Project in R and MongoDB

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Course: Big Data Analytics

Project Description

During the Demonetization phase in India November 2016- April 2017, I subscribe tweets from various days and analyze the top most topics trending during that time. I also compute sentiment analysis of overall tweets each day for 8 different days during this time period and observe if there was any shift in emotions towards the decision

Technology Used

1. R langauge for scripting.
2. Mongodb for the backend.
3. R's Mongolite package for connection of R to mongo
4. SQL on ibm cloud
5. RMySQL package

Using the Data

1) Importing the required libraries

In [15]:

```
library(ggplot2);
library(dplyr);
library(maps);
library(ggmap);
library(mongolite);
library(lubridate);
library(gridExtra);
library("data.table");
```

The dataset:

I decided to work on the tweets related to demonetization. Since the topic was trending on twitter for a lot of time when prime minister of India, Narendra Modi, announced the decision in November 2016, I decided to pull tweets during that period and do some week wise analysis on the reaction to this decision.

Since twitter does not allow to pull tweets which are more than 2 weeks old anymore(its a paid fearture). I tried researching on the internet if there are any tweets scrapped already. I found a dataset which consisted of some of the tweets during the November 2016 period, on this link: https://www.kaggle.com/arathee2/demonetization-in-india-twitter-data/downloads/demonetization-tweets.csv

In [16]:
```
#Working with twitter data, importing the csv file to a dataframe in r
tweet_data <- data.table::fread("demonetization-tweets 2.csv")
```

In [17]:
```
#see what fields this dataframe has
colnames(tweet_data)
```

```
'V1'   'X'   'text'   'favorited'   'favoriteCount'   'replyToSN'   'created'   'truncated'
'replyToSID'   'id'   'replyToUID'   'statusSource'   'screenName'   'retweetCount'
'isRetweet'   'retweeted'
```

```
In [18]: head(tweet_data,3)
```

V1	X	text	favorited	favoriteCount	replyToSN	created	truncated	replyToS
1	1	RT @rssurjewala: Critical question: Was PayTM informed about #Demonetization edict by PM? It's clearly fishy and requires full disclosure &amp; …	FALSE	0	NA	11/23/16 18:40	FALSE	NA
2	2	RT @Hemant_80: Did you vote on #Demonetization on Modi survey app?	FALSE	0	NA	11/23/16 18:40	FALSE	NA
3	3	RT @roshankar: Former FinSec, RBI Dy Governor, CBDT Chair + Harvard Professor lambaste #Demonetization. If not for Aam Aadmi, listen to th…	FALSE	0	NA	11/23/16 18:40	FALSE	NA

In [19]:

```
#Since I am only working with dates, I strip the time factor from the "created" field,
#and convert the datatype of the field to data format.
tweet_data$created <- as.Date(tweet_data$created, "%m/%d/%y")
head(tweet_data,3)
```

V1	X	text	favorited	favoriteCount	replyToSN	created	truncated	replyToS
1	1	RT @rssurjewala: Critical question: Was PayTM informed about #Demonetization edict by PM? It's clearly fishy and requires full disclosure &amp; …	FALSE	0	NA	2016-11-23	FALSE	NA
2	2	RT @Hemant_80: Did you vote on #Demonetization on Modi survey app?	FALSE	0	NA	2016-11-23	FALSE	NA
3	3	RT @roshankar: Former FinSec, RBI Dy Governor, CBDT Chair + Harvard Professor lambaste #Demonetization. If not for Aam Aadmi, listen to th…	FALSE	0	NA	2016-11-23	FALSE	NA

Making a connection with mongodb database

I am using the R package "mongolite"

In [20]:

```
#estabish connection,create db and a collection named tweets inside
tweet_collection = mongo(collection = "tweets", db = "Twit_Sentiment_Analysis")
```

In [21]:

```
#just making sure the tweet_collection instance of tweets collection is
 empty before inserting
tweet_collection$remove('{}')
#insert tweet_data inside the collection
tweet_collection$insert(tweet_data)
```

```
List of 5
 $ nInserted  : num 14940
 $ nMatched   : num 0
 $ nRemoved   : num 0
 $ nUpserted  : num 0
 $ writeErrors: list()
```

Making a connection with SQL database on ibm cloud

conn <- dbConnect(dbDriver('MySQL'),host='localhost',user='aat414',password='aat414123',dbname='aat414')

#create a table demontization
loadDataQuery <- "LOAD DATA LOCAL INFILE '/home/2017/fall/nyu/cs9223/aat414/R- midterm/1.csv' INTO TABLE tweet_collection FIELDS TERMINATED BY ',' ENCLOSED BY '\"' LINES TERMINATED BY '\\n' IGNORE 1 ROWS”

Performing a query and retrieving data

In [22]:

```
#equivalent in SQL to select * from tweet_collection where ROWNUM=1
tweet_collection$iterate()$one()
```

```
$V1
1
$X
1
$text
'RT @rssurjewala: Critical question: Was PayTM informed about #Demonetization edict by PM?
It\'s clearly fishy and requires full disclosure &amp;…'
$favorited
FALSE
$favoriteCount
0
$created
'2016-11-23'
$truncated
FALSE
$id
8.01496e+17
$statusSource
'<a href=""http://twitter.com/download/android"" rel=""nofollow"">Twitter for Android</a>'
$screenName
'HASHTAGFARZIWAL'
$retweetCount
331
$isRetweet
TRUE
$retweeted
FALSE
```

In [23]:

```
# equivalent SQL query -> select text,created from tweet_collection LIMI
T 5;
tweet_collection$find(fields='{"_id":false,"text":true,"created":true}',l
imit=5)
```

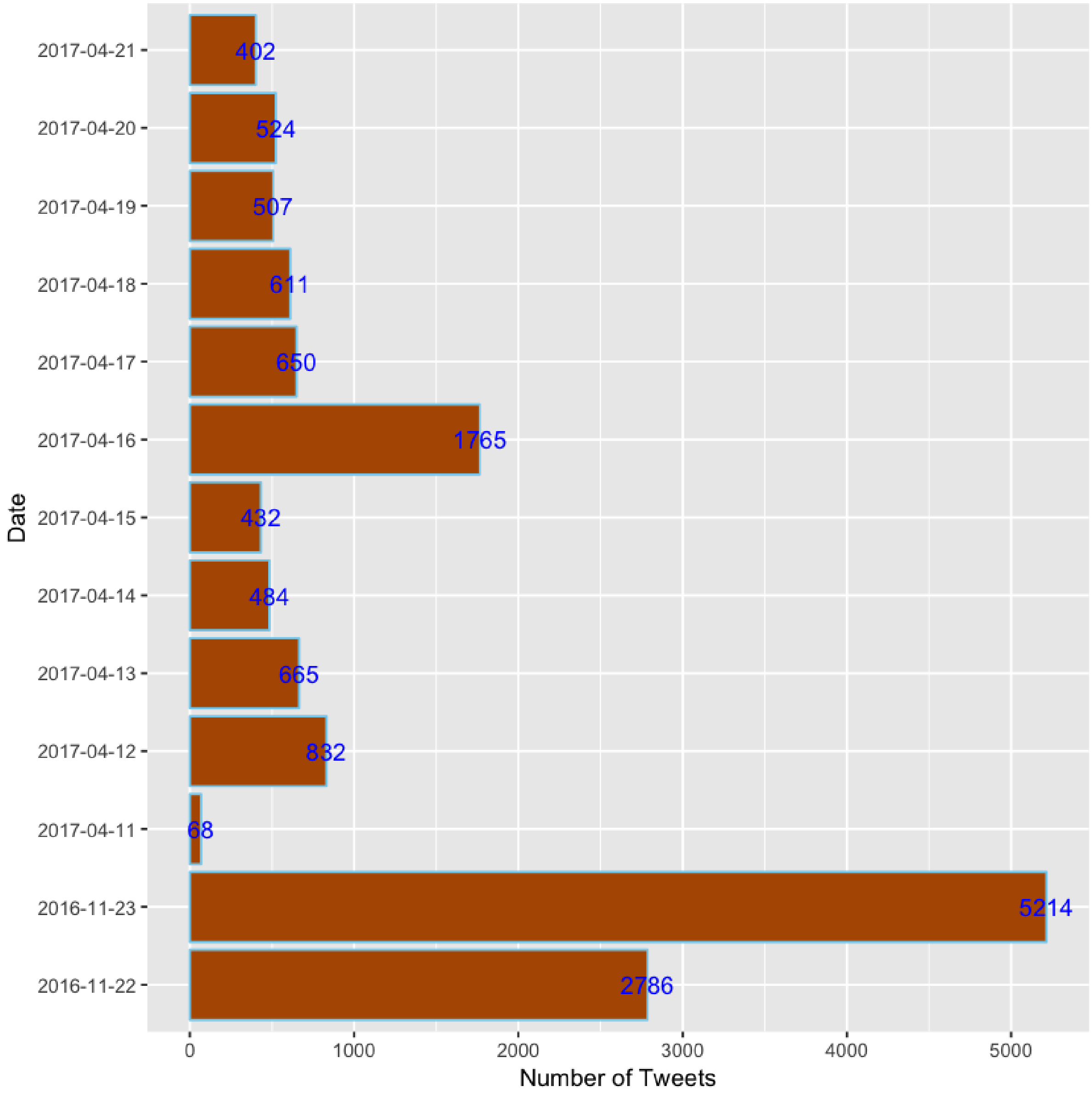
text	created
RT @rssurjewala: Critical question: Was PayTM informed about #Demonetization edict by PM? It's clearly fishy and requires full disclosure &amp;…	2016-11-23
RT @Hemant_80: Did you vote on #Demonetization on Modi survey app?	2016-11-23
RT @roshankar: Former FinSec, RBI Dy Governor, CBDT Chair + Harvard Professor lambaste #Demonetization. If not for Aam Aadmi, listen to th…	2016-11-23
RT @ANI_news: Gurugram (Haryana): Post office employees provide cash exchange to patients in hospitals #demonetization https://t.co/uGMxUP9…	2016-11-23
RT @satishacharya: Reddy Wedding! @mail_today cartoon #demonetization #ReddyWedding https://t.co/u7gLNrq31F	2016-11-23

I want to group the tweets as per day; aggregate in mongo (similar to groupby in sql) may help achieve that!

Using monoglite helps process big amounts of data directly from the datastore, without the need to load it in a dataframe in R, which might slow down the process. Below, I process a query and direclty plot it, without storing it in a dataframe

In [24]:
```
# equivalent to SQL query: select count(*) from tweet_collection group b
y created;

tweet_collection$aggregate('[{"$group": {"_id": "$created","count": {"$s
um": 1}}}]')%>%
ggplot(aes(x=`_id`,y=count))+geom_bar(stat="identity",color='skyblue',fi
ll='#b35900')+
geom_text(aes(label = count), color =
"blue")+coord_flip()+xlab("Date")+ylab("Number of Tweets")
```



Now that I have tweets group by each day, I can perform sentiment analysis for each day and see how it changed over the days

But before that, lets see what the top terms used in tweets were. We will generate a wordcloud to show the top 50 words.

Let us clean the text first

In [25]:

```
#getting the tweets from the mongo database into a dataframe and sorting
 them as per date using R's order() function
tweets_dates <- tweet_collection$find(fields='{"text":true,"created":tru
e}')
tweets_dates<-tweets_dates[order(tweets_dates$created),]
```

In [26]:

```
head(tweets_dates,3)
```

	_id	text	created
5215	59e8dda1c553ce84b80a6792	RT @DrKumarVishwas: And the Oscar goes to ""Mr.<U+092D><U+093E><U+0935><U+0941><U+0915>"" <ed><U+00A0><U+00BD><ed><U+00B8><U+00A9><ed><U+00A0><U+00BD><ed><U+00B8><U+00A5><ed><U+00A0><U+00BD><ed><U+00B8><U+00A2><ed><U+00A0><U+00BD><ed><U+00B8><U+00AD>#demonetization https://t.co/ObQrhlNSL6	2016-11-22
5216	59e8dda1c553ce84b80a6793	RT @ippatel: Retaining all seats of LS and state in Byelection by BJP has proved the people's support on #DeMonetization. It should be abov…	2016-11-22
5217	59e8dda1c553ce84b80a6794	RT @DrKumarVishwas: And the Oscar goes to ""Mr.<U+092D><U+093E><U+0935><U+0941><U+0915>"" <ed><U+00A0><U+00BD><ed><U+00B8><U+00A9><ed><U+00A0><U+00BD><ed><U+00B8><U+00A5><ed><U+00A0><U+00BD><ed><U+00B8><U+00A2><ed><U+00A0><U+00BD><ed><U+00B8><U+00AD>#demonetization https://t.co/ObQrhlNSL6	2016-11-22

Cleaning the text content of the tweets

In [27]:

```
#required packages
library('tm');
```

```
Loading required package: NLP

Attaching package: ‘NLP’

The following object is masked from ‘package:ggplot2’:

    annotate
```

In [28]:

```
cleanText <- function(txt){
    txt.tweets <- VCorpus(VectorSource(txt))
    #lowercase
    txt.tweets <- tm_map(txt.tweets, content_transformer(tolower))
    # Remove numbers
    txt.tweets <- tm_map(txt.tweets, removeNumbers)
    #Remove english common words
    txt.tweets <- tm_map(txt.tweets, removeWords, stopwords("english"))
    #Remove punctuations
    txt.tweets <- tm_map(txt.tweets, removePunctuation)
    #Remove whitespaces
    txt.tweets<- tm_map(txt.tweets, stripWhitespace)

    #remove the word rt(retweet)
    txt.tweets<- tm_map(txt.tweets,content_transformer(function(x){return (gsub("rt","",x))}))


    return(txt.tweets)
}
```

In [29]:

```
tweet.txt_data <- cleanText(tweets_dates$text)
head(tweet.txt_data)
```

```
<<VCorpus>>
Metadata:  corpus specific: 0, document level (indexed): 0
Content:  documents: 6
```

Generate wordcloud

In [30]:

```
library('wordcloud');
```

```
Loading required package: RColorBrewer
```

In [ ]:

```
#create a TermDocumentMatrix in order to generate the wordcloud
dtm <- TermDocumentMatrix(tweet.txt_data)
m <- as.matrix(dtm)
d <- data.frame(as.table(m))
head(d)
```

```
In [ ]: #Generating a word cloud
        wordcloud(d$Terms,d$Freq,min.freq = 1,
                  max.words=50, col=terrain.colors(length(d$Terms), alpha=0.9))
```

Sentiment Analysis

```
In [ ]: library("syuzhet");
```

```
In [ ]: sentiments <- get_sentiment(as.character(tweets_dates$text))
```

```
In [ ]: tweets_dates$sentiments <- sentiments
```

```
In [ ]: head(tweets_dates,2)
```

```
In [ ]: tweet_sentiments = mongo(collection = "tweets_sentiments", db = "Twit_Se
        ntiment_Analysis")
```

```
In [ ]: tweet_sentiments$remove('{}')
        tweet_sentiments$insert(tweets_dates)
```

```
In [ ]: tweet_sentiments$find('{"created":"2017-04-19"}','{"sentiments":true}',l
        imit=5)
```

```
In [ ]: #group by each day and calculate the avg sentiment of tweets that day
        tweet_sentiments$aggregate('[{"$group":{"_id":"$created","sentiments":
        {"$avg":"$sentiments"}}}]')
```

Creating a Sentiment Analysis bar chart which displays the varying sentiments over the days during the demonetization phase

```
In [ ]: tweet_sentiments$aggregate('[{"$group":{"_id":"$created","sentiments":
        {"$avg":"$sentiments"}}}]')%>%
        ggplot(aes(x=`_id`,y=sentiments,fill=sentiments))+scale_fill_gradient(lo
        w = "red", high = "green")+
        geom_bar(stat="identity")+coord_flip()+xlab("Date")+ylab("Overall public
         Sentiment")
```

Results and Discoveries

1. *Initially when the decision was made in the month of november to stop the notes of 500 and 1000 in a very short amount of time, people were slightly happy or neutral.*
2. *On 11th April, as can be seen, there were a lot of hate tweets, this mostly summarizes the angst of people during that time, as people were facing a lot of inconvenience.*
3. *However in the next few days, when people realized there were more pros to the decision than cons, they whole heartedly supported the decision, and hence a flurry of positive tweets followed in the next few days</i>*

References

1. *https://www.r-bloggers.com/ (https://www.r-bloggers.com/)*
2. *https://www.kaggle.com/arathee2/demonetization-in-india-twitter-data/downloads/demonetization-tweets.csv (https://www.kaggle.com/arathee2/demonetization-in-india-twitter-data/downloads/demonetization-tweets.csv)*
3. *https://github.com/jeroen/mongolite (https://github.com/jeroen/mongolite) </i>*