this project surpasses the quality required for the project.

ABSTRACT

Analysis of public information from social media could yield interesting results and insights into the world of public opinions about almost any product, service or personality. Social network data is one of the most effective and accurate indicators of public sentiment. The explosion of Web 2.0 has led to increased activity in Podcasting, Blogging, Tagging, Contributing to RSS, Social Bookmarking, and Social Networking. As a result, there has been an eruption of interest in people to mine these vast resources of data for opinions. Sentiment Analysis or Opinion Mining is the computational treatment of opinions, sentiments and subjectivity of text. In this paper we will be discussing a methodology which allows utilization and interpretation of twitter data to determine public opinions.

Developing a program for sentiment analysis is an approach to be used to computationally measure customers' perceptions. This paper reports on the design of a sentiment analysis, extracting and training a vast number of tweets. Results classify customers' perspective via tweets into positive and negative, which is represented in a pie chart, bar diagram, scatter plot using php, CSS and html pages. Sentiment Analysis, also called opinion mining or emotion AI, is the process of determining whether a piece of writing is positive, negative, or neutral. A common use case for this technology is to discover how people feel about a particular topic.

Keywords: Data mining, Natural language processing, Sent wordnet, Naïve Bayes.

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CHAPTER 1

1. INTRODUCTION:

Sentiment is an attitude, thought, or judgment prompted by feeling. Sentiment analysis, which is also known as opinion mining, studies people's sentiments towards certain entities. Internet is a resourceful place with respect to sentiment information. From a user's perspective, people are able to post their own content through various social media, such as forums, micro-blogs, or online social networking sites. From a researcher's perspective, many social media sites release their application programming interfaces (APIs), prompting data collection and analysis by researchers and developers. For instance, Twitter currently has three different versions of APIs available, namely the REST API, the Search API, and the Streaming API. With the REST API, developers are able to gather status data and user information; the Search API allows developers to query specific Twitter content, whereas the Streaming API is able to collect Twitter content in real time. Moreover, developers can mix those APIs to create their own applications. Hence, sentiment analysis seems having a strong fundament with the support of massive online data.

However, those types of online data have several flaws that potentially hinder the process of sentiment analysis. The first flaw is that since people can freely post their own content, the quality of their opinions cannot be guaranteed. For example, instead of sharing topic-related opinions, online spammers post spam on forums. Some spam is meaningless at all, while others have irrelevant opinions also known as fake opinions. The second flaw is that ground truth of such online data is not always available. A ground truth is more like a tag of a certain opinion, indicating whether the opinion is positive, negative, or neutral. The Stanford Sentiment 140 Tweet Corpus is one of the datasets that has ground truth and is also public available. The corpus contains 1.6 million machine- tagged Twitter messages.

Microblogging websites have evolved to become a source of varied kind of information. This is due to nature of micro blogs on which people post real time messages about their opinions on a variety of topics, discuss current issues, complain, and express positive sentiment for products they use in daily life. In fact, companies manufacturing such products have started to poll these microblogs to get a sense of general sentiment for their product. Many times, these companies study user reactions and reply to users on microblogs. One challenge is to build technology to detect and summarize an overall sentiment.

As the preprocessing phase was done in certain extent it was possible to guarantee that analyzing these filtered tweets will give reliable results. Twitter does not provide the gender as a query parameter so it is not possible to obtain the gender of a user from his or her tweets. It turned out that twitter does not ask for user gender while opening an account so that information is seemingly unavailable.

1.1 LITERATURE REVIEW

Sentiment analysis has been handled as a Natural Language Processing task at many levels of granularity. Starting from being a document level classification task (Turney, 2002; Pang and Lee, 2004), it has been handled at the sentence level (Hu and Liu [2], 2004; Kim and Holy, 2004) and more recently at the phrase level (Wilson et al., 2005; Agarwal et al., 2009). Microblog data like Twitter, on which users post real time reactions to and opinions about "everything", poses newer and different challenges. Some of the early and recent results on sentiment analysis of Twitter data are by Go et al. (2009), (Birmingham and Smeaton, 2010) and Pak and Perouse (2010). Go et al. (2009) use distant learning to acquire sentiment data. They use tweet sending in positive emotions like ":)" ":-)" as positive and negative emoticons like ":(" ":-(" as negative. They build models using Naive Bayes, Max Ent and Support Vector Machines (SVM), and they report SVM outperforms other classifiers. In terms of feature space, they try a Unigram, Bigram model in conjunction with parts-of-speech (POS) features. They note that the unigram model outperforms all other models. Specifically, bigrams and POS features do not help. Pak and Paroubek (2010) collect data following a similar distant learning paradigm. They perform a different classification task though: subjective versus objective.

For subjective data they collect the tweets ending with emoticons in the same manner as Go et al. (2009). For objective data they crawl twitter accounts of popular newspapers like "New York Times", "Washington Posts" etc. They report that POS and bigrams both help (contrary to results presented by Go et al. (2009)). Both these approaches, however, are primarily based on engram models. Moreover, the data they use for training and testing is collected by search queries and is therefore biased. In contrast, we present features that achieve a significant gain over a unigram baseline. In addition, we explore a different method of data representation and report significant improvement over the unigram models. Another contribution of this paper is that we report results on manually annotated data that does not suffer from any known biases. Our data will be a random sample of streaming tweets unlike data collected by using specific queries. The size of our hand-labeled data will allow us to perform cross validation experiments and check forth variance in performance of the classifier across fools. Another significant effort for sentiment classification on Twitter data is by Barbosa and Feng (2010). They use polarity predictions from three websites as noisy labels to train a model and use 1000 manually labeled tweets for tuning and another 1000 manually labeled tweets for testing. They however do not mention how they collect their test data. They propose the use of syntax features of tweets like retweet, hashtags, link, punctuation and exclamation marks in conjunction with features like prior polarity of words and POS of words. We extend their approach by using real valued prior polarity, and by combining prior polarity with POS. Our results show that the features that enhance the performance of our

classifiers the most are features that combine prior polarity of words with their parts of speech. The tweet syntax features help but only marginally. Gammon (2004) perform sentiment analysis on feedback data from Global Support Services survey. One aim of their paper is to analyze the role of linguistic features like POS tags. They perform extensive feature analysis and feature selection and demonstrate that abstract linguistic analysis features contribute to the classifier accuracy. In this paper we perform extensive feature for feature selection, Pang and Lee suggested to remove objective sentences by extracting subjective ones. They proposed a text-categorization technique that is able to identify subjective content using minimum cut. Gunmetal. selected 6,799 tokens based on Twitter data, where each token is assigned a sentiment score.

1.2 Main challenges involved in Twitter data Sentimental Analysis are:

The problem at hand consists of two subtasks:

- Phrase Level Sentiment Analysis in Twitter: - Given a message containing a marked instance of a word or a phrase, determine whether that instance is positive, negative or neutral in that context.

- Sentence Level Sentiment Analysis in Twitter: - Given a message, decide whether the message is of positive, negative, or neutral sentiment. For messages conveying both a positive and negative sentiment, whichever is the stronger sentiment should be chosen.

1.3 Solution to tackle these challenges

The objectives of this project are:

1. To implement an algorithm for automatic classification of text into positive and negative
2. Sentiment Analysis to determine the attitude of the mass is positive, negative or neutral towards the subject of interest
3. Graphical representation of the sentiment in form of Pie-Chart, Bar Diagram and Scatter Plot.

1.4 Scope of Project

This project will be helpful to the companies, political parties as well as to the common people. It will be helpful to political party for reviewing about the program that they are going to do or the program that they have performed. Similarly, companies also can get review about their new product on newly released hardware's or software's. Also, the movie maker can take review on the currently running movie. By analyzing the tweets analyzer can get result on how positive or negative or neutral are peoples about it.

CHAPTER 2
SOFTWARE REQUIREMENT & SPECIFICATION

2.1 Hardware Requirements: -

- Processor   : Pentium IV(Minimum)

- Hard Disk   :40GB

- RAM   :500MB(Minimum)

2.2 Software Requirements: -

- Operating System   : Windows or Linux

- Technology   :Python

- IDE   : Jupiter notebook

2.3 Operating System: -

Factors that would influence the choice of an operating system

- Support for the programming language

- Feature like multitasking, backup and recovery

- Performance related issue

- Open system or patented

- Support for disk mirroring

2.4 Front- End: -

As we know that such computer language can be use in software development, which must have the following criteria

- Easy to Learn

- Convenient in coding

- Easy To use control structure

- Lesser input provides larger output

- Highly efficient and productive

- Compatibility with other language and other tools

- Support latest technologies

- Provides flexibility etc.

2.5 User Interface: -

Each control, including states enabled and operations.

- Supported orientations and transitions between them.

- Functionality represented.

- Error handling

2.6 FEASIBILITY ANALYSIS

A feasibility study is a preliminary study which investigates the information of prospective users and determines the resources requirements, costs, benefits and feasibility of proposed system. A feasibility study takes into account various constraints within which the system should be implemented and operated. In this stage, the resource needed for the implementation such as computing equipment, manpower and costs are estimated. The estimated are compared with available resources and a cost benefit analysis of the system is made. The feasibility analysis activity involves the analysis of the problem and collection of all relevant information relating to the project. The main objectives of the feasibility study are to determine whether the project would be feasible in terms of economic feasibility, technical feasibility and operational feasibility and schedule feasibility or not. It is to make sure that the input data which are required for the project are available. Thus, we evaluated the feasibility of the system in terms of the following categories:

- Technical feasibility
- Operational feasibility
- Economic feasibility
- Schedule feasibility

1.Technical feasibility: -

Evaluating the technical feasibility is the trickiest part of a feasibility study. This is because, at the point in time there is no any detailed designed of the system, making it difficult to access issues like performance, costs (on account of the kind of technology to be deployed) etc. A number of issues have to be considered while doing a technical analysis; understand the different technologies involved in the proposed system. Before commencing the project, we have to be very clear about what are the technologies that are to be required for the development of the new system.

2.Operational feasibility: -

Proposed project is beneficial only if it can be turned into information systems that will meet the operating requirements. Simply stated, this test of feasibility asks if the system will work when it is developed and installed. Are there major barriers to Implementation? The proposed was to make a simplified web application. It is simpler to operate and can be used in any webpages. It is free and not costly to operate.

3. Economic feasibility: -

Economic feasibility attempts to weigh the costs of developing and implementing a new system, against the benefits that would accrue from having the new system in place. This feasibility study gives the top management the economic justification for the new system. A simple economic analysis which gives the actual comparison of costs and benefits are much more meaningful in

this case. In addition, this proves to be useful point of reference to compare actual costs as the project progresses. There could be various types of intangible benefits on account of automation. These could increase improvement in product quality, better decision making, and timeliness of information, expediting activities, improved accuracy of operations, better documentation and record keeping, faster retrieval of information.

4.Schedule feasibility: -

A project will fail if it takes too long to be completed before it is useful. Typically, this means estimating how long the system will take to develop, and if it can be completed in a given period of time using some methods like payback period. Schedule feasibility is a measure how reasonable the project timetable is. Given our technical expertise A minor deviation can be encountered in the original schedule decided at the beginning of the project. The application development is feasible in terms of schedule.

2.7 Requirement Definition

After the extensive analysis of the problems in the system, we are familiarized with the requirement that the current system needs. The requirement that the system needs is categorized into the functional and non-functional requirements. These requirements are listed below:

1. **Functional Requirements: -**

   Functional requirement are the functions or features that must be included in any system to satisfy the business needs and be acceptable to the users. Based on this, the functional requirements that the system must require are as follows:

   - System should be able to process new tweets stored in database after retrieval
   - System should be able to analyze data and classify each tweet polarity

2. **Non-Functional Requirements: -**

   Non-functional requirements are a description of features, characteristics and attribute of the system as well as any constraints that may limit the boundaries of the proposed system. The non-functional requirements are essentially based on the performance, information, economy, control and security efficiency and services. Based on these the non-functional requirements are as follows:

   - User friendly
   - System should provide better accuracy
   - To perform with efficient throughput and response time

ARCHITECTURE DIAGRAM

3.1 DATAFLOW DIAGRAM (DFDS):

A graphical tool used to describe and analyze the moment of data through a system manual or automated including the process, stores of data, and delays in the system. Data Flow Diagrams are the central tool and the basis from which other components are developed. The transformation of data from input to output, through processes, may be described logically and independently of the physical components associated with the system. The DFD is also known as a data flow graph or a bubble chart. DFDs are the model of the proposed system. They clearly should show the requirements on which the new system should be built. Later during design activity this is taken as the basis for drawing the system's structure charts. The Basic Notation used to create a DFD's are as follows:
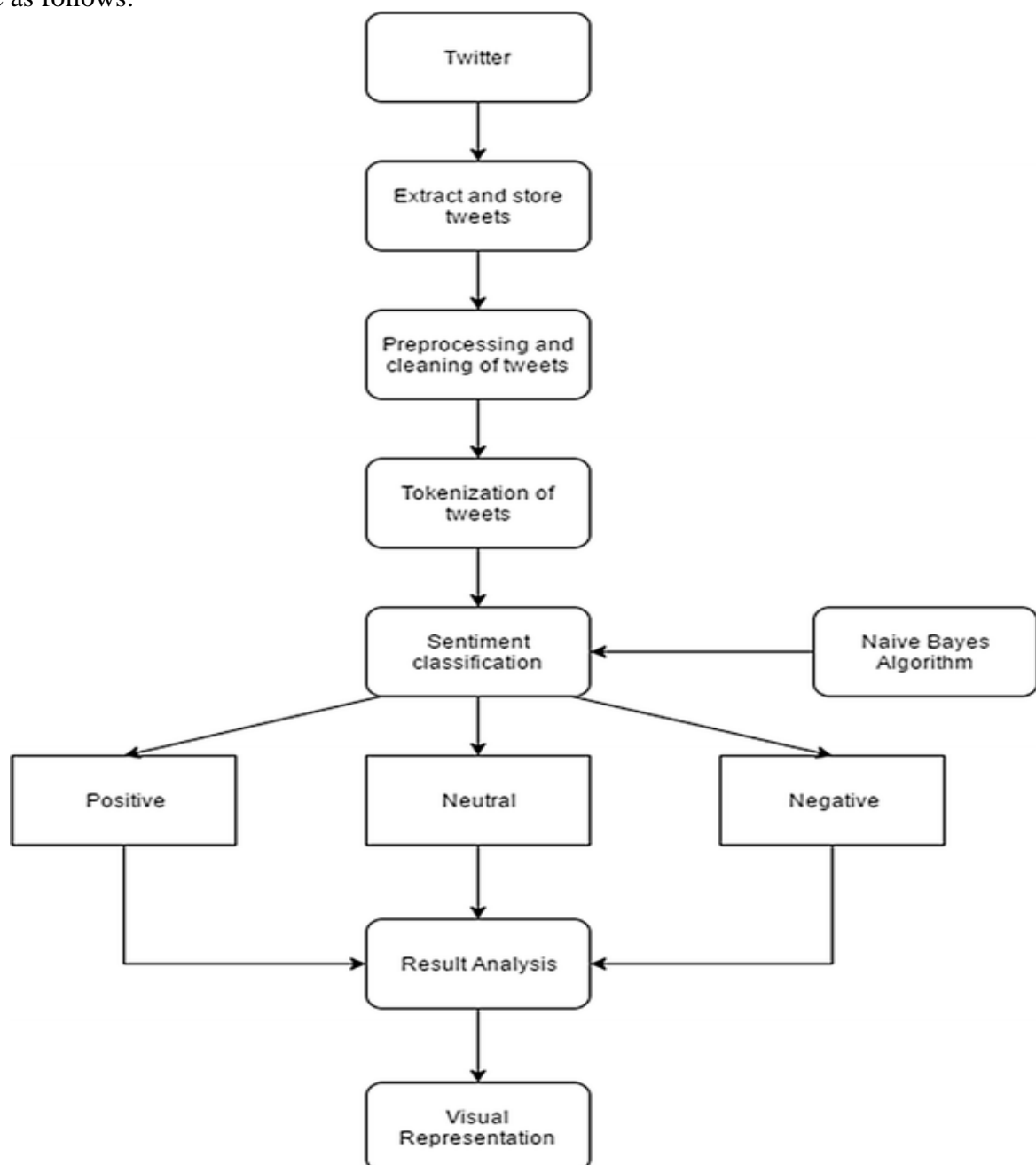
Fig 3.1:" Dataflow Diagram"

3.2 CONTEXT LEVEL DIAGRAM:

A context diagram is a top level (also known as "Level 0") data flow diagram. It only contains one process node ("Process 0") that generalizes the function of the entire system in relationship to external entities. DFD Layers. Draw data flow diagrams can be made in several nested layers.
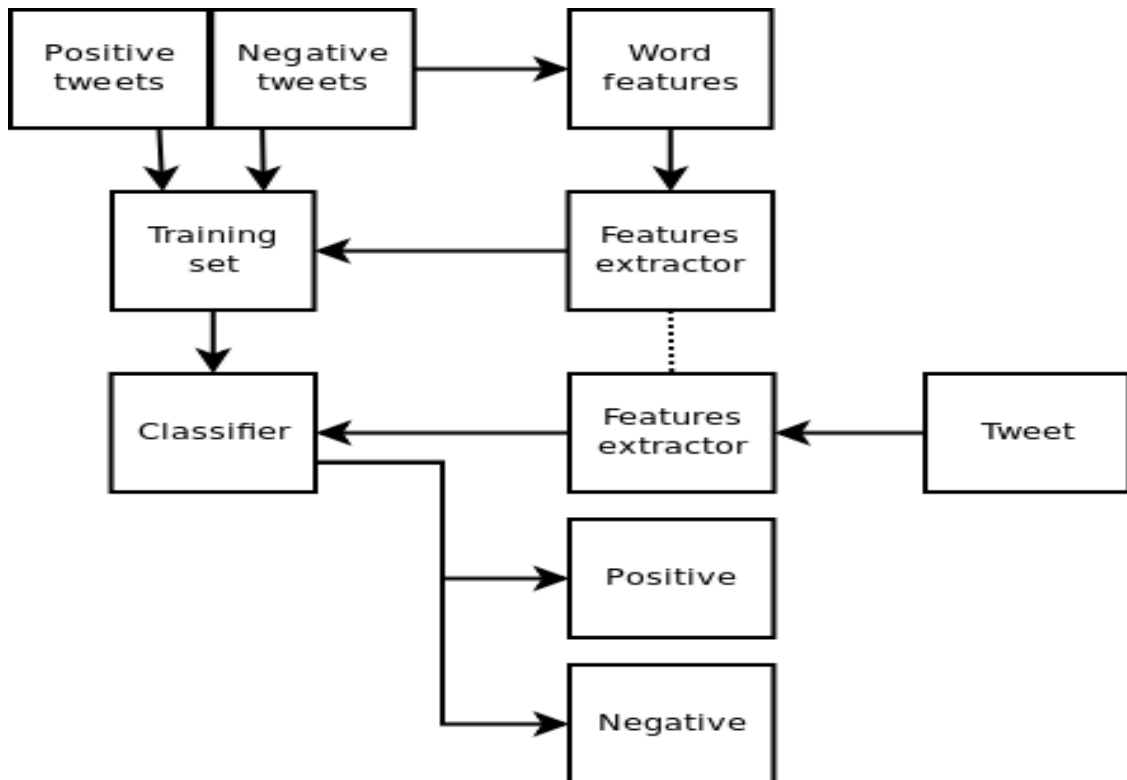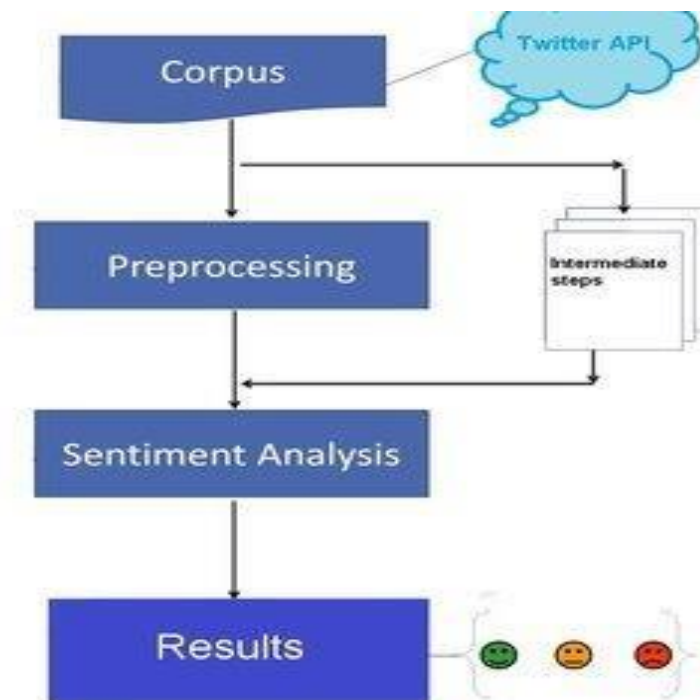
Fig 3.2:" Context Level Diagram"

3.3 UML Diagram: -

Fig 3.3:" UML Diagram"

3.4 Data Dictionary for the Project: -

Login

Field name	Data Type	Size
Id	Int	100
Email id	Text	–
Passward	Varchar	230
Fname	Varchar	230
Lname	Varchar	230
Phoneno	Int	20
City	Varchar	230
State	Varchar	230
Country	Varchar	230

Fig 3.4:" Data Dictionary Diagram"

3.5 ERD for project: -
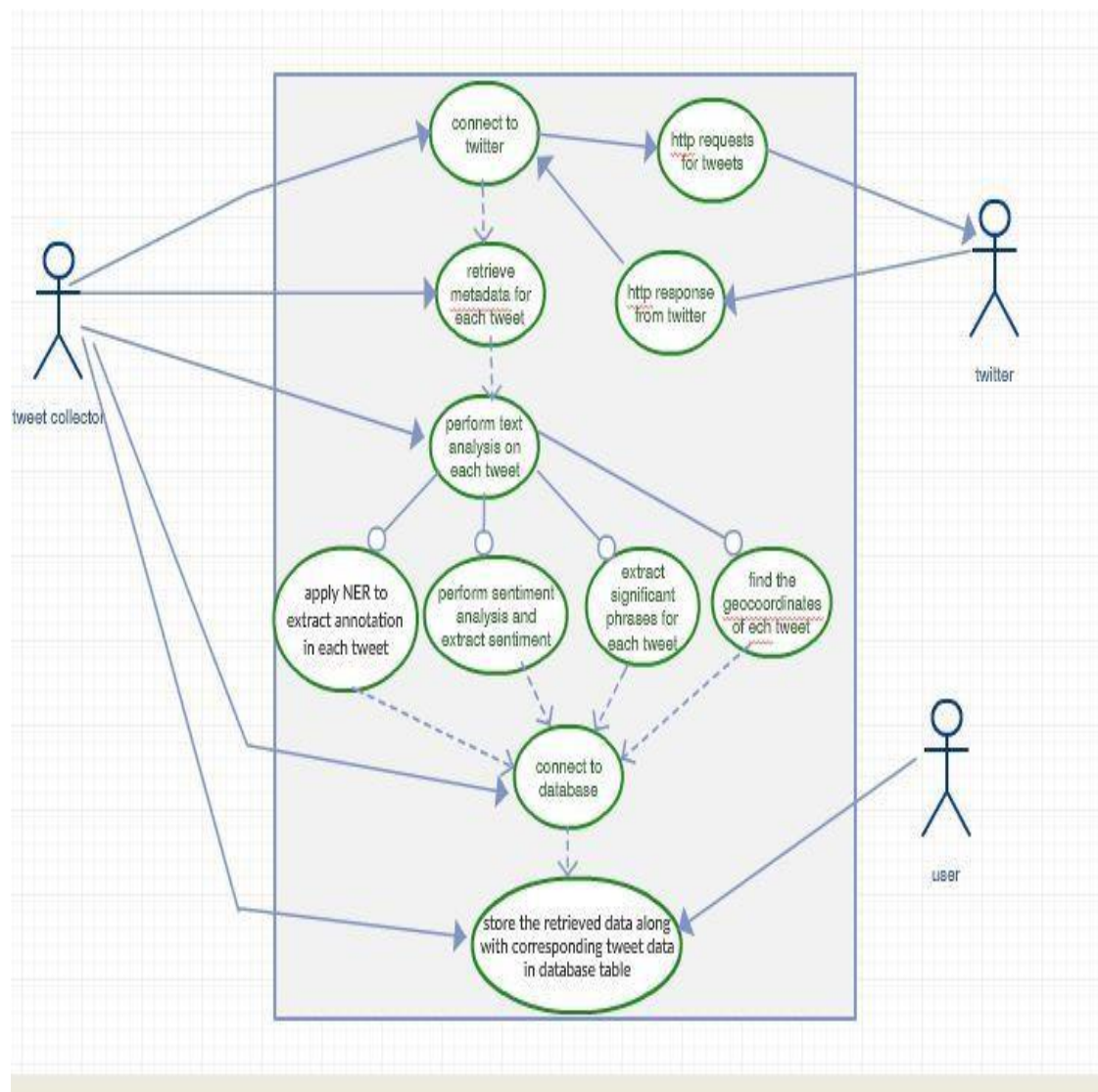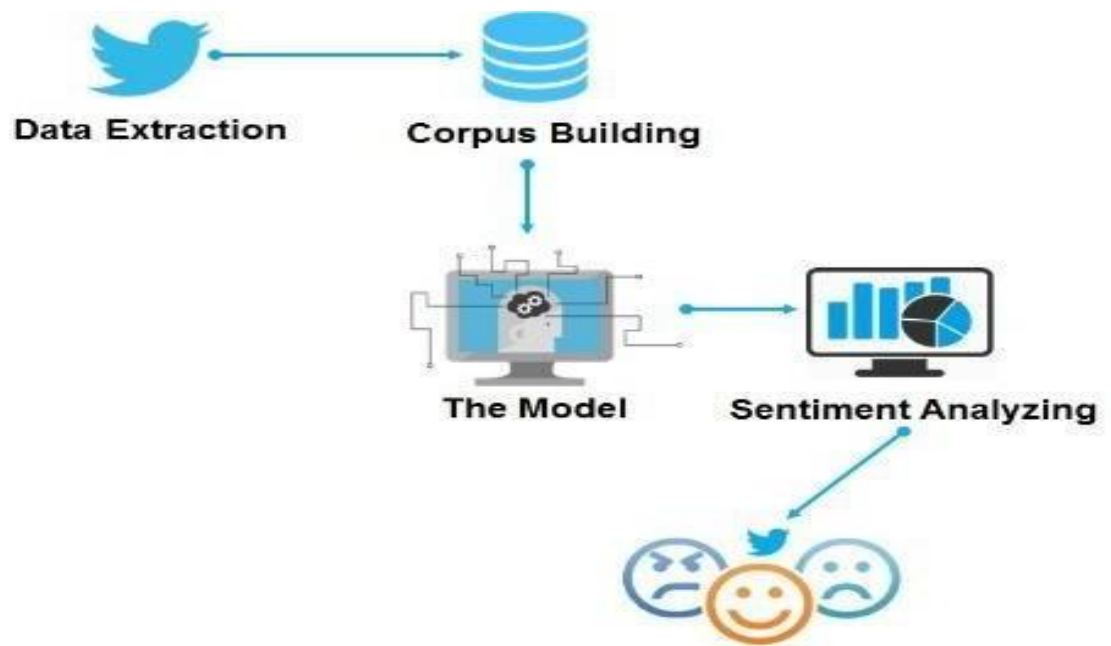

Fig 3.5:" ERD Diagram"

3.6 Working diagram: -

Fig 3.6:" Working Diagram"

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CHAPTER- 4
METHODOLOGY

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We will divide our whole project in the following parts:

1. Understand the Problem Statement

2. Tweets Preprocessing and Cleaning

3. Story Generation and Visualization from Tweets

4. Extracting Features from Cleaned Tweets

5. Model Building: Sentiment Analysis

1. Understand the Problem Statement: -

The objective of this task is to detect hate speech in tweets. For the sake of simplicity, we say a tweet contains hate speech if it has a racist or sexist sentiment associated with it. So, the task is to classify racist or sexist tweets from other tweets.

2. Tweets Preprocessing and Cleaning: -

The preprocessing of the text data is an essential step as it makes the raw text ready for mining, i.e., it becomes easier to extract information from the text and apply machine learning algorithms to it. If we skip this step then there is a higher chance that you are working with noisy and inconsistent data. The objective of this step is to clean noise those are less relevant to find the sentiment of tweets such as punctuation, special characters, numbers, and terms which don't carry much weightage in context to the text.

3. Story Generation and Visualization from Tweets: -

In this section, we will explore the cleaned tweets text. Exploring and visualizing data, no matter whether its text or any other data, is an essential step in gaining insights. Do not limit yourself to only these methods told in this tutorial, feel free to explore the data as much as possible.

4. Extracting Features from Cleaned Tweets: -

To analyze a preprocessed data, it needs to be converted into features. Depending upon the usage, text features can be constructed using assorted techniques – Bag-of-Words, TF-IDF, and Word Embeddings. In this article, we will be covering only Bag-of-Words and TF-IDF.

5. Model Building: Sentiment Analysis: -

We are now done with all the pre-modeling stages required to get the data in the proper form and shape. Now we will be building predictive models on the dataset using the two-feature set

- Bag-of-Words
- TF-IDF.

We will use logistic regression to build the models. It predicts the probability of occurrence of an event by fitting data to a logit function.

The following equation is used in Logistic Regression:

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta(Age)$$

Modules used: -

1.Textblob

TextBlob is a Python (2 and 3) library for processing textual data. It provides a simple API for diving into common natural language processing (NLP) tasks such as part-of-speech tagging, noun phrase extraction, sentiment analysis, classification, translation, and more. Its features are

- Noun phrase extraction
- Part-of-speech tagging
- Sentiment analysis
- Classification (Naive Bayes, Decision Tree)
- Language translation and detection powered by Google Translate
- Tokenization (splitting text into words and sentences)
- Word and phrase frequencies
- Parsing
- Word inflection (pluralization and singularization) and lemmatization
- Spelling correction
- Add new models or languages through extension.

2.Tweepy

Twitter is a popular social network where users share messages called tweets. Twitter allows us to mine the data of any user using Twitter API or Tweepy. The data will be tweets extracted from the user. The first thing to do is get the consumer key, consumer secret, access key and access secret from twitter developer available easily for each user. These keys will help the API for authentication.

Steps to obtain keys:

- Login to twitter developer section
- Go to "Create an App"
- Fill the details of the application.
- Click on Create your Twitter Application
- Details of your new app will be shown along with consumer key and consumer secret.

- For access token, click" Create my access token". The page will refresh and generate access token.

Tweepy is one of the libraries that should be installed using pip. Now in order to authorize our app to access Twitter on our behalf, we need to use the OAuth Interface. Tweepy provides the convenient Cursor interface to iterate through different types of objects. Twitter allows a maximum of 3200 tweets for extraction.

3.Matplotlib

Matplotlib is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, the Python and IPython shells, the Jupiter notebook, web application servers, and four graphical user interface toolkits. Matplotlib tries to make easy things easy and hard things possible. You can generate plots, histograms, power spectra, bar charts, error charts, scatterplots, etc., with just a few lines of code.

Module & Team Member wise Distribution of work:

This project is developed by 3 members. By the determination of members in the group we have achieved our goal. All the members have their own key skills by the help of each the project is created very well with all the client requirements fulfilled. Every member has contribution in developing this project and making it easier to use. This module also include ability to hear and speak. Some visuals are also provided in this project So this module is the result of ability and skills of every member of the group

CHAPTER- 5
RESULTS AND DISCUSSION

5.1 Analysis

We collected dataset containing positive and negative data. Those datasets were trained data and was classified using Naïve Bayes Classifier. Before training the classifier unnecessary words, punctuations, meaning less words were cleaned to get pure data. To determine positivity and negativity of tweets we collected data using twitter API. Those data were stored in database and then retrieved back to remove those unnecessary word and punctuations for pure data. To check polarity of test tweet we train the classifier with the help of trained data. Those results were stored in database and then retrieved back using php, html, JavaScript and CSS.

- **Pie-chart: -**

- **Bar-Graph: -**

- **Scatter-Plot: -**

Scatter representation of positivity and negativity of tweets
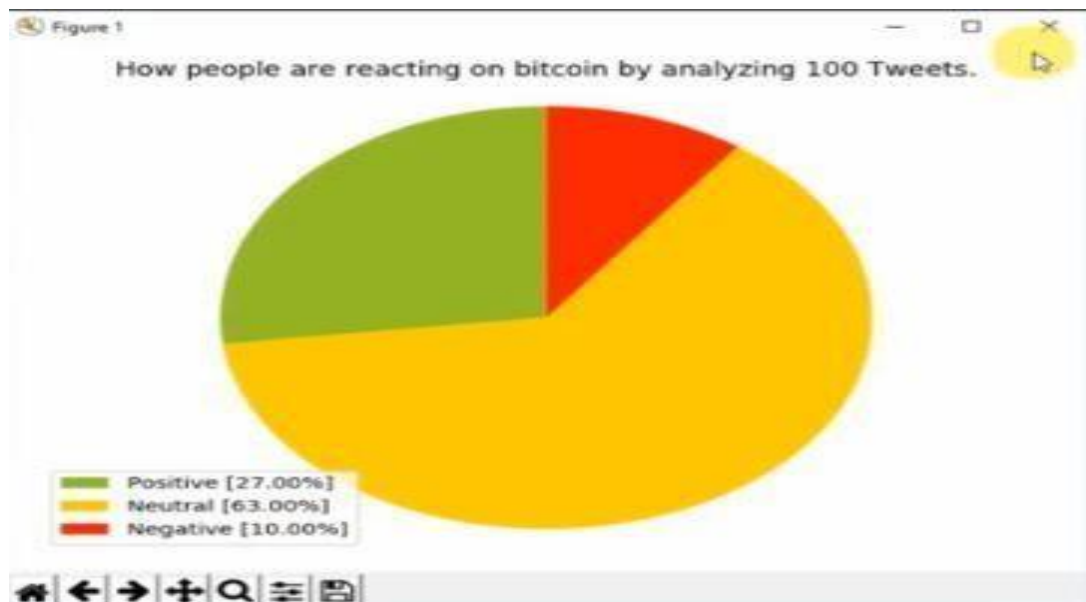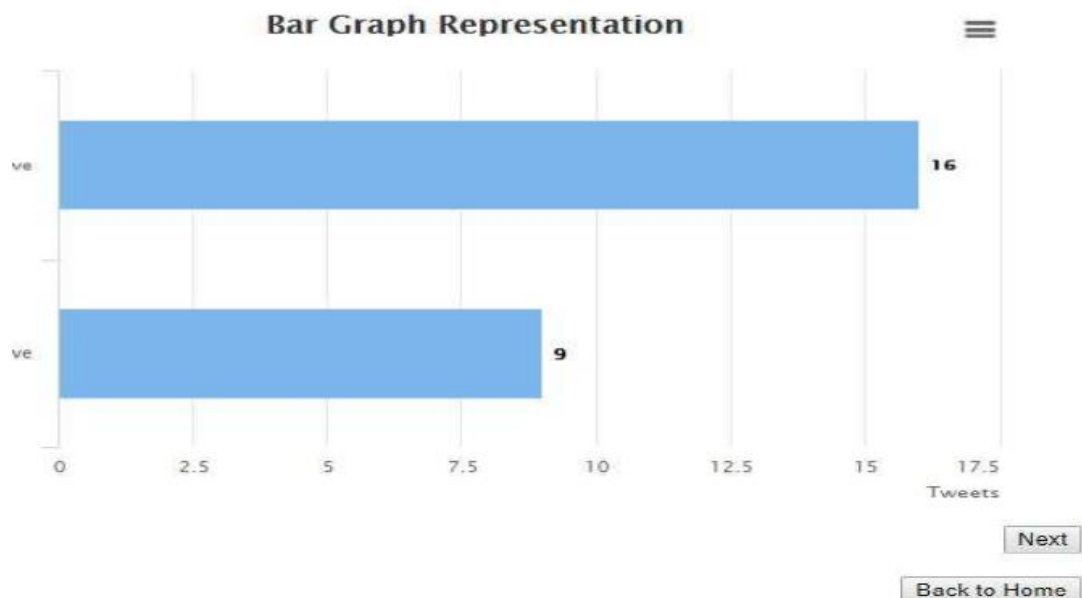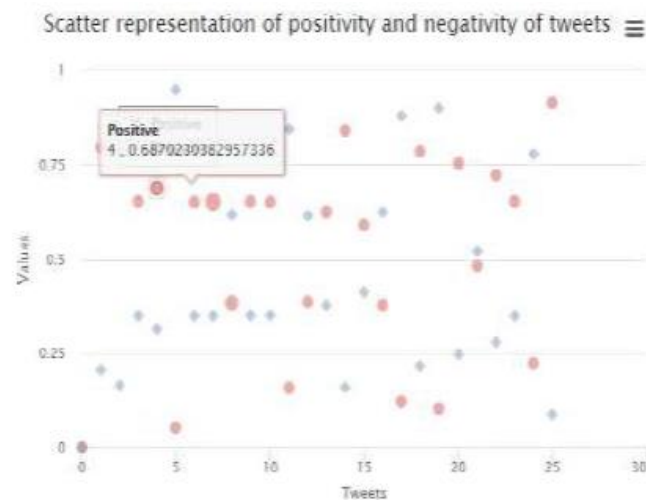
Previous

Back to Home

5.2 Result

After facing a number of errors, successful elimination of those error we have completed our project with continuous effort. At the end of the project the results can be summarized as:

- A user-friendly web-based application.
- No expertise is required for using the application.
- Organizations can use the application to visualize product or brand review graphically.

5.3 Screenshots

- **Installing tweepy through command prompt: -**

- **Importing libraries: -**

These libraries will be installed through command prompt. Then these all modules will be imported to code for further use.

- **Detailed analysis without graphical representation: -**

	Tweet	Sentiment
1	Tweet	Sentiment
2	Tesla Tax - Norwegian Tesla cars will increase by 7000 70000 NOK, if... #tesla #tech #ElectricDreams url=https://t.co/5HNoXgl2QI	neutral
3	There is really nothing like a gull wing door. Thank you to #amazonfwt #tesla #afwt https://t.co/BqSyzBC0b6	positive
4	@Autonomous_Newz HINT: Partner with Tesla and stop wasting time & $...	negative
5	Tesla factory worker sues, claiming harassment, discrimination - MarketWatch https://t.co/f3dLV3QcMd	neutral
6	Super Soco TS1200R first ride review // The Tesla of the 50cc moped world? Not quite... https://t.co/KRKkmnTb0T https://t.co/woE(	neutral
7	@ElectrekCo @ToyotaMotorCorp please develop BEV's you intended to sell. I'll keep my @Tesla Model 3 reservation.	neutral
8	Teslas former battery director joins high-tech farming startup Plenty https://t.co/2EdN4UkJ6E	neutral
9	Elon Musk - co-founder, CEO and Product Architect at Tesla, , Gives some "Never Give Up" speech. Everyone may... https://t.co/Ml(	neutral
10	@latimes Elon Musk is a con artist. Tesla will soon implode.	neutral
11	Teslas former battery director joins high-tech farming startup Plenty https://t.co/MGw5OvlQjR	neutral
12	What Makes Tesla The Best Car Brand In The World? https://t.co/epo4yzakU8	neutral
13	Tesla's Former Battery Director Joins Farming Startup Plenty https://t.co/gC1A3fQCYx	neutral

- **Searching statement: -**

CHAPTER 6
CONCLUSION & SCOPE FOR FUTRURE DEVLOPMENT

6.1 Limitation

The system we designed is used to determine the opinion of the people based on twitter data. We somehow completed our project and was able to determine only positivity and negativity of tweet. For neutral data we were unable to merge dataset. Also, we are currently analyzing only 25 live tweets. This may not give proper value and results. The results are not much accurate. More as: -

- It cannot provide videos.
- It cannot detect mixed sounds

6.2 Future Enhancement

- Analyzing sentiments on emo/smiley.
- Determining neutrality.
- Potential improvement can be made to our data collection and analysis method.
- Future research can be done with possible improvement such as more refined data and more accurate algorithm.

6.3 CONCLUSION

It is fully working twitter sentiment analyzer, which can perform task in online condition as we given her local modules. In online condition it gets more resources to work with. Also, any peripheral can be control with the sentiment analyzer, just by giving the command. The local modules can be added or removed by user as he sees fit. Also, there is simple option for conversation with it, where it learns further. In online condition it gets more resources to work with. Also, any peripheral can be control with the sentiment analyzer, just by giving the command. The local modules can be added or removed by user as he sees fit. Also, there is simple option for conversation with it, where it learns further.

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- Python for beginners