

Data Mining and Machine Learning: Design a Generalized Real Time Sentiment Analysis System on Tweeter Data Using Natural Language Processing

Jitendra Soni, Kirti Mathur



Abstract: Sentiment analysis is a task, that is becoming recently important for numerous companies. Because the consigner subscriptions on social media like Facebook, twitter and other side get their product reviews. If the company wants to track tweets about their brand to command over the impact on time or many website analyze the comments on their articles. This will help them to track comments and impact. So the sentiment analysis is an automated system that collects and analyzes the content and generates the desired results. This paper proposes a sentiment analysis system for twitter posts. Proposed system will work on real time tweets. System is also designed in such a way that this can analyze data related to any topic. Python programming language is used to extract tweets form twitter feeds. Proposed system also calculates the level of sentiments. That how much negative or positive tweets are. This paper also presents some real time result analysis.

Keywords: API, Lexican, Machine Learning, NLP, Python, Sentiment Analysis, Tweepy.

I. INTRODUCTION

An important part of our information congregate has always been to find out what other people think about any person, incident or issue. More availability of opining resources including online review sites and personal blogs mean one can use technologies to seek out and understand the opinions of others and put it to use. Sentiment analysis deals with the computational treatments of opinion, sentiments and subjectivity in text. Sentiment analysis is classification of the polarity of a given text in the documents, sentence or phrase. Con-tents of every text documents can be categorized weather con-tent are positive, negative or neutral. If text contain has pos-sible thought word with positive meaning sentence that means sentence is positive polarities. Like a sentence “you are such a special human being and I am so honored to be here on this earth with you”. Similarly some sentences may give negative impression and some may give neutral. So the computing based sentiment analysis system can calculate these sentiments by computing text through algorithm and generates some short of sentiment value.

This can give a clear impression of text. Sentiment analysis system has bunch of applications platform like in stock market [1, 2], political is-sues [3] or news article [4].

I.I. OBJECTIVE

Proposed implementation is based on following objectives:

- (i) To design a sentiment analysis system based on machine learning concept.
- (ii) To implement a generalize sentiment analysis system for twitter.
- (iii) To calculate sentiments on different levels.

II. BACKGROUND

Sentiment analysis also known as opinion mining, however some researchers mentioned few differences in both [5]. Sen-timent analysis or opinion mining can be categorized from different aspects they are as following:

- (i) Technique based
- (ii) Text view based
- (iii) Analysis level based
- (iv) Rating level based

On the view of technical aspects, sentiment analysis can be done through machine learning, lexicon based, rule-based and some time hybrid approach is used. The machine learning approach works on natural language processing (NLP) concept [6,8]. This approach used training data set to calculate sentiment values. Lex-icon based technique used frequency of words to calculate senti-ment values in text, this technique is also called “Bag of words” model. An another simple approach called rule based mining, in this simple positive and negative words are count to calculate the polarities of statements. Some researchers also proposed some hybrid approach in which they proposed mixed approach of ma-chine learning and lexicon based technique. Another level of categorization can be defined at text view. In this classification sentiment analysis can be done on the structure of the text. It can be either at document level, sentence level or word level. In document level classification sentiment analysis can be implemented document wise. Sentiment polarities are calculated for whole document in a single iteration. Whereas in sentence level, polarities are calculated on the basis of sentence and in word level polarities of each word is calculated separately. Among all three techniques it has been observed that document level classifi-cation is mostly used.

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There is one more parameter to classify the sentiment analysis that is rating level. According to rating level, it can be classified into global rating and aspect rating. Global rating is overall rating of any product and aspect rating deals in any specific feature of product to rate it.

III. SENTIMENT ANALYSIS ON SOCIAL NETWORKING CONTENT

Social sentiment analysis is the use of social media like Facebook and Twitter to grasp the knowledge of the crowd [7]. therefore analyst take Twitter station and therefore place bound key words a few bound subject material and that they try to perceive from NLP, that what the folks measure oral communication to this specific topic.

A legion work analyst try to do is to understand, that how to fil- shows the overall data flow of implementation of sentiment analysis system for Twitter data.

ter out sarcasm, what's positive and what's negative. also perceive many mode of icons utilized by individuals on Twitter. This is terribly helpful for vendor to grasp what is the pulse about the product. It additionally helps to understand where company swings their marketing amount. What is the reaction to advertising campaign? it's ability to seem at a lot of tweets in couple of time about a given subject. It is like having innumerable folks focusing cluster. so sentiment analysis of social media is much additional representative and helpful in this respect.

IV. IMPLEMENTATION OF TWITTER SENTIMENT ANALYSIS SYSTEM

Twitter is trouser of sentiments. This section explores the technique through which sentiment can be calculated through Tweets. To do this there are four step procedure:

- i. Get the Twitter credential
- ii. Access the Twitter data
- iii. Calculate Sentiments
- iv. Represent results in Desired Format

To run social media campaigns on Twitter with social moves, API key and access token are required to be generated for each Twitter pro-file, which is used. API depicts for Application Program Inter-face. A series of code called API keys provided by twitter allows twitter profile to poll these feeds. For creating twitter applications one can use <http://apps.twitter.com> by filling 5 point information through dialog boxes. Now by providing all the basic data, Twitter application is created allowing user to move social profile to function. But before this whole method, it's necessary to have a valid mobile number associated with profile, which is going to be used. To check this we can visit mobile tab in settings of Twitter account to validate the Twitter profile.

After making of application Twitter, application manager space will be there. Here tab "Key and Access Token" offers all creden-tial needed for Twitter application development. Four main data are needed to develop Twitter app development and they are client Key (API Key), client Secret (API Secret), Access Token and Access Token Secret. We can additionally mänge access level through permission tab weather app needed read only permission or read/write or read/write and access direct message permission.

After getting this Twitter credential, Twitter data needs to be re-trrieved. As in this implementation Python programming language is used. Python provides a API called "tweepy" to provide access functionality on Twitter account. So first of all tweepy API must be installed on system. After installation three main classes of tweepy needs to be import in the program. Those are stream, OAuthHandler and StreamListener. In this proposed implementa- tion "Sentdex" API is used for sentiment analysis. Instead of Sentdex API one can use any other API like TextBlob or any one can create their own custom function to calculate sentiments of Tweets. Since this implementation is using Sentdex API, imple-mentation has requires to import urllib. Sentdex API gives different level of sentiments through integer numbers. If number is positive means Tweets contain positive thought, if negative means negative thoughts and if number is zero it means tweet is neutral. Finaly these generated results can be represented in graphical form to understand the overall sentiments of public opinion figure1

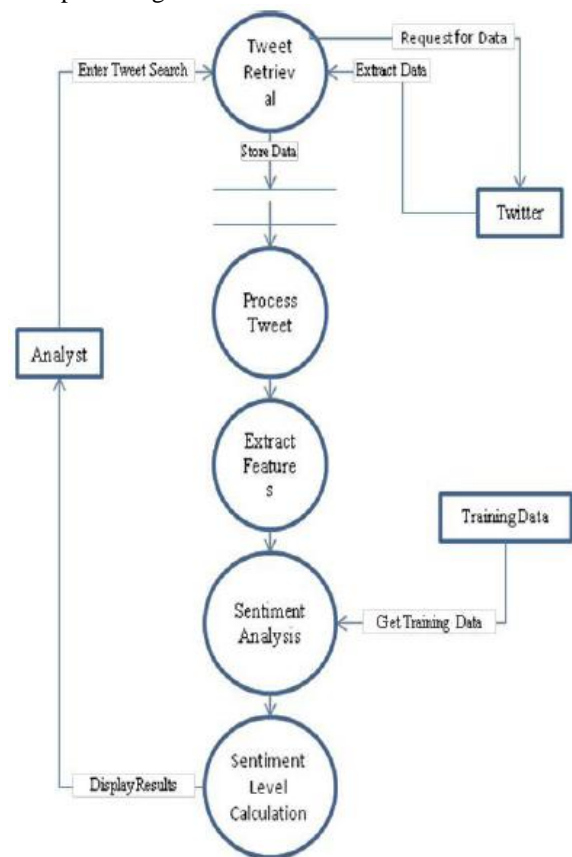


Figure 1: Data Flow Diagram of Twitter Sentiment Analysis System

V. RESULT ANALYSIS

This section represents some experimental results and their analysis drowns by implemented application. Broadly proposed implementation work can be divided into three major steps.

- i. Data extraction from Twitter
- ii. Sentiment value calculation
- iii. Result display

In this implementation first two steps are done using Python programming language and last step is using C# (.net). It is not mandatory to use same technology and programming language to develop sentiment analysis system. It can be implemented in all major programming languages.

As discussed in previous section, “tweepy” API is used to extract the data form Twitter. Stream Listener of tweepy is used for this. Stream listener is the Twitter streaming API that is used to down-load Twitter messages in real time. It is also useful for extracting a high volume of tweets, or for creating a live feed using a site stream or user stream. A predefined method called “on_data()” of StreamListener is invoked every time whenever live tweets are received by listener.

This method need to override for getting tweet information. This method receives all messages and calls function according to the message type. The default StreamListener can classify most com-mon twitter feeds and send them to appropriately named

method. There is a three step process of using streaming API. First, create a class inheriting from StreamListener. Second, using StramListener class creates a stream object. And third, connect to the twitter API

using the stream object. A filter on tweets can be applied using “fil- ter” method to stream object. By using this “filter” method, pro-posed implementation is designed as a generalized sentiment anal-ysis system for any type of subject matter.

In the second step sentiment values are calculated by creating a “Sentiment Analysis” method. The “urllib” module of Python is used for sentiment analysis. Proposed implementation used “sentdex” API for sentiment calculation. The “urllib” module allows accessing any website or API through url in user program. This open up as many doors for programs as the internet opens up. Through “urllib” program can access websites, download data, parse data, modify header and do any GET or POST requests. The “sentdex” API calculate sentiments using machine learning and give different level of sentiments in integer numbers. That can be positive, negative or zero according to sentiment calculation.

After getting sentiments value, results has been presented in graphical form to get quick idea about overall sentiment analysis of any subject matter. Implemented program saves all the sentient value in a csv file, as shown in figure 2. This file is used to repre-sent consolidated results in the form of graphs, like pie chart and bar charts. Figure 3 shows the bar char of result extracted and figure 4 shows the pie chart to get clear idea about sentiment anal-ysis.

	A	B	C
1	-1		
2	3		
3	-2		
4	3		
5	-2		
6	-3		
7	4		
8	2		
9	1		
10	2		
11	2		
12	-2		
13	-1		
14	-2		
15	-3		
16	2		
17	3		
18	2		
19	-2		
20	-1		
21	0		
22			
23			

Figure 2: csv File of Sentiment Values

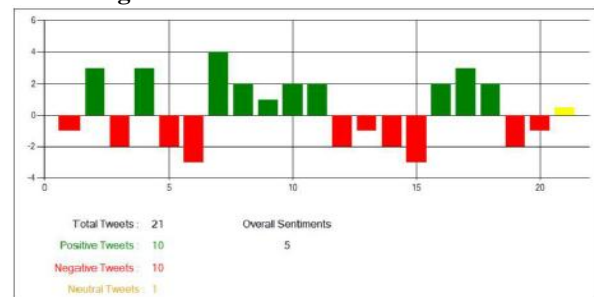


Figure 3: Bar Chart

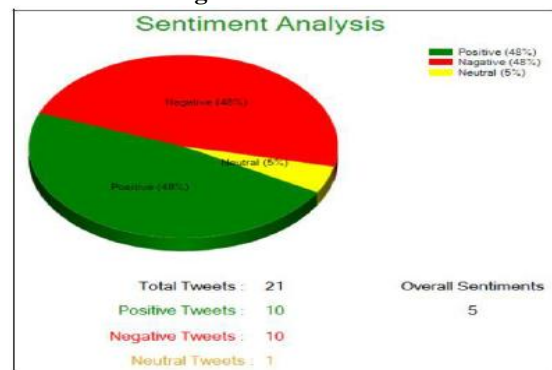


Figure 4: Pie Char

This paper also includes the comparison of proposed implementation with Deep learning sentiment analysis system proposed by Oscar Araque et al. in 2017 [7] and Surface classifier which is based on bag or word model. Table 1 shows the comparison of sentiment analysis system with proposed system. Six parameters are taken as analysis of system. Parameters are as follows.

- i. Bag of word model: - This is a base model of sentiment analysis. In which sentiments are calculated based on count of positive and negative words.
- ii. Machine learning: - This is also a base model of sentiment analysis system. In this natural language processing concepts is being implemented to develop system.
- iii. Real time analysis: - This parameter shows that weather application is working on real time data or not.
- iv. Level of Sentiments: - This shows that sentiment analysis system calculates level of sentiments or giving results in positive and negative sentiments only.
- v. Stored data analysis: - This shows that weather algorithm are able to calculate sentiments of stored data or not.

S. No.	Parameter	Surface Method Based SA	Deep Learning Based SA	Proposed SA
1	Bag of word model	✓	✗	✗
2	Machine Learning	✗	✓	✓
3	Real time analysis	✗	✗	✓
4	Level of Sentiments	✗	✗	✓
5	Stored data analysis	✓	✓	✗

VI. CONCLUSION AND FUTURE SCOPE

Social networking sites are the open platform to express sentiments and people all over the world doing this every moment of every day. Proposed system is a solution to get abstract sentiments of any topic or subject on twitter. In this machine learning approach for sentiment analysis is used. Proposed implementation gives real time sentiment analysis and also generates level of sentiments. It can be used for any marketing campaign, recommendation system etc. Proposed implementation is working on real time data only. In future it can be implemented for both real time and stored data. This implementation is focused on twitter data, in the same way this concept can be implemented for other social media like facebook or instagram. Proposed work calculates sentiments from text data of tweets. It has been observed that lots of user on social networking sites uses images and symbols to express their opinion. In future images and symbols can be used with text to do sentiment analysis.

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