Analysis of User Behavior for Twitter Posts on Hadoop

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Abstract - *Big Data refers to collection of large datasets containing massive amount of data. Big Data is generated from various sources such as social networking sites like Facebook, Twitter etc. and the data that is generated can be in various formats like structured, semi-structured or unstructured format. Social media monitoring is growing day by day therefore analysis of social data plays a vital role in knowing user behaviour. These behaviour of users country wise helps in getting information about various current trends and can be used further in deciding usefulness of some tasks, products and themes. In this paper we would be analyzing tweets for user behaviour. Tweets are available in JSON format which is to be converted into a structured data. By analyzing all the user social data about a particular topic we would give the output of how users behave for particular topic in certain country and city.*

Key Words **:** Big data, Sentiment Analysis, Hadoop, Naïve Bayesian Classification, Twitter

1. INTRODUCTION

Big Data refers to collection of large datasets containing massive amount of data whose size is in the range of Petabytes, Zettabytes, or with high rate of growth, and complexity that make them difficult to process and analyse using conventional database technologies. Big Data is generated from various sources such as social networking sites like Facebook, Twitter etc, and the data that is generated can be in various formats like structured, semi-structured or unstructured format. Social media monitoring is growing day by day therefore analysis of social data plays a vital role in knowing customer behaviour. These behaviours of users country wise helps in getting information about various current trends and can be used further in deciding usefulness of some tasks, products and themes. So by analysing Social data such as Twitter Tweets, Facebook posts, comments using sentiment analysis which checks the attitude of User review. In this project we would be analysing tweets for user behaviour. Tweets are available in JSON format which is to be converted into a structured data. By analysing all the user social data about a particular topic we would give the output of how users behave for particular topic in certain country and city.

Challenges with social media data are as under [3]:-

1. Grammar and Spellings: With users being too causal when posting on the web they tend to make a lot of mistakes in the semantics of the language and even the spellings of words. These are generally checked in the pre-processing stage of any application using these datasets.
2. Trustworthiness: The most important property of social data is the views of different users on different subjects, but there are many fake accounts being made to give fake views and reviews to either push or pull an entity on the platform.
3. Format: Every other social media site has its own style of posting data and also the way users post their data on these sites. Like people using # to tag subjects or using @ to refer to different users. Hence, it is important to study and understand each site differently.
4. Language: Social media sites provide options of using different languages to post views. There lie options to tackle this problem with either using translation mechanisms or building engines with respect to different languages.

1.1 Existing Work

Sentiment Data is the representation of the different opinions, emotions and attitudes which can be found in social media posts, blogs, online product reviews, and customer support interactions. It is a data set of unstructured data. Sentiment Analysis is a major area of study under Machine learning. The ideology used in existing system is based on the underlying principles in which the tweets were classified using unigram vectors and training was performed by distant supervision. The use of emoticons as labels is effective in reducing dependencies in machine learning. The system also focusses on the basis of a query term and feature reduction using algorithms like Naive Bayes, Maximum Entropy and Support Vector Machines. The research and analysis conducted by Pang and Lee was used to analyse the performance of different machine learning techniques in the movie review domain. It also found implementations as a sub component technology in augmentation with other systems like emails and online advertisements. With the help of improved Natural Language Processing capabilities and tools, this domain is gaining widespread importance and improved application in various other fields.
The Figure shows the overall architecture and process flow of various tasks for analysing sentiments of social media dataset of existing system.

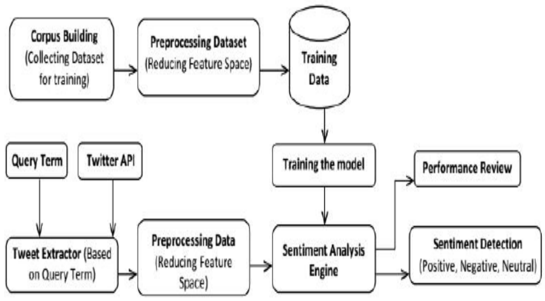

Corpus Building (Collecting Dataset for training)
Preprocessing Dataset (Reducing Feature Space)
Training Data
Query Term
Twitter API
Training the model
Performance Review
Tweet Extractor (Based on Query Term)
Preprocessing Data (Reducing Feature Space)
Sentiment Analysis Engine
Sentiment Detection (Positive, Negative, Neutral)

Figure 1: Architecture of existing system

Figure 1, depicts the general architecture of existing system. In the above process, Firstly, training data collected from various sources is subjected to pre-processing to eliminate features which do not contribute to polarity detection. This training data is fed into sentiment analysis engine for classifying test data.

Secondly, the input query term is used to fetch data from social media for which polarity is to be detected. The sentiment analysis engine contains Naive Bayes classification algorithm which consults training data to calculate probabilities and predict the sentiment for given query term.

Demerits with existing system are that it is only used for sentiment analysis of uses i.e. positive, negative or neutral. But the proposed system focusses on the behavioral of user according to various tweets that whether the user is in drifting mode, positive, or negative. Also the proposed system focuses on the general behavior of user country wise or city wise in context of particular topic.

2. LITERATURE REVIEW

Aditya Bhardwaj and Ankit kumar [1] have discussed on big data analysis. Big Data refers to the volume of data beyond the traditional database technology capacity to store, access, manage and compute efficiently. By analyzing this large amount of data companies can predict the customer behavior, improved marketing strategy, and get competitive advantages in the market. Hadoop is a flexible and open source implementation for analyzing large datasets using MapReduce. There are various emerging technologies such as Apache Pig, Hive, Sqoop, HBase, Zookeeper, and Flume that can be used to improve the performance of basic Hadoop MapReduce framework. The paper also discussed fetching and executing Twitter tweets by using Hive query on HDInsight cluster and results shows that as we increase number of nodes in the cluster, then MapReduce slot time increase but overall total time taken for executing Hive query decease.

Raj Kumar Verma and Ritu Tiwari[2] have focused on social networking websites which is a source of various kind of information. This is because of the nature of these websites on which peoples comments and post their opinions on different types of topics i.e. they express positive or negative sentiments about any product that they use in daily life, complains and current issues etc. These sentiments help in getting information about various current trends and can be used further in deciding usefulness of some tasks, products and themes. Also social web data like twitter has a large amount of data that people post so it's become important to work on efficient intelligent systems that can do data refinement, analysis of tasks intelligently and efficiently.

Dhiraj Gurkhe and Niraj Pal[3] have discussed the effective Sentiment Analysis of Social Media Datasets Using Naive Bayesian Classification. It involves extraction of subjective information from textual data. A normal human can easily understand the sentiment of a document written in natural language based on its knowledge of understanding the polarity of words (unigram, bigram and n-grams) and in some cases the general semantics used to describe the subject. The project aims to make the machine extract the polarity (positive, negative or neutral) of social media dataset with respect to the queried keyword. This project introduces an approach for automatically classifying the sentiment of social media data by using the following procedure: First the training data is fed to the Sentiment Analysis Engine for learning by using machine learning algorithm. After the learning is complete with qualified accuracy, the machine starts accepting individual social data with respect to keyword that it analyse and interprets, and then classifies it as positive, negative or neutral with respect to the query term.

Laurie Butgereit[4] has focussed on the event held on 1 November in South Africa, 2014 in which a coal silo collapsed at Eskom's newest power station, Majuba. The damage forced Eskom to implement rolling blackouts(called load-shedding) throughout the country. The paper investigated if it was possible to quantify the relative anger against Eskom as expressed in pairs of posts on Twitter (called tweets). An algorithm was developed that measured certain characteristics of the tweets such as swear words, emoticons, emojis, uppercase letters, and certain punctuation marks. The results were evaluated against results provided by two independent people acting as coders. These two people also evaluated the same tweets. The results show that as the polarity(or difference) in anger in two tweets increases, the algorithm is nearly as accurate as two human coders.

A. K. Santra and S. Jayasudha[5] have focused on behaviour of the interested users instead of spending time in overall behavior. The existing model used enhanced version of decision tree algorithm C4.5. In the paper, they use the Naive Bayesian Classification algorithm for classifying the interested users and also they presented a comparison study of using enhanced version of decision tree algorithm C4.5 and Naive Bayesian Classification algorithm for identifying interested users. The performance of this algorithm is measured for web log data with session based timing, page visits, repeated user profiling, and page depth to the site length. Experimental results conducted shows that the performance metric i.e., time taken and memory to classify the web log files are more efficient when compared to existing C4.5 algorithm.

3. METHODOLOGY

In Figure 2, for the proposed system, First of all, we connected to live social media to extract and store data using flume. Secondly, Data is stored in external repository. Then, convert the JSON tweet data to .CSV file and transfer it to HDFS. After that, create table in Hadoop using hive to give data a tabular form. Then, do user behaviour analysis on tweets by extracting past few tweets of particular user corresponding to tweet_id. Create codes for providing visualization of user behaviour. Lastly, Using naïve Bayesian technique and map reduce to apply the analytics on tweet.

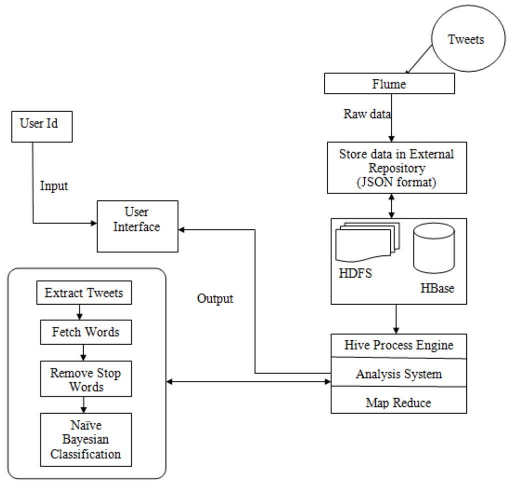
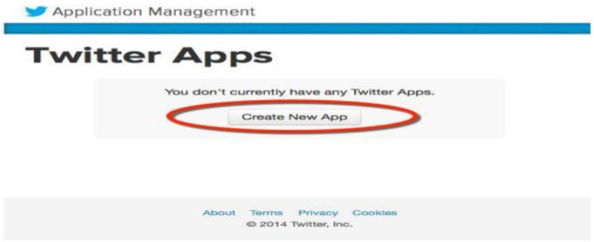


Figure 2: Architecture of the proposed system.

3.1 Modules Description

1. Creating Twitter Application

Figure 3 shows how to create application on twitter. If we have twitter account then directly lgin. Otherwise create a new account on Twitter.com and login.



You don't currently have any Twitter Apps.

Figure 3: Creating Twitter Application

After login completion, we need four pieces of information i.e. API Key, API secret, Access token and Access Token Secret.

2. Extraction of data via Flume

For extracting data first of all we need to configure flume. follow the below steps for flume configuration:

- Run yum command and it flume is installed.

yum install flume

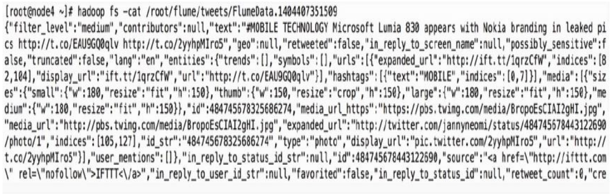
- Now set the flume classpath.

FLUME_CLASSPATH= /usr/lib/flume/lib/flume.jar

- We then start flume agent to get the data.

/usr/hdp/2.2.4.2-2/flume/bin/flume-ag agent –conf ./conf/ -f conf/flume.conf –name TwitterAgent –Dflume.root.logger=DEBUG,console –n TwitterAgent

The output data looks like:



```
[root@node4 ~]# hadoop fs -cat /root/flume/tweets/FlumeData.1404407351509
{"filter_level":"medium","contributors":null,"text":"#MOBILE TECHNOLOGY Microsoft Lumia 830 appears with Nokia branding in leaked pi
cs http://t.co/EAU9GQ0qlv http://t.co/2yyhpMIro5","geo":null,"retweeted":false,"in_reply_to_screen_name":null,"possibly_sensitive":f
alse,"truncated":false,"lang":"en","entities":{"trends":[],"symbols":[],"urls":[{"expanded_url":"http://ift.tt/1qrzCfW","indices":[8
2,104],"display_url":"ift.tt/1qrzCfW","url":"http://t.co/EAU9GQ0qlv"}],"hashtags":[{"text":"MOBILE","indices":[0,7]}],"media":[{"siz
es":{"small":{"w":180,"resize":"fit","h":150},"thumb":{"w":150,"resize":"crop","h":150},"large":{"w":180,"resize":"fit","h":150},"me
dium":{"w":180,"resize":"fit","h":150}},"id":484745678325686274,"media_url_https":"https://pbs.twimg.com/media/BropoEsCIAI2gHI.jpg",
"media_url":"http://pbs.twimg.com/media/BropoEsCIAI2gHI.jpg","expanded_url":"http://twitter.com/jannyneomi/status/484745678443122690
/photo/1","indices":[105,127],"id_str":"484745678325686274","type":"photo","display_url":"pic.twitter.com/2yyhpMIro5","url":"http://
t.co/2yyhpMIro5"}],"user_mentions":[]},"in_reply_to_status_id_str":null,"id":484745678443122690,"source":"<a href=\"http://ifttt.com
\" rel=\"nofollow\">IFTTT<\/a>","in_reply_to_user_id_str":null,"favorited":false,"in_reply_to_status_id":null,"retweet_count":0,"cre
```

Figure 4: Data extracted via flume

Figure 4 shows the example of data which is extracted from flume.

3. Converted data in .csv format and uploaded on HDFS

This data is stored in external repository. The data extracted from flume is in unstructured JSON format. The data is then converted into csv format. The data is finally uploaded to HDFS.

4. Run Hive script and create table

We then run hive script and created external table to give it a structural format.

5. Preprocessing of data

Preprocessing eliminates the part which does not contribute significantly to the polarity detection. Tweets often contain usernames of account holder (@nirajp) which are replaced with the generic token USERNAME. Links(http://goo.gl/nirajp) are eliminated or replaced with the generic token URL. Also, the preprocessing of tweets is needed to reduce the feature which includes converting tweets to lower case characters to remove unevenness.'#' symbol used to denote hash tags are eliminated while keeping the succeeding hash tag word. Stop words such as a, is, the which do not contribute significantly to polarity detection are eliminated. Punctuation marks and additional white spaces are also eliminated.

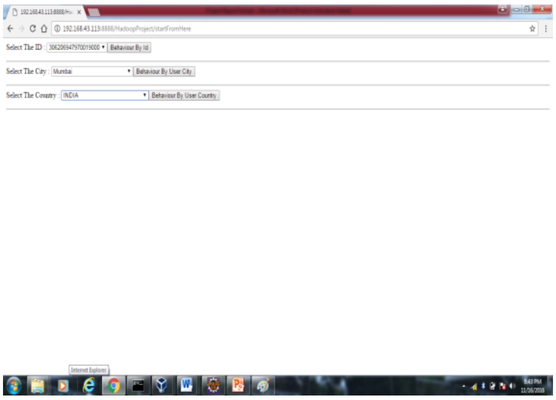
6. Classification of data using Naïve Bayesian technique

Naive Bayesian Text Classification algorithm is used for the purpose of classification of given trained model. It is the probabilistic approach to the text classification. Here the class labels are known and the goal is to create probabilistic models, which can be used to classify new texts. It is specifically formulated for text and makes use of text specific characteristics. The Naive Bayesian classifier treats each tweet as a ”bag of words” free of stop words.

7. Provided visualization of behavioral system

Visualization of the behavioral analysis of all the data gathered is provided through excel sheets. Each Tweet has been assigned a frequency having positive, negative and neutral. Result is to depicted in graphical format for each users. Whether user is in drifting mode, positive or negative. Also we can plot the general behavior of users country wise or city wise for particular topic.

4. EXPEREMENTAL WORK



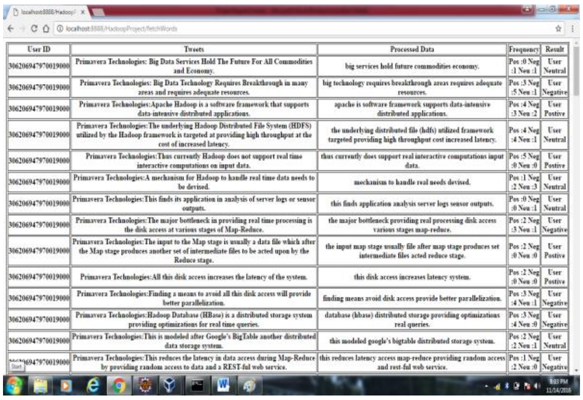
Select The ID : 306206947970019000 Behaviour By Id

Select The City : Mumbai Behaviour By User City

Select The Country : INDIA Behaviour By User Country

Figure 5: User Behavior System

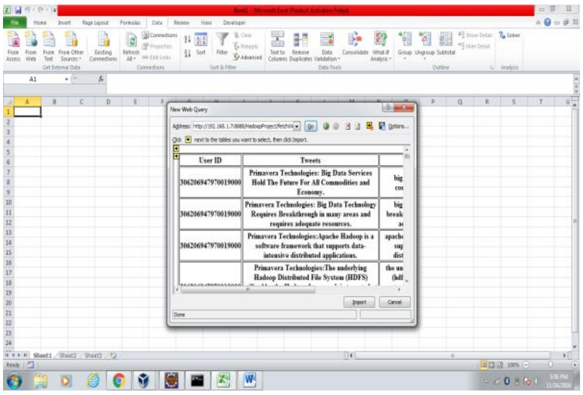
Figure 5 shows the basic User Interface for user behavior system. In this we can either search by id, city or by country.



User ID	Tweets	Processed Data	Frequency	Result
306206947970019000	Primavera Technologies: Big Data Services Hold The Future For All Commodities and Economy.	big services hold future commodities economy.	Pos :0 Neg :1 Neu :1	User Neutral
306206947970019000	Primavera Technologies: Big Data Technology Requires Breakthrough in many areas and requires adequate resources.	big technology requires breakthrough areas requires adequate resources.	Pos :3 Neg :5 Neu :1	User Negative
306206947970019000	Primavera Technologies:Apache Hadoop is a software framework that supports data-intensive distributed applications.	apache is software framework supports data-intensive distributed applications.	Pos :4 Neg :3 Neu :2	User Postive
306206947970019000	Primavera Technologies:The underlying Hadoop Distributed File System (HDFS) utilized by the Hadoop framework is targeted at providing high throughput at the cost of increased latency.	the underlying distributed file (hdfs) utilized framework targeted providing high throughput cost increased latency.	Pos :4 Neg :4 Neu :1	User Neutral
306206947970019000	Primavera Technologies:Thus currently Hadoop does not support real time interactive computations on input data.	thus currently does support real interactive computations input data.	Pos :5 Neg :0 Neu :0	User Postive
306206947970019000	Primavera Technologies:A mechanism for Hadoop to handle real time data needs to be devised.	mechanism to handle real needs devised.	Pos :1 Neg :2 Neu :3	User Neutral
306206947970019000	Primavera Technologies:This finds its application in analysis of server logs or sensor outputs.	this finds application analysis server logs sensor outputs.	Pos :0 Neg :0 Neu :1	User Neutral
306206947970019000	Primavera Technologies:The major bottleneck in providing real time processing is the disk access at various stages of Map-Reduce.	the major bottleneck providing real processing disk access various stages map-reduce.	Pos :2 Neg :3 Neu :1	User Negative
306206947970019000	Primavera Technologies:The input to the Map stage is usually a data file which after the Map stage produces another set of intermediate files to be acted upon by the Reduce stage.	the input map stage usually file after map stage produces set intermediate files acted reduce stage.	Pos :2 Neg :0 Neu :0	User Postive
306206947970019000	Primavera Technologies:All this disk access increases the latency of the system.	this disk access increases latency system.	Pos :2 Neg :0 Neu :0	User Postive
306206947970019000	Primavera Technologies:Finding a means to avoid all this disk access will provide better parallelization.	finding means avoid disk access provide better parallelization.	Pos :3 Neg :4 Neu :1	User Negative
306206947970019000	Primavera Technologies:Hadoop Database (HBase) is a distributed storage system providing optimizations for real time queries.	database (hbase) distributed storage providing optimizations real queries.	Pos :3 Neg :4 Neu :0	User Negative
306206947970019000	Primavera Technologies:This is modeled after Google's BigTable another distributed data storage system.	this modeled google's bigtable distributed storage system.	Pos :2 Neg :2 Neu :1	User Neutral
306206947970019000	Primavera Technologies:This reduces the latency in data access during Map-Reduce by providing random access to data and a REST-ful web service.	this reduces latency access map-reduce providing random access and rest-ful web service.	Pos :1 Neg :2 Neu :0	User Negative

Figure 6: User data corresponding to USER_ID

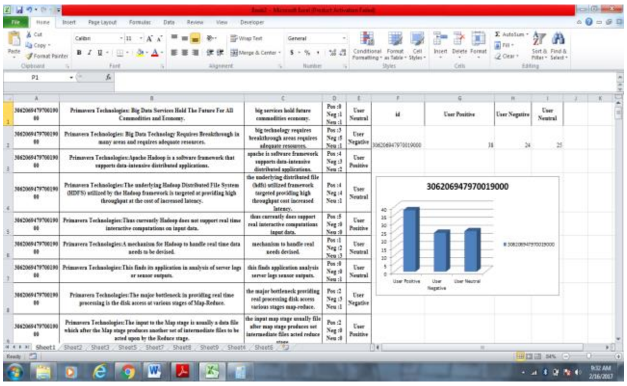
Figure 6 shows the individual tweet wise behavior of user corresponding to a particular user_id.


New Web Query
Address: http://192.168.1.7:8888/HadoopProject/fetchW
Go
Options...
Click next to the tables you want to select, then click Import.
Import
Cancel
Done
Sheet1
Sheet2
Sheet3

User ID	Tweets
306206947970019000	Primavera Technologies: Big Data Services Hold The Future For All Commodities and Economy.
306206947970019000	Primavera Technologies: Big Data Technology Requires Breakthrough in many areas and requires adequate resources.
306206947970019000	Primavera Technologies:Apache Hadoop is a software framework that supports data-intensive distributed applications.

Figure 7: User data imported to excel sheet

Figure 7 represents the data imported to the excel sheet. From here we can make the graphs for analysis.

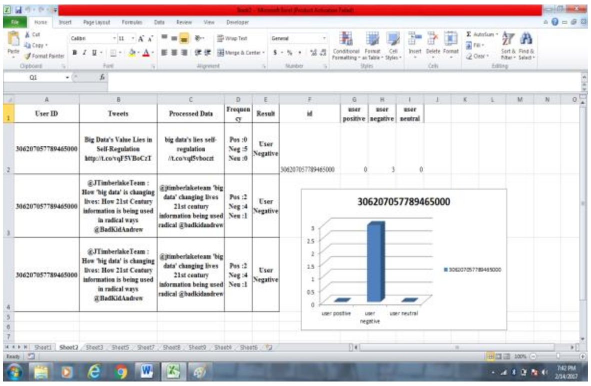


A	B	C	D	E
306206947970019000	Primavera Technologies: Big Data Services Hold The Future For All Commodities and Economy.	big services hold future commodities economy.	Pos :0 Neg :1 Neu :1	User Neutral
306206947970019000	Primavera Technologies: Big Data Technology Requires Breakthrough in many areas and requires adequate resources.	big technology requires breakthrough areas requires adequate resources.	Pos :3 Neg :5 Neu :1	User Negative
306206947970019000	Primavera Technologies:Apache Hadoop is a software framework that supports data-intensive distributed applications.	apache is software framework supports data-intensive distributed applications.	Pos :4 Neg :3 Neu :2	User Positive
306206947970019000	Primavera Technologies:The underlying Hadoop Distributed File System (HDFS) utilized by the Hadoop framework is targeted at providing high throughput at the cost of increased latency.	the underlying distributed file (hdfs) utilized framework targeted providing high throughput cost increased latency.	Pos :4 Neg :4 Neu :1	User Neutral
306206947970019000	Primavera Technologies:Thus currently Hadoop does not support real time interactive computations on input data.	thus currently does support real interactive computations input data.	Pos :5 Neg :0 Neu :0	User Positive
306206947970019000	Primavera Technologies:A mechanism for Hadoop to handle real time data needs to be devised.	mechanism to handle real needs devised.	Pos :1 Neg :2 Neu :3	User Neutral
306206947970019000	Primavera Technologies:This finds its application in analysis of server logs or sensor outputs.	this finds application analysis server logs sensor outputs.	Pos :0 Neg :0 Neu :1	User Neutral
306206947970019000	Primavera Technologies:The major bottleneck in providing real time processing is the disk access at various stages of Map-Reduce.	the major bottleneck providing real processing disk access various stages map-reduce.	Pos :2 Neg :3 Neu :1	User Negative
306206947970019000	Primavera Technologies:The input to the Map stage is usually a data file which after the Map stage produces another set of intermediate files to be acted upon by the Reduce stage.	the input map stage usually file after map stage produces set intermediate files acted reduce stage.	Pos :2 Neg :0 Neu :0	User Positive

id	User Positive	User Negative	User Neutral
306206947970019000	38	24	25

Figure 8: User behavior on the basis of USER_ID

Figure 8 shows the graph for the user corresponding to user_id. In this the user is first positive then negative and lastly neutral i.e. The user with the corresponding id is in drifting state.

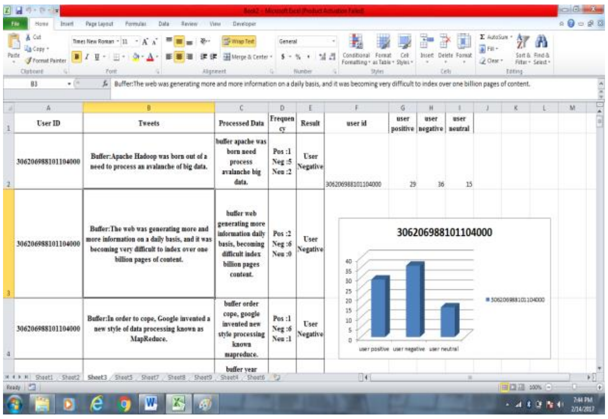


User ID	Tweets	Processed Data	Frequency	Result
306207057789465000	Big Data's Value Lies in Self-Regulation http://t.co/vqF5VBoCzT	big data's lies self-regulation //t.co/vqf5vboczt	Pos :0 Neg :5 Neu :0	User Negative
306207057789465000	@JTimberlakeTeam : How 'big data' is changing lives: How 21st Century information is being used in radical ways @BadKidAndrew	@jtimberlaketeam 'big data' changing lives 21st century information being used radical @badkidandrew	Pos :2 Neg :4 Neu :1	User Negative
306207057789465000	@JTimberlakeTeam : How 'big data' is changing lives: How 21st Century information is being used in radical ways @BadKidAndrew	@jtimberlaketeam 'big data' changing lives 21st century information being used radical @badkidandrew	Pos :2 Neg :4 Neu :1	User Negative

id	user positive	user negative	user neutral
306207057789465000	0	3	0

Figure 9: Another User behavior on the basis of USER_ID

Figure 9 shows the user here has the maximum of negative counts. Therefore we conclude that the user is negative.

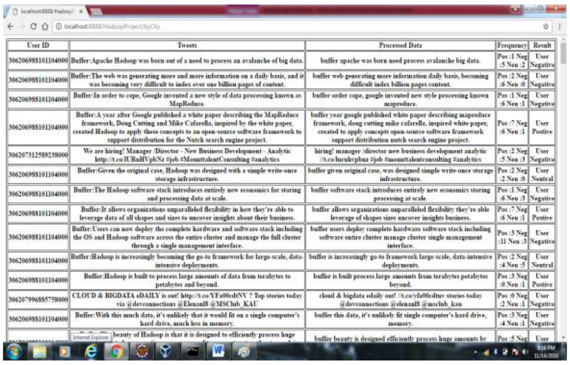


B3 Buffer:The web was generating more and more information on a daily basis, and it was becoming very difficult to index over one billion pages of content.

User ID	Tweets	Processed Data	Frequency	Result	user id	user positive	user negative	user neutral
306206988101104000	Buffer:Apache Hadoop was born out of a need to process an avalanche of big data.	buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative	306206988101104000	29	36	15
306206988101104000	Buffer:The web was generating more and more information on a daily basis, and it was becoming very difficult to index over one billion pages of content.	buffer web generating more information daily basis, becoming difficult index billion pages content.	Pos :2 Neg :6 Neu :0	User Negative				
306206988101104000	Buffer:In order to cope, Google invented a new style of data processing known as MapReduce.	buffer order cope, google invented new style processing known mapreduce.	Pos :1 Neg :6 Neu :1	User Negative				
		buffer year						

Figure 10: Another User behavior on the basis of USER_ID

In Figure 10, the user is a combination of positive, negative and neutral. Therefore the user is in drifting mode.

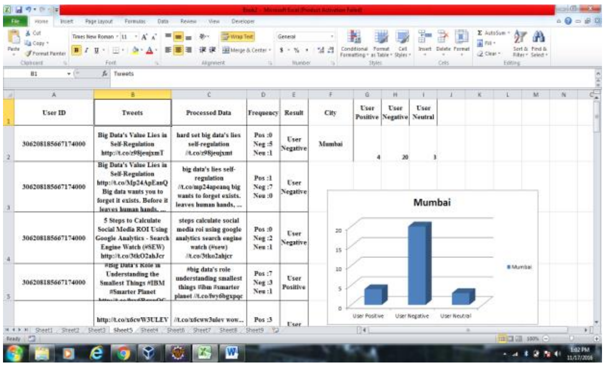


localhost:8888/HadoopProject/byCity

User ID	Tweets	Processed Data	Frequency	Result
306206988101104000	Buffer:Apache Hadoop was born out of a need to process an avalanche of big data.	buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative
306206988101104000	Buffer:The web was generating more and more information on a daily basis, and it was becoming very difficult to index over one billion pages of content.	buffer web generating more information daily basis, becoming difficult index billion pages content.	Pos :2 Neg :6 Neu :0	User Negative
306206988101104000	Buffer:In order to cope, Google invented a new style of data processing known as MapReduce.	buffer order cope, google invented new style processing known mapreduce.	Pos :1 Neg :6 Neu :1	User Negative
306206988101104000	Buffer:A year after Google published a white paper describing the MapReduce framework, Doug Cutting and Mike Cafarella, inspired by the white paper, created Hadoop to apply these concepts to an open-source software framework to support distribution for the Nutch search engine project.	buffer year google published white paper describing mapreduce framework, doug cutting mike cafarella, inspired white paper, created to apply concepts open-source software framework support distribution nutch search engine project.	Pos :7 Neg :6 Neu :1	User Postive
306207312589238000	We are hiring! Manager /Director - New Business Development - Analytic http://t.co/lURaHVpbNz #job #MounttalentConsulting #analytics	hiring! manager /director new business development analytic //t.co/luruhvpbnz #job #mounttalentconsulting #analytics	Pos :2 Neg :5 Neu :3	User Negative
306206988101104000	Buffer:Given the original case, Hadoop was designed with a simple write-once storage infrastructure.	buffer given original case, was designed simple write-once storage infrastructure.	Pos :2 Neg :2 Neu :0	User Neutral
306206988101104000	Buffer:The Hadoop software stack introduces entirely new economics for storing and processing data at scale.	buffer software stack introduces entirely new economics storing processing at scale.	Pos :1 Neg :6 Neu :3	User Negative
306206988101104000	Buffer:It allows organizations unparalleled flexibility in how they're able to leverage data of all shapes and sizes to uncover insights about their business.	buffer allows organizations unparalleled flexibility they're able leverage of shapes sizes uncover insights business.	Pos :7 Neg :6 Neu :1	User Postive
306206988101104000	Buffer:Users can now deploy the complete hardware and software stack including the OS and Hadoop software across the entire cluster and manage the full cluster through a single management interface.	buffer users deploy complete hardware software stack including software entire cluster manage cluster single management interface.	Pos :3 Neg :11 Neu :3	User Negative
306206988101104000	Buffer:Hadoop is increasingly becoming the go-to framework for large-scale, data-intensive deployments.	buffer is increasingly go-to framework large-scale, data-intensive deployments.	Pos :2 Neg :4 Neu :5	User Neutral
306206988101104000	Buffer:Hadoop is built to process large amounts of data from terabytes to petabytes and beyond.	buffer is built process large amounts from terabytes petabytes beyond.	Pos :3 Neg :0 Neu :1	User Postive
306207996885758000	CLOUD & BIGDATA eDAILY is out! http://t.co/YFa00cdtNV ? Top stories today via @devconnections @Elenanl8 @MSClub_KAU	cloud & bigdata edaily out! //t.co/yfa00cdtnv stories today @devconnections @elenanl8 @msclub_kau	Pos :0 Neg :2 Neu :1	User Negative
306206988101104000	Buffer:With this much data, it's unlikely that it would fit on a single computer's hard drive, much less in memory.	buffer this data, it's unlikely fit single computer's hard drive, memory.	Pos :3 Neg :4 Neu :1	User Negative
[illegible]	beauty of Hadoop is that it is designed to efficiently process huge	buffer beauty is designed efficiently process huge amounts by	Pos :5 Neg	User

Figure 11: User data corresponding to city

Figure 11 corresponds to the tweets of various users from a same city. From here, general behavior of users can be analyzed.

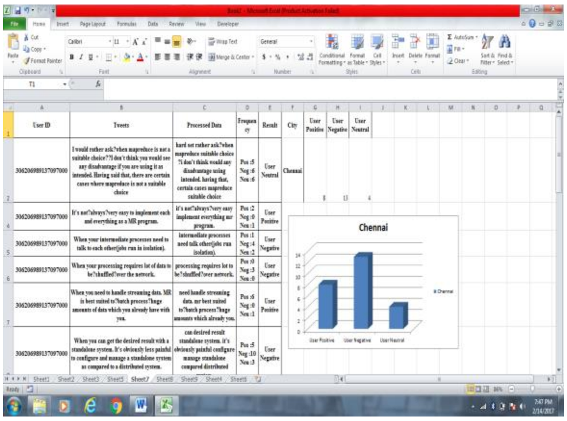


B1 Tweets

User ID	Tweets	Processed Data	Frequency	Result	City	User Positive	User Negative	User Neutral
306208185667174000	Big Data's Value Lies in Self-Regulation http://t.co/z98jeujxmT	hard set big data's lies self-regulation //t.co/z98jeujxmt	Pos :0 Neg :5 Neu :1	User Negative	Mumbai	4	20	3
306208185667174000	Big Data's Value Lies in Self-Regulation http://t.co/Mp24ApEanQ Big data wants you to forget it exists. Before it leaves human hands, ...	big data's lies self-regulation //t.co/mp24apeanq big wants to forget exists. leaves human hands, ...	Pos :1 Neg :7 Neu :0	User Negative				
306208185667174000	5 Steps to Calculate Social Media ROI Using Google Analytics - Search Engine Watch (#SEW) http://t.co/3tkO2ahJcr	steps calculate social media roi using google analytics search engine watch (#sew) //t.co/3tko2ahjcr	Pos :0 Neg :2 Neu :1	User Negative				
306208185667174000	#Big Data's Role in Understanding the Smallest Things #IBM #Smarter Planet	#big data's role understanding smallest things #ibm #smarter planet //t.co/fwy6bgxpqc	Pos :7 Neg :3 Neu :1	User Positive				
	http://t.co/x6cwW3ULEV	//t.co/x6cww3ulev wow...	Pos :3	User				

Figure 12: User behavior on the basis of city

Figure 12 corresponds to different users from Mumbai were positive then negative and lastly neutral. Hence general behavior of people living in Mumbai is of drifting mode.

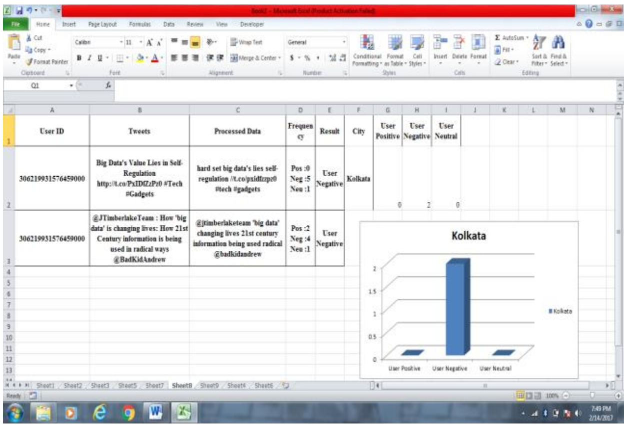


T1

User ID	Tweets	Processed Data	Frequency	Result	City	User Positive	User Negative	User Neutral
306206989137097000	I would rather ask?when mapreduce is not a suitable choice??I don't think you would see any disadvantage if you are using it as intended. Having said that, there are certain cases where mapreduce is not a suitable choice	hard set rather ask?when mapreduce suitable choice ?i don't think would any disadvantage using intended. having that, certain cases mapreduce suitable choice	Pos :5 Neg :6 Neu :6	User Neutral	Chennai	8	13	4
306206989137097000	It's not?always?very easy to implement each and everything as a MR program.	it's not?always?very easy implement everything mr program.	Pos :2 Neg :0 Neu :1	User Positive				
306206989137097000	When your intermediate processes need to talk to each other(jobs run in isolation).	intermediate processes need talk other(jobs run isolation).	Pos :1 Neg :4 Neu :2	User Negative				
306206989137097000	When your processing requires lot of data to be?shuffled?over the network.	processing requires lot to be?shuffled?over network.	Pos :0 Neg :3 Neu :0	User Negative				
306206989137097000	When you need to handle streaming data. MR is best suited to?batch process?huge amounts of data which you already have with you.	need handle streaming data. mr best suited to?batch process?huge amounts which already you.	Pos :6 Neg :0 Neu :1	User Positive				
306206989137097000	When you can get the desired result with a standalone system. It's obviously less painful to configure and manage a standalone system as compared to a distributed system.	can desired result standalone system. it's obviously painful configure manage standalone compared distributed	Pos :5 Neg :10 Neu :3	User Negative				

Figure 13: User behavior on the basis of city

Figure 13 corresponds to different users from Chennai were positive then negative and lastly neutral. Hence general behavior of people living in Chennai is of drifting mode.

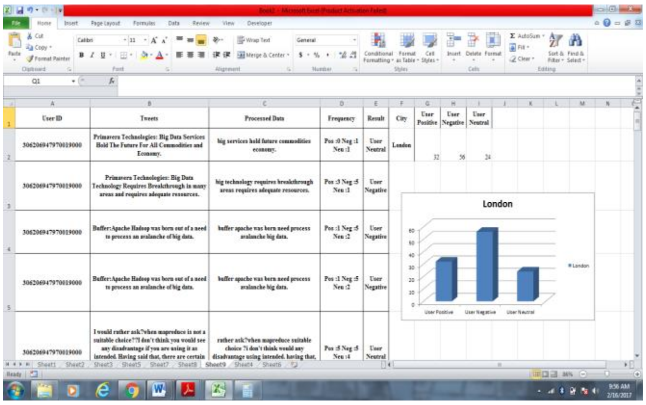


Q1

User ID	Tweets	Processed Data	Frequency	Result	City	User Positive	User Negative	User Neutral
306219931576459000	Big Data's Value Lies in Self-Regulation http://t.co/PxIDfZzPz0 #Tech #Gadgets	hard set big data's lies self-regulation //t.co/pxidfzzpz0 #tech #gadgets	Pos :0 Neg :5 Neu :1	User Negative	Kolkata	0	2	0
306219931576459000	@JTimberlakeTeam : How 'big data' is changing lives: How 21st Century information is being used in radical ways @BadKidAndrew	@jtimberlaketeam 'big data' changing lives 21st century information being used radical @badkidandrew	Pos :2 Neg :4 Neu :1	User Negative				

Figure 14: User behavior on the basis of city

Figure 14 corresponds that the users here have the maximum of negative counts. Therefore we conclude that the general behavior of users living in Kolkata is negative.

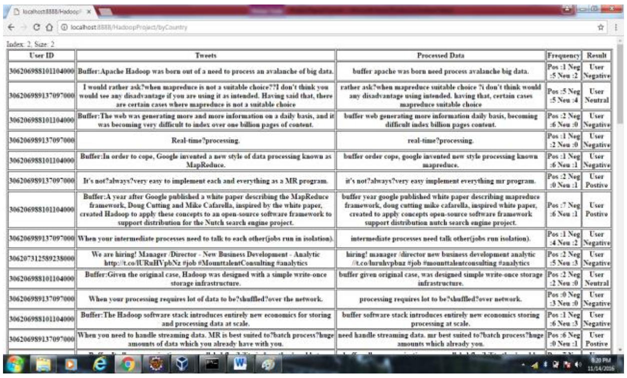


Q1

User ID	Tweets	Processed Data	Frequency	Result	City	User Positive	User Negative	User Neutral
306206947970019000	Primavera Technologies: Big Data Services Hold The Future For All Commodities and Economy.	big services hold future commodities economy.	Pos :0 Neg :1 Neu :1	User Neutral	London	32	56	24
306206947970019000	Primavera Technologies: Big Data Technology Requires Breakthrough in many areas and requires adequate resources.	big technology requires breakthrough areas requires adequate resources.	Pos :3 Neg :5 Neu :1	User Negative				
306206947970019000	Buffer:Apache Hadoop was born out of a need to process an avalanche of big data.	buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative				
306206947970019000	Buffer:Apache Hadoop was born out of a need to process an avalanche of big data.	buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative				
306206947970019000	I would rather ask?when mapreduce is not a suitable choice??I don't think you would see any disadvantage if you are using it as intended. Having said that, there are certain	rather ask?when mapreduce suitable choice ?i don't think would any disadvantage using intended. having that,	Pos :5 Neg :5 Neu :4	User Neutral				

Figure 15: User behavior on the basis of city

Figure 15 shows the different users from London were first positive then negative and finally neutral. Hence the general behavior of people living in London is of drifting mode.



localhost:8888/HadoopProject/byCountry

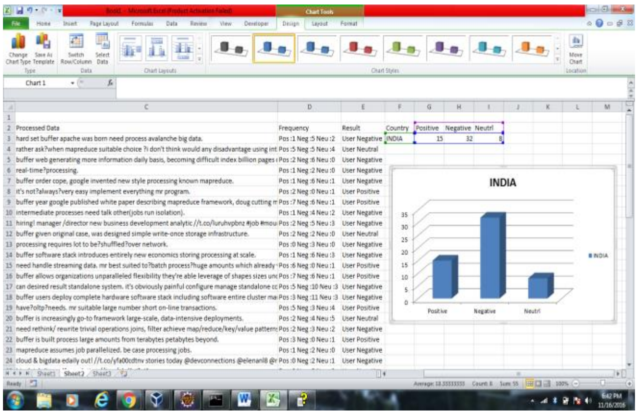
Index: 2, Size: 2

User ID	Tweets	Processed Data	Frequency	Result
306206988101104000	Buffer:Apache Hadoop was born out of a need to process an avalanche of big data.	buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative
306206989137097000	I would rather ask?when mapreduce is not a suitable choice??I don't think you would see any disadvantage if you are using it as intended. Having said that, there are certain cases where mapreduce is not a suitable choice	rather ask?when mapreduce suitable choice ?i don't think would any disadvantage using intended. having that, certain cases mapreduce suitable choice	Pos :5 Neg :5 Neu :4	User Neutral
306206988101104000	Buffer:The web was generating more and more information on a daily basis, and it was becoming very difficult to index over one billion pages of content.	buffer web generating more information daily basis, becoming difficult index billion pages content.	Pos :2 Neg :6 Neu :0	User Negative
306206989137097000	Real-time?processing.	real-time?processing.	Pos :1 Neg :2 Neu :0	User Negative
306206988101104000	Buffer:In order to cope, Google invented a new style of data processing known as MapReduce.	buffer order cope, google invented new style processing known mapreduce.	Pos :1 Neg :6 Neu :1	User Negative
306206989137097000	It's not?always?very easy to implement each and everything as a MR program.	it's not?always?very easy implement everything mr program.	Pos :2 Neg :0 Neu :1	User Postive
306206988101104000	Buffer:A year after Google published a white paper describing the MapReduce framework, Doug Cutting and Mike Cafarella, inspired by the white paper, created Hadoop to apply these concepts to an open-source software framework to support distribution for the Nutch search engine project.	buffer year google published white paper describing mapreduce framework, doug cutting mike cafarella, inspired white paper, created to apply concepts open-source software framework support distribution nutch search engine project.	Pos :7 Neg :6 Neu :1	User Postive
306206989137097000	When your intermediate processes need to talk to each other(jobs run in isolation).	intermediate processes need talk other(jobs run isolation).	Pos :1 Neg :4 Neu :2	User Negative
306207312589238000	We are hiring! Manager /Director - New Business Development - Analytic http://t.co/lURuHVpbNz #job #MounttalentConsulting #analytics	hiring! manager /director new business development analytic //t.co/luruhvpbnz #job #mounttalentconsulting #analytics	Pos :2 Neg :5 Neu :3	User Negative
306206988101104000	Buffer:Given the original case, Hadoop was designed with a simple write-once storage infrastructure.	buffer given original case, was designed simple write-once storage infrastructure.	Pos :2 Neg :2 Neu :0	User Neutral
306206989137097000	When your processing requires lot of data to be?shuffled?over the network.	processing requires lot to be?shuffled?over network.	Pos :0 Neg :3 Neu :0	User Negative
306206988101104000	Buffer:The Hadoop software stack introduces entirely new economics for storing and processing data at scale.	buffer software stack introduces entirely new economics storing processing at scale.	Pos :1 Neg :6 Neu :3	User Negative
306206989137097000	When you need to handle streaming data. MR is best suited to?batch process?huge amounts of data which you already have with you.	need handle streaming data. mr best suited to?batch process?huge amounts which already you.	Pos :6 Neg :0 Neu :1	User Postive

8:20 PM
11/14/2016

Figure 16: User data corresponding to country

Figure 16 corresponds to the tweets of various users from a same country. From here, general behavior of users corresponding to a country can be analyzed.



Book1 - Microsoft Excel (Product Activation Failed)

Chart 1

	C	D	E	F	G	H	I
1							
2	Processed Data	Frequency	Result	Country	Positive	Negative	Neutrl
3	hard set buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative	INDIA	15	32	8
4	rather ask?when mapreduce suitable choice ?i don't think would any disadvantage using int	Pos :5 Neg :5 Neu :4	User Neutral				
5	buffer web generating more information daily basis, becoming difficult index billion pages	Pos :2 Neg :6 Neu :0	User Negative				
6	real-time?processing.	Pos :1 Neg :2 Neu :0	User Negative				
7	buffer order cope, google invented new style processing known mapreduce.	Pos :1 Neg :6 Neu :1	User Negative				
8	it's not?always?very easy implement everything mr program.	Pos :2 Neg :0 Neu :1	User Positive				
9	buffer year google published white paper describing mapreduce framework, doug cutting m	Pos :7 Neg :6 Neu :1	User Positive				
10	intermediate processes need talk other(jobs run isolation).	Pos :1 Neg :4 Neu :2	User Negative				
11	hiring! manager /director new business development analytic //t.co/luruhvpbnz #job #mou	Pos :2 Neg :5 Neu :3	User Negative				
12	buffer given original case, was designed simple write-once storage infrastructure.	Pos :2 Neg :2 Neu :0	User Neutral				
13	processing requires lot to be?shuffled?over network.	Pos :0 Neg :3 Neu :0	User Negative				
14	buffer software stack introduces entirely new economics storing processing at scale.	Pos :1 Neg :6 Neu :3	User Negative				
15	need handle streaming data. mr best suited to?batch process?huge amounts which already	Pos :6 Neg :0 Neu :1	User Positive				
16	buffer allows organizations unparalleled flexibility they're able leverage of shapes sizes unc	Pos :7 Neg :6 Neu :1	User Positive				
17	can desired result standalone system. it's obviously painful configure manage standalone cc	Pos :5 Neg :10 Neu :3	User Negative				
18	buffer users deploy complete hardware software stack including software entire cluster ma	Pos :3 Neg :11 Neu :3	User Negative				
19	have?oltp?needs. mr suitable large number short on-line transactions.	Pos :5 Neg :3 Neu :4	User Positive				
20	buffer is increasingly go-to framework large-scale, data-intensive deployments.	Pos :2 Neg :4 Neu :5	User Neutral				
21	need rethink/ rewrite trivial operations joins, filter achieve map/reduce/key/value pattern	Pos :2 Neg :3 Neu :2	User Negative				
22	buffer is built process large amounts from terabytes petabytes beyond.	Pos :3 Neg :0 Neu :1	User Positive				
23	mapreduce assumes job parallelized. be case processing jobs.	Pos :1 Neg :2 Neu :0	User Negative				
24	cloud & bigdata edaily out! //t.co/yfa00cdtnv stories today @devconnections @elenanl8 @r	Pos :0 Neg :2 Neu :1	User Negative				

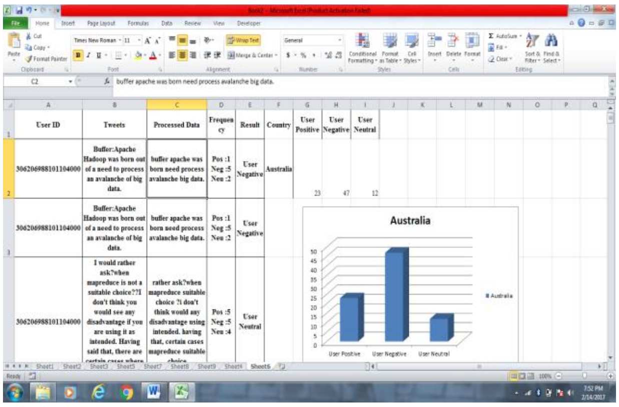
Sheet1 Sheet2 Sheet3

Average: 18.33333333 Count: 8 Sum: 55

6:42 PM
11/16/2016

Figure 17: User behavior on the basis of COUNTRY

In Figure 17, different users from India were positive then negative and lastly neutral. Hence general behavior of people living in India is of drifting mode.



Book2 - Microsoft Excel (Product Activation Failed)

C2 buffer apache was born need process avalanche big data.

	A	B	C	D	E	F	G	H	I
1	User ID	Tweets	Processed Data	Frequency	Result	Country	User Positive	User Negative	User Neutral
2	306206988101104000	Buffer:Apache Hadoop was born out of a need to process an avalanche of big data.	buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative	Australia	23	47	12
3	306206988101104000	Buffer:Apache Hadoop was born out of a need to process an avalanche of big data.	buffer apache was born need process avalanche big data.	Pos :1 Neg :5 Neu :2	User Negative				
	306206988101104000	I would rather ask?when mapreduce is not a suitable choice??I don't think you would see any disadvantage if you are using it as intended. Having said that, there are	rather ask?when mapreduce suitable choice ?i don't think would any disadvantage using intended. having that, certain cases mapreduce suitable	Pos :5 Neg :5 Neu :4	User Neutral				

Sheet1 Sheet2 Sheet3 Sheet5 Sheet7 Sheet8 Sheet9 Sheet4 Sheet6

7:52 PM
2/14/2017

Figure 18: User behavior on the basis of COUNTRY

In Figure 18, different users from Australia were positive then negative and lastly neutral. Hence general behavior of people living in Australia is of drifting mode.

5. OUTCOME

User behavioural analysis system that predicts the behaviour of user whether the user is in drifting mode, positive or negative on the basis of the tweet_id of user on live social twitter data. Also to predict the general behaviour of users in different locations in particular time stamp in a certain context and depicted in graph form.

Table 1: Statistical Data

Domain	Positive	Negative	Neutral	Total
User By Id				
306206947970019000	38	24	25	87
306207057789465000	0	3	0	3
306206988101104000	29	36	15	80
User By City				
Mumbai	4	20	3	27
Chennai	8	13	4	25
Kolkata	0	2	0	2
London	32	56	24	112
User By Country				
India	15	32	8	56
Australia	23	47	12	82

Table 1 shows the statistical data of the tweets used to analyse behaviour of user corresponding to user_id, city and country.

6. CONCLUSION AND FUTURE SCOPE

For analyzing the user behaviour, first of all twitter data is extracted using flume. The data extracted is available is in unstructured (JSON) format. The data is integrated with Hadoop. Using hive it is given a tabular form i.e. a structured form of data is obtained. Mavean framework is used to get the executable jar to integrate eclipse and Hadoop. Data needs to be filtertered before analyzing. Data is cleaned by removing stop words. For classification, Naïve Bayesian Technique has been used.

For using naïve Bayesian technique, we have used a dictionary which stores a list of words that are positive, negative and neutral. Lastly, data is imported to excel to give a graphical form and to get the results.

In the project, we can identify the user behaviour with the help of user_id whether the user is positive, negative or in drifting mode. Also, the system tells the general behavior of users country-wise as well as city-wise for a particular topic. The system is 70-80% accurate.

In future, the data can be from multiple sources at the same time. Also various different tools like R, tablue can be integrated. Also we can continue with ontologies in it. Finally, multiple topics also can be taken into consideration. Further works can be done to improve the efficiency and accuracy.

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BIOGRAPHIES

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