Twitter Report

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Twitter API Concepts

Twitter Intro:

- Structure of data storage is a graph. The graph contains 4 main objects/nodes:
  - Tweets
  - Users
  - Entities: metadata and contextual information. Often appears as a field in other objects.
  - Places: location information associated with endpoints.
- Each object can be referenced by an unique ID.
- Requests are made using HTTP requests.
- **Divided into 2 types of API:**
  - *REST API:* which is used for requesting existing objects within Twitter.
  - *Streaming API:* used for streaming *LIVE* data from the twitter API stream.
- Twitter goes beyond *OAuth* for security purposes, twitter server will negotiate a cipher upon establishing connection. TLS Information
  - This report likely uses pre-made pacakges and will not delve into the specifics for security.
- Specific Twitter endpoints support pagination. To request for cursored results, add `&cursor=-1` to the request. If then endpoint/node support cursoring, the API will default `cursor` to `-1`. The response value for cursor can be used to navigate.
  - Cursoring

REST API:

- Only takes Application-Only Authentication(requests made on behalf of the application).
- Request format:
  - `https://api.twitter.com/1.1/{endpoints}/{fields}.json?q={query}`
- Rate limited by 15 minute windows, each endpoint/requets have varying limitations. Limitations are a cucumlative sum. For more information refer to REST Rate Limit
  - Rate Limit Table
  - GET requests can be made on the behalf of application or user account.
  - HTTP headers are available to request for rate limit information.
- Working with Timelines:

  - Since timelines are changing in real time, twitter addes parameters to avoid redundant information retrival.
    * *max_Id*: specifies the to retrieve posts up to and including the max_Id. This will return 1 redundant request.To avoid this, add 1 to the ID of the post (doesn't matter if the post exists or not).
    * *since_Id*: extract posts after an id.
    * Details on Working with Timelines
- URLs in twitter are often shortened to "twitter format" but the expanded URL is usually available in the response as well.
- Includes the option to retrieve/post private messages (not very applicable).

Search API:

- Essentially the search engine of twitter and will return information from public feed that matches search string.
- This is part of the REST API.
- Example Request:'https://api.twitter.com/1.1/search/tweets.json?q=%40twitterapi'
- Search API

Streaming API:

- Twitter Stream API
- This stream provides access to new and updating public tweets data.
- Includes two useful types: *Public* and *User* stream api.
  - Public Stream: Live stream of public posts. *GET* for shorter URL requests while *POST* for longer URLs.
  - User Stream used to extract a person's view of twitter: direct messages,replies etc.
- General process is to establish a connection to the stream api with a request and save the data into a database for future use.
- Does not have normal rate limit caps, however connections will be closed if:
  - attempting to establish too many connections.
  - suddenly stops reading data.
  - reads data at a slow pace such that the queue is filled.
- For more details regarding stalls, reconnecting etc, refer to Connecting to Stream API
- Each JSON return will be seperated by `\r\n`
- Missing fields will be indicated by a "-1", use REST API to retrieve information.
- Stream Message Types
  - will contain blank messages (to sustain connection), delete messages notifications, changes to tweets etc..

Account and Access Token

Test Gmail Account:

- *Name:* API-Testing(first name) NRC(last name)
- *Username/Email:* NRC.API.Testing@gmail.com

- *Password:* NRCTesting123
- *Birthday:* July 1st 1997
- *Gender*: Rather not say

Twitter Test Account:

- *Username:* NRC API-Testing
- *Email:* NRC.API.Testing@gmail.com
- *Password:* NRCTesting123
- *Twitter Username:* NRC_API_Testing

Creating Application Access Token:

1: Register on to the Twitter Application Site.

2: Create a new Application. Fill in a placeholder for the *Website URL*.

3: After creation, click on the "keys and Token" tab and create tokens.

Rest API

Tools and Packages:

- Apigee Twitter API Console
  - Useful interface to test out queries to the API.
- twitteR
- twitteR Vignette
  - **Highly Recommanded to Read**

First Look at *twitteR*:

- The package provides methods for parsing returned data.
- Methods to setup, store, load twitter data bases.
- Classes/objects wrappersto represent twitter objects.
  - includes functions to convert to Data frames.
- Extracting personal data:
  - favorites
  - friendships
  - direct messages
- Public data:

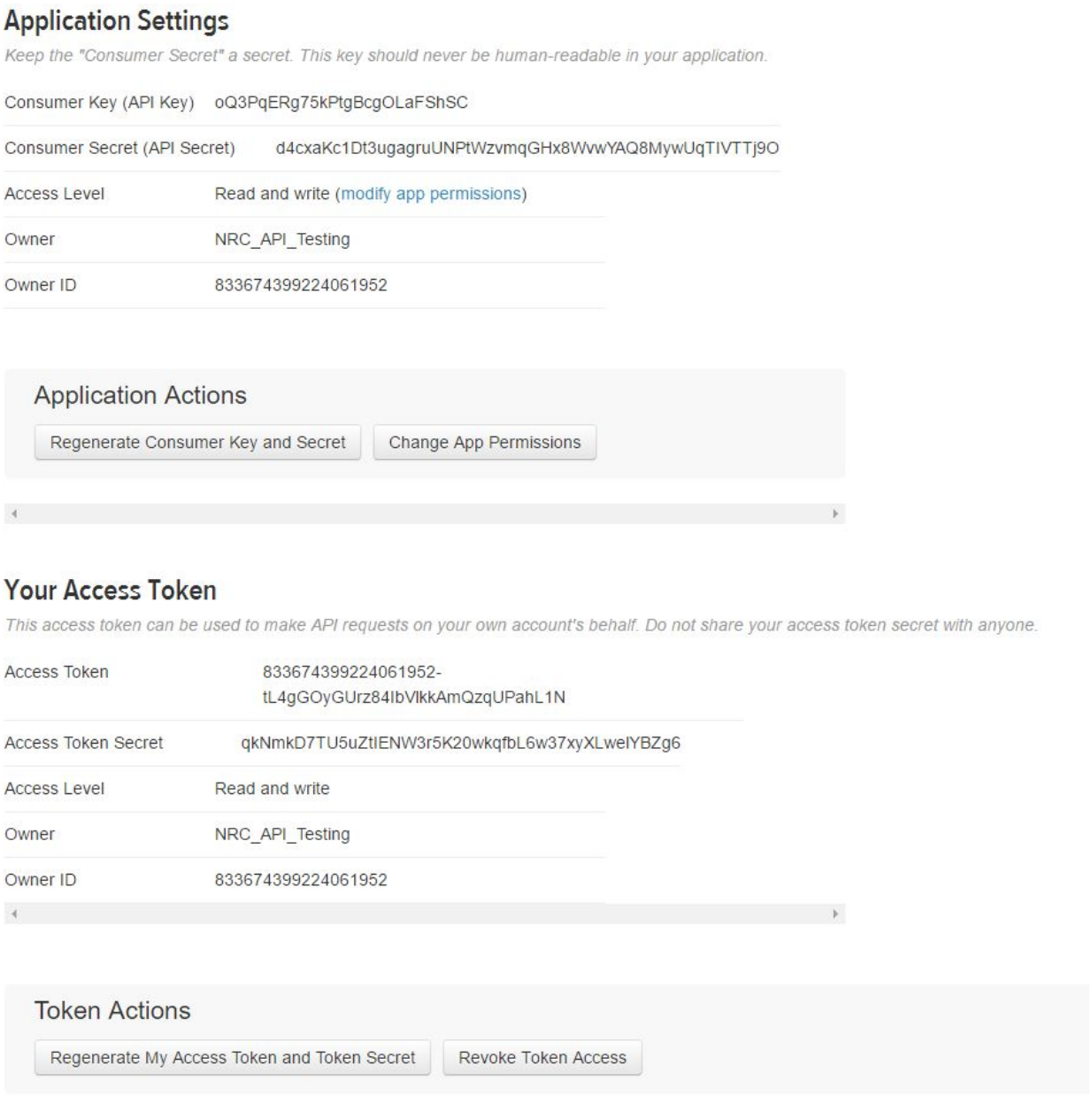


Figure 1: Twitter Token

  - trends
  - public tweets
  - retweets
  - search Twitter
- Create access tokens (handling handshake between brower and Twitter Server)
- Many customizable parameters.
  - Abstracts away from retrying in case of rate limit
  - Abstracts away from manual navigation of cursors
- Uncertain as to how to access the *.httr-oauth*
-

Tweeter Limits And Information:

- Can extract up to a maximum 3200 statuses from a user Timeline.
  - Each page of response can contain up to 200 results.
- For search/tweets, each page of response can contain up to 100 tweets.
- The *source owner* is mentioned in the text of the tweet (status in twitteR package) by an _@_ sign followed by the source owner of the tweet.

Example 1: Creating a Word Cloud From Twitter

GOAL: To test out the *twitteR* package's ability to scrape public twitter data.

- Google Building wordCloud
- Building wordCloud
- Using tm Package

1: Import Libraries and getting Access Token

```
rm(list = ls())

library(twitteR)
library(httr)

library(tm)
library(wordcloud)
library(SnowballC)
library(RColorBrewer)
```

```
# access Tokens
consumer_Key = "oQ3PqERg75kPtgBcgOLaFShSC"
consumer_Secret = "d4cxaKc1Dt3ugagruUNPtWzvmqGHx8WvwYAQ8MywUqTIVTTj9O"
access_Token = "833674399224061952-tL4gGOyGUrz84IbVlkkAmQzqUPahL1N"
access_Secret = "qkNmkD7TU5uZtIENW3r5K2OwkqfbL6w37xyXLwelYBZg6"


##  Intially, the function asks the user to cache the credentials and
##  will be used for another session.
setup_twitter_oauth(consumer_Key,consumer_Secret,access_Token,access_Secret)
```

```
## [1] "Using direct authentication"
```

```
    ##  Creating a token
    app <- oauth_app("twitter", key=consumer_Key, secret=consumer_Secret)

    token = Token1.0$new(endpoint = NULL, params = list(as_header = TRUE),
                                 app = app, credentials = list(oauth_token = access_Token,
                         oauth_token_secret = access_Secret))
    saveRDS(token,"tokenTest")
    test_Token = readRDS("tokenTest")

    ## token and test_Token are the same object.

    ## loading cached token from twitteR package:
    ##  It failed, likely because of the output format.
    ##  The file size is 0KB
   # oauth_content <- readRDS('.httr-oauth')
```

2: Getting Raw Data

```
    search_String = "NRC+OR+#NRC+OR+@NRC"
    lang = "en"
    since = "2016-01-01"


    ##  Extracting coordinates for center of Canada:
    google_Api_Key = "AIzaSyBGTs-gZCbyP8n0Hvw_VZ76Z6YrST1DNa8"
    google_Host = "https://maps.googleapis.com/maps/api"

    request = paste(google_Host,"/geocode/json",
                    "?address=Canada&key=",
                    google_Api_Key,sep="")
    raw= GET(request)

    data = jsonlite::fromJSON(
       httr:: content(raw,as="text")
        )
    lat = data$results$geometry$location["lat"]
    lng = data$results$geometry$location["lng"]

    geocode =paste(lat,lng,"2000km",sep=",")



    ##  A list of tweets in Ottawa mentioning NRC. Note, the return
    ## already a "status"
    NRC_Search = searchTwitter(search_String, n=200,
                               lang=lang, since=since,geocode =geocode)
```

```
## Warning in doRppAPICall("search/tweets", n, params = params,
## retryOnRateLimit = retryOnRateLimit, : 200 tweets were requested but the
## API can only return 159
```

```
    ##  Does allow the specification of "untruncated tweets"
    ##  This was done manually.
```

```
##  Many tweets are truncated. Getting a list
## of ids for tweets that have been truncated.

truncated_Id = lapply(NRC_Search, function(x)
        {
            if(x$truncated)
               return(x$id)
            else
                return(NA)
        }
    )

version = 1.1
cmd = "/statuses/show/"
param = "?tweet_mode=extended"

search_Id = truncated_Id[
    !is.na(truncated_Id)]

long_Tweet = list();

##  Getting Untruncated tweets
##  Going to use traditionall get methods
for(i in 1:length(search_Id))
{
    url = paste("https://api.twitter.com/",
                version,cmd,
                search_Id[i],".json",
                param, sep="")

    ##getting raw response
    raw_Response = GET(url,config=token)

    ##  expanded
    long_Tweet[[i]] = jsonlite::fromJSON(
        httr::content(raw_Response,"text")
    )

}


truncated_Id[!is.na(truncated_Id)] = long_Tweet

## Organized texts results
for(i in 1:length(NRC_Search)){
    if(NRC_Search[[i]]$truncated){
        NRC_Search[[i]] = truncated_Id[[i]]

    }
}


## removing twitter links
```

```
text_NRC = lapply(NRC_Search, function(x)
        {
            text = x$text
            ## converting to ASCII
            text= iconv(x=text,from="UTF-8",to="ASCII",sub="")

            ##Clearning out URLs
            text=gsub("http(s?)://t.co/[a-zA-Z0-9]+",
                 "",text)
            text=gsub("\nhttps:","",text)
        }
    )



 rm(list = setdiff(ls(),c("token","text_NRC")))
```

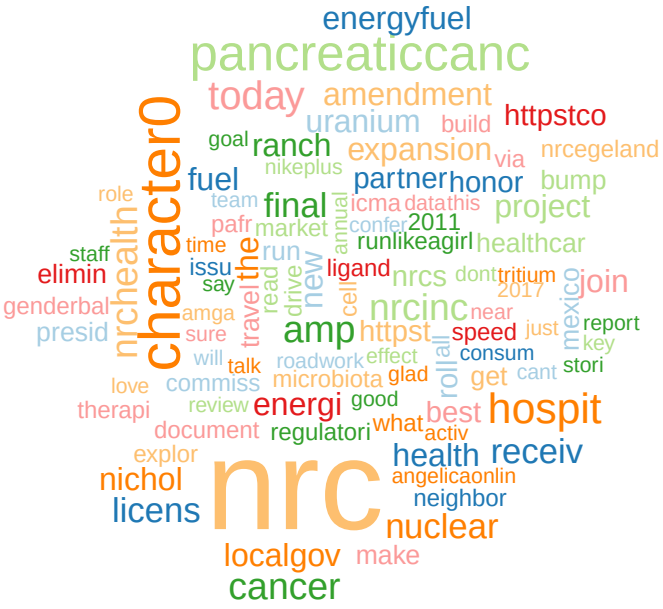
3: Make the word Map

```
require(twitteR)
##  Constructing corpus (structure to process text)
cor= Corpus(VectorSource(text_NRC))
cor = tm_map(cor,removePunctuation)
cor = tm_map(cor, removeWords,stopwords('english'))
cor = tm_map(cor,stemDocument)



## Some words may appear to be missing characters
## This is due to the stem analysis function.

wordcloud(cor,max.words = 100,random.color=T,random.order = T,
          colors =brewer.pal(8,"Paired") )
```



REST API Example 2: Random Exploration

```
## Useful for examining rate
## remaining in 15 window
rate_Limit = getCurRateLimitInfo()
```

1: Friendships and Users * **The *lookupUsers* and *friendships* function behaves as specified by the documentation.**

2: Favorites: **The *favorites* function behaves as specified by the documentation.**

3: Trending Section of Twitter: * **the trending section describes the popular live disscussions and behaves as the documentation specifies.**

Example 3: DataBase Connection Functions of twitteR:

- The functionality provided by twitteR package behaves as the documentation outlines. To view testing code, refer to the *Twitter Rest API.Rmd* file.

```
library(twitteR)
search_Data = searchTwitter(searchString="sports",n=10,
                            lang="en")
```

```
    db_Data = twitteR::twListToDF(search_Data)

      ##sorting text in search_Data
    for(i in 1: length(db_Data$text)){
        db_Data[[i]] = gsub(pattern="\n", replacement = " ",
                            db_Data[[i]])
    }

    if(!file.exists("DB_Data.txt"))
    {
        file.create("DB_Data.txt")

    }

     write.table(db_Data, file="./DB_Data.txt",row.names = F,
                fileEncoding = "UTF-8",sep="\t",col.names=F)
```

- A very simple database containing the 10 tweets from the *db_Data* and stored it in a local sql data base.

```
require(RMySQL)
require(twitteR)
```

```
    db_name = "twitterdb"
    user = "root"
    host ="localhost"
    password = "19970728Paul$"

    ## sets up a connection
    DBI = register_mysql_backend(db_name,host,user,password)

    ## returns a list of twitteR status
    loaded_Data = load_tweets_db(table_name = "status")
    paste("Length", length(loaded_Data))
```

```
## [1] "Length 44"
```

```
    ## Trying to store tweets into the same db:
      search_Data2 = searchTwitter(searchString="#glee",n=10,
                                   lang="en")

    ## The new data is appended to the bottom
    store_tweets_db(search_Data2,table_name="status")
```

```
## [1] TRUE
```

```
    loaded_Data = load_tweets_db(table_name = "status")
    paste("Length", length(loaded_Data))
```

```
## [1] "Length 44"
```

REST API Example 4: Tweets maximum:

GOAL: Test to see how many tweets can twitter return. * The maximum number of tweets is 3200.

Evaluation of *twitteR*:

- The built in class wrappers provides convient and organized information.
  - functions associated with these class are very useful.
- The built in function provides substantial details and is shown in an easily accessible way.
- Unlike facebook, many users are public and thus the account details are easily accessed.
- High level of abstraction, easy to use but rather hard to change inner workings.

Stream API

IMPORTANT NOTE:

- **Make sure that the twitter application has "obb" specified in the call back URL, this will take the user to the authorization page to extract the pin to set up twitter handshake.**
- **It is recommanded to store the RAW JSON response into a file and then process it later on to reduce possible delay for streams.**
- ___ The streaming functions provided by streamR only stores complete tweets and disregardes deletion, updates, incomplete posts etc.___
- **User stream returns only data for the authenticated user for this session. Which is the twitter test account for this report.Not much information due to the nature of the account being a test account.**

libraries

- streamR: Handles connecting and extracting information from twitter stream apis.

Stream Example 1: Public Streams:

```
if(!file.exists("stream Token")){
    file.create("stream Token")
    saveRDS(object = my_oauth, file="stream Token")

}

token = readRDS("stream Token")
```

```
##Creating a file to store data
if(!file.exists("tweets_CNN.json")){
    file.create("tweets_CNN.json")

     ## Can be controlled by either number of tweets
```

```
        ## and maximum connection time (timeout)

        filterStream( file.name="tweets_CNN.json",
        track="CNN", tweets=10, oauth=token)
    }

    ## reading in saved file, converted to a data frame.
    ## where each column is a field and each row is a tweet.
    tweets_DB = parseTweets(tweets = "tweets_CNN.json")
```

```
## 6 tweets have been parsed.
```

```
    names(tweets_DB)
```

```
##  [1] "text"                      "retweet_count"
##  [3] "favorited"                 "truncated"
##  [5] "id_str"                    "in_reply_to_screen_name"
##  [7] "source"                    "retweeted"
##  [9] "created_at"                "in_reply_to_status_id_str"
## [11] "in_reply_to_user_id_str"   "lang"
## [13] "listed_count"              "verified"
## [15] "location"                  "user_id_str"
## [17] "description"               "geo_enabled"
## [19] "user_created_at"           "statuses_count"
## [21] "followers_count"           "favourites_count"
## [23] "protected"                 "user_url"
## [25] "name"                      "time_zone"
## [27] "user_lang"                 "utc_offset"
## [29] "friends_count"             "screen_name"
## [31] "country_code"              "country"
## [33] "place_type"                "full_name"
## [35] "place_name"                "place_id"
## [37] "place_lat"                 "place_lon"
## [39] "lat"                       "lon"
## [41] "expanded_url"              "url"
```

```
    ## a list where each element is a JSON nested
    ## tweet
    tweets_List = readTweets(tweets="tweets_CNN.json")
```

```
## 6 tweets have been parsed.
```

Stream API Example 2: UserStream

```
    if(!file.exists("user stream.json")){
        file.create("user stream.json")
        userStream(file.name="user stream.json",
               timeout=120,oauth=token)

    }
```