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Sentiment Analysis of Twitter using Machine Learning

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ABSTRACT:

Social media today makes a shift in lifestyle of many people. Twitter is often used for giving campaigns, critics and opinions that can make pros and cons. So, there are large amounts of textual data contained in twitter called big data. We can crawl the Twitter data and use it for Sentiment analysis to predict positive, negative or neutral sentiment. Finding the best combination algorithms is the key to success in sentiment analysis. Therefore, we compare the combination algorithms of preprocessing, feature extraction, feature selection and classification method. The research framework takes an unique approach to tweet information by combining an approved polarities lexicon learned from customer reviews of domains with tweet-specific characteristics and unigrams to create a classification model employing machine learning methods.
Keywords: Twitter, Sentiment Analysis, Positive, negative and neutral sentiment.

1. INTRODUCTION

Feelings assume numerous significant parts in individuals lives and have been the subjects of logical enquiry in brain science for well longer than a century social, context oriented and wistful examination is a type of Bigdata which utilizes certain procedures to investigate archives, information, writings and discourse from messages, instant messages, web-based media and then some, to recognize describe and comprehend people groups wants, tones, wishes needs stresses, desires, expectations and conduct [1-5]. This helps developing marketing strategies and plans, growth plans and manufacturing strategies to name a few in public, retail, sales, marketing, linguistics, security and several other sectors [6-7]. Our cycle of computationally distinguishing and sorting assessments communicated in a piece of text, particularly to decide if the author's mentality towards a specific point the item is positive, negative or neutral [8]. We excel in analyzing all the reviews and reactions of the customers in different sites which products the mood impact of the brand. Sentiment Analysis is a procedure to comprehend the sentiments or assessments of the clients or clients we utilize the correct API and apparatuses to utilize the opinion examination administration for web-based media and other online stage [9-14]. It assists with knowing the positive, negative and neutral conclusion of the various kinds of individuals having interest. It is otherwise called assessment mining, is essentially for investigating discussions, suppositions and sharing of perspectives for choosing business system, political examination and furthermore for getting to public activities. It is the indispensable segment that decides a client's feelings or mentality. Sentiment analysis is a particular domain where you try to understand human emotions with software and if these human emotions are in written form and we can go ahead and classify the sentiments to be positive, negative or neutral [15].

In generally, sentiment analytics is used to determine the author's opinion about a certain issue. Emotion identification and polarization detection are the two most basic tasks of sentiment analysis performed here [16-17]. Sentiment analytics has been widely employed in applications like sentiment analysis for assessing product reviews and opinions, as well as in hot issues like political analysis. Twitter sentiment classification employs Machine Learning techniques to examine data and aid in the development of an analytical framework [18-23].

The algorithms will continually update analyse and converting it in order to uncover hidden insights. Machine learning techniques are used in a variety of disciplines, including big data, IoT, and cyber security, to name a few [24].
This work focuses on:

- Extracting opinion of people from twitter based on a specific keyword.
- Directly extracting the real time twitter data from the twitter UPI.
- Then applying the machine learning techniques to classify the sentiments of tweets into negative, positive and neutral comments.
- TextBlob python library package is mainly used for the sentiment analysis of tweets and to find the polarity of the words.
- Model is also trained using Classification algorithms such as Naïve Bayes and SVM are also used for the classification of texts.
- Textblob help in building the fast machine learning models that can make quick predictions.

The famous Python module tweepy is also used to analyse data. Tweepy is a Python browser for such twitter Page API that accepts both Simple Identification as well as the updated OAuth authorization technique. Because Twitter no longer accepts Basic Identification, OAuth is now the only method to use the Twitter API. Tweety provides access to the Twitter API, which is well-known. Tweepy enables you to get a product and use any of the Twitter API's official strategies. The idea behind it Tweet, Members, Groups, and Destinations are some of the class labels in the Twitter API. [25-30]

II. BACKGROUND STUDY(LITERATURE)

[A] MACHINE LEARNING

Machine learning is the process of computers figuring out how to do things without being specifically programmed to do so. While AI concentrates around expectation, in light of realised characteristics gained from the preparations data it around revelation of (previously) opaque qualities in the data (), machine learning techniques mining commonly use comparable methodologies and cover essentially the same ground. Data mining employs a variety of machine learning techniques, each with its own set of goals; nevertheless, artificial intelligence also use data mining techniques as "unsupervised classification" or as a pre-training phase to increase learner accuracy. Machine learning entails creating a model based on certain preliminary data and then being able to handle other data to generate predictions. For Machine Learning systems, various types of models have been used and researched. [31-37].

[B] SENTIMENT ANALYSIS

Sentiment classification is indeed an field of Natural Language Processing that is rapidly expanding. Emotion recognition refers to the general technique of removing subjectivity and extremism from semantic direction, which refers to the power of words and extreme language or emotions. The lexicon-based technique and machine-learning-based methods are indeed the two basic ways for obtaining sentiment mechanically [38-41].

[C] TWITTER

Twitter means unified message. It's a microblogging that provides communication services between friends, family and colleagues. It can connect to network and quickly exchange information in real time to answer questions. What are you doing Twitter was founded by obvious crop company in March 2006 in San Francisco, USA, developed by Evan Williams and Meg Houriban. Evan

Williams are the same people who create the most popular blog services in the world. That's Blogger.com. Many people would know the blogger.com in the beginning started up under the supervision of a small company called Pyxa labs built up from August 1999 twitter means unified message, a kind of microblogging [42-48]

[D] MICRO BLOGGING

Micro blogging sites, such as Tweet, are similar to traditional wordpress themes, with the exception that single postings are smaller. Twitter sentiment classification is a unique task owing to the sensitivity of the micro - blogging site. It's unclear how well the highlighting and techniques used on more highly formed content will translate to microblogging's small writing. Bold characters, sentences, expressions, capital letters, quoted text, and other expressive punctuations distinguish the blogging language and limit the breadth of sentiment collection.

[E] KEY FINDINGS

A number of papers on Twitter opinion and buzz have been published in recent years. Previously published research focused on obtaining people's opinions from Twitter based on a certain keyword and doing sentiment analysis. The following are some of the conclusions drawn from a few of the papers cited:

[1] Applying the machine learning classifiers RF, SVM to classify tweets. Performance evaluation parameters are compared with Random Forest, Support Vector Machine

[2] SVM, ADABOOSTED DECISION TREE and DECISION TREE based hybrid sentiment classification model are presented for improving the overall accuracy of the classifier in the classification of tweets.

[3] Experts conducted a review and comparative assessment of current methods in opinion mining, such as machine learning and lexicon-based methods, as well as assessment metrics, with both the goal of merging machine learning and opinion lexicon methods.

[4] Study of sentiment analysis in micro blogging to analyze customer feedback using case based reasoning and artificial neural network by setting target to each tweet post, collecting all adjectives for entire tweets post, navigate and finding no of positive words and no of negative words.

[F] GAPS IDENTIFIED

With respect to the above literature survey there are certain gaps which are identified in the existing systems. Analysts have started to investigate the utilization of part-o-speech form includes however results stay blended. Features common to micro blogging (e.g., emoticons) are also common, but there has been little investigation into the usefulness of existing sentiment resources developed on non-micro blogging data. Real time twitter data isn't collected instead already processed twitter data were used in most of the research. Accuracy of the prediction is less considering the fact that algorithms like Adaboosted decision tree, max entropy have been used. Majority of the papers limit their experiments to sentiment/non-sentiment classification, rather than 3-way polarity classification.

- **Abbreviations and Acronyms**

SVM: Support Vector Machine

RF: Random Forest

III. METHODOLOGY

The methodology of the work is depicted briefly through the system architecture of the model as shown below. The user first inputs a keyword in the GUI which may be name of an actor, a sport, a company or any filed of interest. The entered keyword in the search bar is then sent to the twitter to search for the tweets related to the entered keyword. To obtain real time tweets, twitter is connected

through twitter API and requests for the tweets of the entered keyword are sent. The twitter then sends the collected tweets of the particular keyword as the response. In the data retrieval process all the tweets obtained with respect to the searched keyword are collected and stored in csv file. To analyze the sentiment of the tweets, the tweets in csv are sent to pre processing where the tweets are processed. The processed data are then subjected to sentiment analysis which as a result classifies the processed data into positive, negative and neutral data.

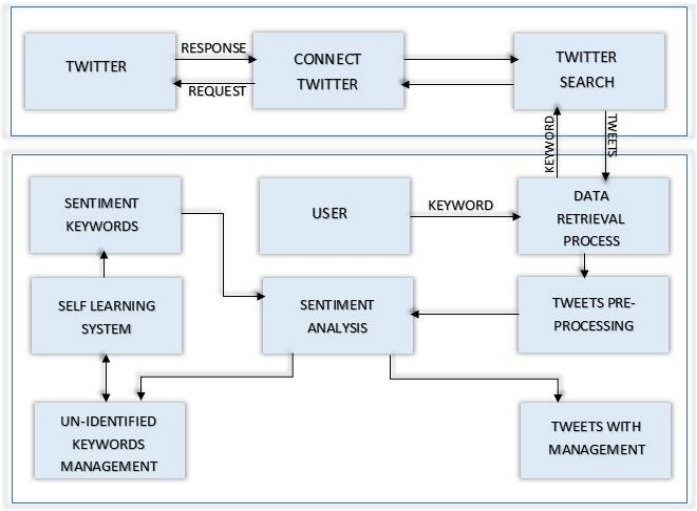

Fig 3.1 System Architecture

Twitter emotion is analysed using Python and python Programming libraries such as Tweepy and TextBlob, which would tokenize textual information into different words or phrases. The classifiers of naive Bayes methods are described, and they are shown on an essential classification task: The process of categorizing a full document by providing it a text classification label from a list of categories is known as topic modeling. It concentrates on one typical text classification problem, sentiment, the ex-sentiment analyse Suction of sentiment, or an author's favorable, unfavorable, or neutrality attitude toward a given object.

Abbreviations and Acronyms

GUI: Graphical User Interface.
API: Application programming Interface.
CSV: Comma Separated Values.

IV. IMPLEMENTATION

Implementation process involves tweets collection, data preprocessing, vectorization and Sentiment analysis.

- **Tweets collection from twitter API:**

  In order to fetch tweets through twitter API, one needs to register an app through their twitter account and obtain tokens or keys to access the twitter. Tweepy is the Python library which supports accessing twitter through Twitter API. By passing consumer key and consumer secret key to OAuthHandler instance the model will be authenticated. After the authentication process is done, by creating cursor object and passing required parameters we obtain the tweets.

- **Data Preprocessing**:

The offered data are largely unorganized tweets that must be pre - processed in order to create an NLP classifier. Textblob, based on the NLTK, is a prominent Python library for analyzing text information. Extra features in TextBlob include emotion analysis and typo corrections.

In this project, the data is preprocessed in three steps,

- **Tokenization:**

Tokenization is just a method of dividing an input image into tokens. Whitespace and punctuation symbols could be used to distinguish tokens. Textblob has the ability to tokenize text into various words or phrases. This makes it easier to look at the context.

- **Normalization**:

The existence of abbreviation inside a tweet is recorded for the normalising procedure, and afterwards abbreviation are restored by their genuine sense, and various terms that have the same significance as a regular word are solved utilizing Lexicon normalisation.

- **Part of Speech:**

The practise of applying a tag to every phrase indicating which grammar part - of - speech it belongs to is known as POS-tagging. Textblob can also be used to tag different sections of speech in the sentence.

- **Vectorization and Model selection:**

The preprocessed information must be quantitatively expressed even before information is let to training. Counting vectorization and Bag-of-words conversion are two well-known approaches for vectorizing word in language processing. The string information is processed to numeric value using one of the techniques in order to provide this to a machine learning algorithm.

The Nave Bayes classifier is employed in this project for classification problem as it is the most often used technique in NLP. Furthermore, machine learning pipeline approaches are being used to conserve a significant amount of time and computing power.

- **Sentiment Analysis:**

Here we analyze the sentiment of data and based on the polarity it is classified as positive, negative or neutral.

Example using TextBlob python package:

The TextBlob package for Python is a convenient way to do a lot of Natural Language Processing (NLP) tasks. For example:

From textblob import TextBlob

TextBlob(“not a very great calculation”).sentiment When calculating sentiment for a single word, TextBlob uses a sophisticated technique known to Mathematicians as “averaging”.

TextBlob(“great").sentiment

Sentiment (polarity=0.8, subjectivity=0.75)

This tells us that the English phrase "not a very great calculation" has a polarity of about -0.3, meaning it is slightly negative, and a subjectivity of about 0.6, meaning it is fairly Subjective. TextBlob comes discovering words and expressions it can allocate extremity and subjectivity to, and it midpoints them all together for longer content.

Example for Naïve Bayes Classification:

Step 1: Gather Tweets:

To begin, select a topic to investigate. You may define inputs in sentiment-analysis.js to be any word you choose. In this case, we'll use a word that we know will yield positive outcomes.

```
var algorithmia = require("algorithmia");
Varclient=algorithmia(process.env.ALGORITHMIA_API_KEY);
var input = "happy";
var no_retweets = [ ];
```

Step 2: Perform Sentiment Analysis on Tweets:

We're ready to run the sentiment method around each tweet now that we've gathered and cleaned our data collection. Then, for all of the tweets combined, we'll compute an average score.

With variables score count, we keep records about how many twitter we've gone over so when it reaches the very same amount as the number of comments, we may stop. We calculated the final result by average the total score, which we intended to investigate. The end result is a value between 0 and 4 that represents extremely negative, negative, neutral, positive, and very positive sentiment, in that order.

v. RESULT

Fig 5.1 Sample Result

As a result, polarity of sentiment is calculated for positive, negative and neutral. By using mathplotlib, this model displays the percentage of positive, negative and neutral in a pie chart. The pie chart is a circular graph divided into slices which shows the percentage of a particular data from the whole pie. By the visual display of the result it is easy to understand the sentiment of people.

VI. CONCLUSION

Sentiment analysis is a branch of research that looks at how people express themselves in text on various social media sites. Because Twitter data is very unstructured, it is tough to evaluate. Our model, however, differs from previous work in this sector because of the real time twitter data used, the usage of TextBlob package from python library and other methodologies used as mentioned above to get the best results with respect to positive, negative and neutral sentiments. The following is the procedure for sentiment analysis: Tweets were retrieved straight from the Twitter API, followed by data cleansing and finding. Following that, the data was loaded into numerous models for training purposes. Each tweet was evaluated as either favourable, negative, or neutral based on its sentiment. We also looked into the impact of various variables on classification accuracy. We can deduce that the clearer the data, the more accurate the results. Various metrics were employed for testing, and cross validation revealed that maximal entropy has the highest accuracy. An system that can automatically identify tweets is a fascinating field of research for future projects.

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