Sharat_Sripada_HW3

```
requestURL <- 'https://api.twitter.com/oauth/request_token'
accessURL <- 'https://api.twitter.com/oauth/access_token'
authURL <- 'https://api.twitter.com/oauth/authorize'

# Install the following packages
# install.packages('twitteR')
# install.packages('ROAuth')
# install.packages('rtweet')
# install.packages('streamR')
# install.packages('rjson')
# install.packages('tokenizers')
# install.packages('tidyverse')
# install.packages('syuzhet')
# install.packages('data.table')
# install.packages('arulesViz')
# install.packages('stopwords')
# install.packages('wordcloud')
# install.packages('tm')
# install.packages('arules')

library(arules)
```

```
## Loading required package: Matrix
```

```
##
## Attaching package: 'arules'
```

```
## The following objects are masked from 'package:base':
##
##     abbreviate, write
```

```
library(rtweet)
library(twitteR)
```

```
##
## Attaching package: 'twitteR'
```

```
## The following object is masked from 'package:rtweet':
##
##     lookup_statuses
```

```
library(ROAuth)
library(jsonlite)
```

```
##
## Attaching package: 'jsonlite'
## The following object is masked from 'package:rtweet':
##
##     flatten
```

```r
library(rjson)
```

```
##
## Attaching package: 'rjson'
```

```
## The following objects are masked from 'package:jsonlite':
##
##     fromJSON, toJSON
```

```r
library(tokenizers)
library(tidyverse)
```

```
## ── Attaching packages
────────────────────────────────────────────────────────────────────────────
─────────────────────────── tidyverse 1.3.0 ──
```

```
## ✓ ggplot2 3.3.2     ✓ purrr   0.3.4
## ✓ tibble  3.0.3     ✓ dplyr   1.0.0
## ✓ tidyr   1.1.0     ✓ stringr 1.4.0
## ✓ readr   1.3.1     ✓ forcats 0.5.0
```

```
## ── Conflicts
────────────────────────────────────────────────────────────────────────────
────────────────────────────── tidyverse_conflicts() ──
## x tidyr::expand()   masks Matrix::expand()
## x dplyr::filter()   masks stats::filter()
## x purrr::flatten()  masks jsonlite::flatten(), rtweet::flatten()
## x rjson::fromJSON() masks jsonlite::fromJSON()
## x dplyr::id()       masks twitteR::id()
## x dplyr::lag()      masks stats::lag()
## x dplyr::location() masks twitteR::location()
## x tidyr::pack()     masks Matrix::pack()
## x dplyr::recode()   masks arules::recode()
## x rjson::toJSON()   masks jsonlite::toJSON()
## x tidyr::unpack()   masks Matrix::unpack()
```

```r
library(plyr)
```

```
## ----------------------------------------------------------------------------
----
```

```
## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first,
then dplyr:
## library(plyr); library(dplyr)
```

```
## ----------------------------------------------------------------------------
----
```

```
##
## Attaching package: 'plyr'

## The following objects are masked from 'package:dplyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize

## The following object is masked from 'package:purrr':
##
##     compact

## The following object is masked from 'package:twitteR':
##
##     id
```

```
library(dplyr)
library(ggplot2)
library(syuzhet) #sentiment analysis
```

```
##
## Attaching package: 'syuzhet'

## The following object is masked from 'package:rtweet':
##
##     get_tokens
```

```
library(stringr)
#library(arulesViz)
library(stopwords)
library(tm)
```

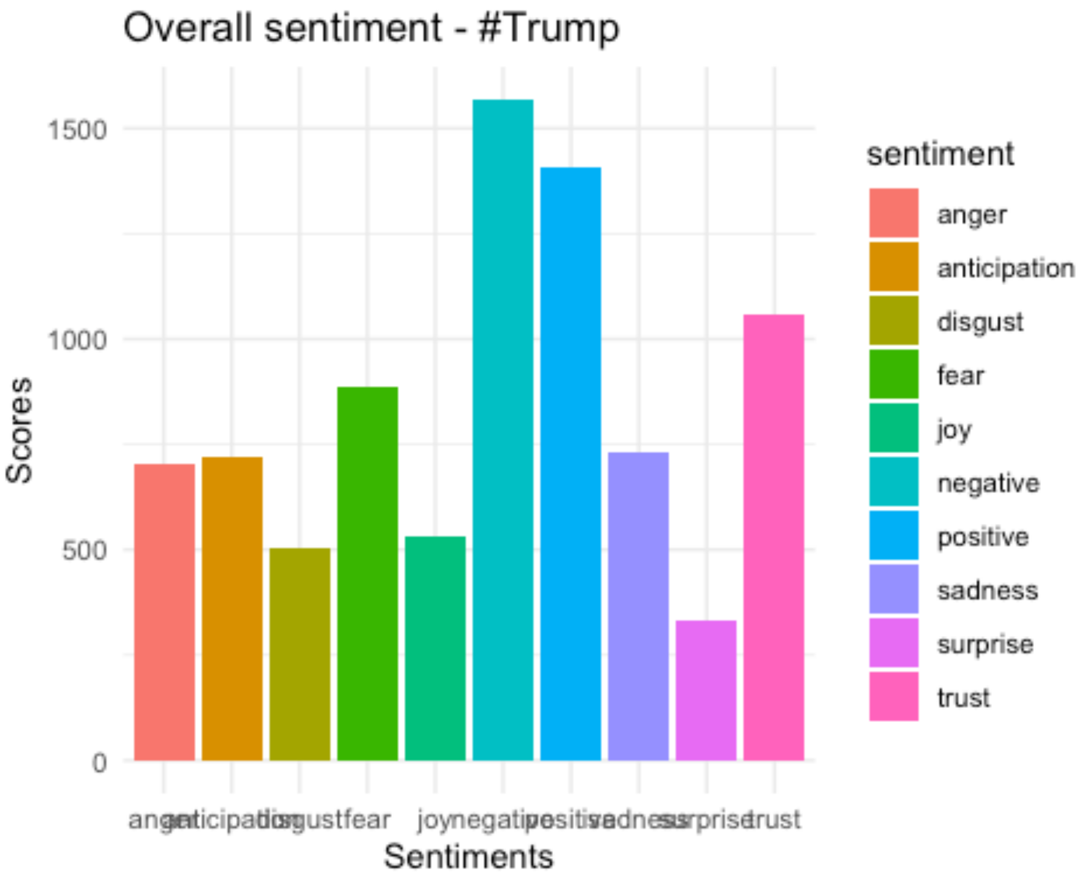
```
## Loading required package: NLP

##
## Attaching package: 'NLP'

## The following object is masked from 'package:ggplot2':
##
##     annotate

##
## Attaching package: 'tm'

## The following object is masked from 'package:stopwords':
##
##     stopwords

## The following object is masked from 'package:arules':
##
##     inspect
```

```r
library(RColorBrewer)
library(wordcloud)

consumerKey <- 'rtOHXdgu2S8SIFctVfF0yhXcY'
consumerSecret <- 'l8E5AIArXxZvr2idFTCzoLDkjqssLVIeo3TaUSyObqH0tQ7KsE'
access_Token <- '185329008-rIYt3Y8HBkgBVSdYcy6iTMkXiUXFF3cSJkjuCZU6'
access_Secret <- 'qKIz3VOjOus4mvNNg0JYGbaMHncPgLqajhUxJfiUBTHbL'


# Using twitteR
setup_twitter_oauth(consumerKey, consumerSecret, access_Token, access_Secret)

## [1] "Using direct authentication"

Search <- twitteR::searchTwitter("#Trump",n=3000,since="2020-03-01")
Search_DF <- twListToDF(Search)
TransactionTweetsFile = "Trump_2020.csv"
Search_DF$text[1]

## [1] "She and David would be going through a separation for the billionth
time and CPS would have full CUstody of everyon… https://t.co/JdToxQ85cS"
```

Sentiment analysis

First analysis of the raw tweets associated with #Trump since Mar-2020

```r
# Converting tweets to ASCII
tweets <- iconv(Search_DF$text, from="UTF-8", to="ASCII", sub="")

my_stop_words <- c()
# Clean-up a few-words prior to sentiment analysis
for(i in stopwords()){
  pattern <- paste(" ", i, " ")
  my_stop_words <- c(my_stop_words, pattern)
}

my_stop_words <- c(my_stop_words, '#trump', '#', 'RT.*: ', 'amp',
                   'trump', 'https')

for(i in my_stop_words){
  tweets <- gsub(i, '', tweets, ignore.case=T)
}

# Get the sentiment scores
sentiment <- get_nrc_sentiment((tweets))

## Warning: `filter_()` is deprecated as of dplyr 0.7.0.
## Please use `filter()` instead.
## See vignette('programming') for more help
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_warnings()` to see where this warning was generated.
## Warning: `group_by_()` is deprecated as of dplyr 0.7.0.
## Please use `group_by()` instead.
## See vignette('programming') for more help
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_warnings()` to see where this warning was generated.

## Warning: `data_frame()` is deprecated as of tibble 1.1.0.
## Please use `tibble()` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_warnings()` to see where this warning was generated.

sentiment_scores <- data.frame(colSums(sentiment[,]))
names(sentiment_scores) <- "Score"
sentiment_scores <- cbind("sentiment"=rownames(sentiment_scores),
sentiment_scores)
rownames(sentiment_scores) <- NULL

ggplot(data=sentiment_scores,aes(x=sentiment, y=Score)) +
  geom_bar(aes(fill=sentiment),stat = "identity") +
  theme(legend.position="none") +
  xlab("Sentiments")+ylab("Scores") +
  ggtitle("Overall sentiment - #Trump") +
  theme_minimal()
```



```
sentiment_scores <- data.frame(colSums(sentiment[,]))
```

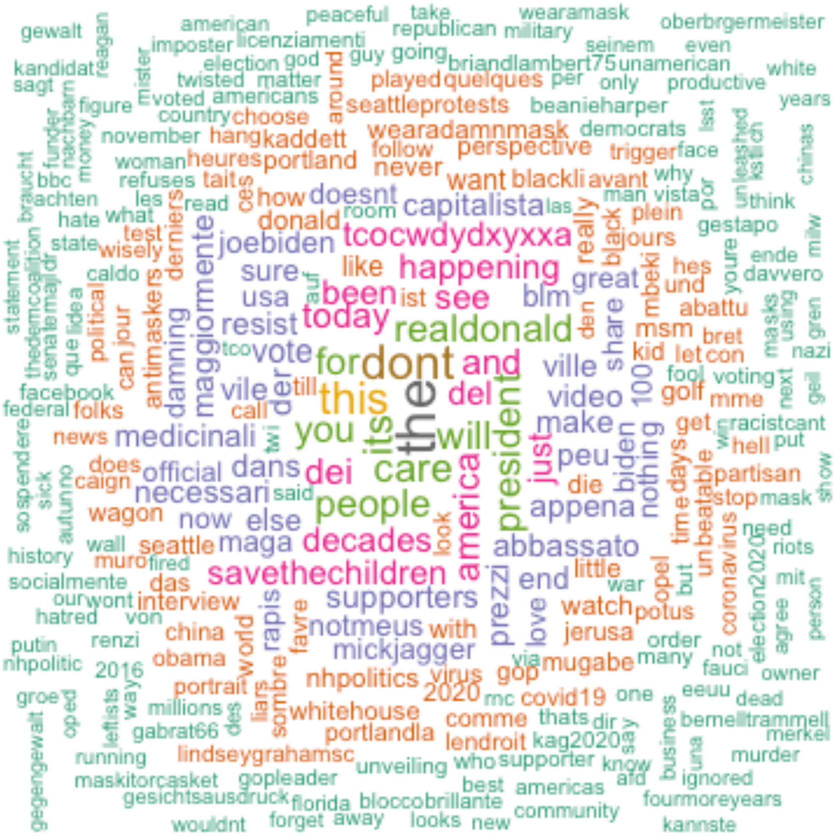
The overall sentiment seems to be that ‘Negativity’ - Anger, disgust, fear, negative, sadness & possibly (mis-) trust. This was probably a start of a lot of events that caused the overall situation to degrade with time - to cite a few: - socio-economic issues around unemployment rate - BLM protests - Trade wars - DACA and immigration issues - AND perhaps the greatest of them all, the Pandemic itself #COVID-19.

Wordcloud

Next, let’s mine the words and corroborate it with the sentiments above.

```
# library(tm)
set.seed(1234)
wordcloud(tweets[1:1500], min.freq=10, scale=c(1.5, .5), random.order=FALSE,
rot.per=0.25,
          colors=brewer.pal(8, "Dark2"))
```

```
## Warning in tm_map.SimpleCorpus(corpus, tm::removePunctuation):
transformation
## drops documents

## Warning in tm_map.SimpleCorpus(corpus, function(x) tm::removeWords(x,
## tm::stopwords())): transformation drops documents

## Warning in wordcloud(tweets[1:1500], min.freq = 10, scale = c(1.5, 0.5), :
## vorbild could not be fit on page. It will not be plotted.
```



NOTE: One of the topics that seems popular is tcocwdydxyxxa (which is essentially a page hosted on twitter). ARM in the coming sections will likely help us understand the association/topic.

Start the file

```
# Unload tm since there is a conflict between the inspect method in tm and
arules
# detach(package:tm, unload=TRUE)

Trans <- file(TransactionTweetsFile)
```

Tokenize to words

```
Tokens <- tokenizers::tokenize_words(Search_DF$text[1], stopwords =
stopwords::stopwords('en'),
                                     lowercase = TRUE, strip_punct = TRUE,
strip_numeric = TRUE,
                                     simplify = TRUE)
```

Write squished Tokens

```
cat(unlist(str_squish(Tokens)), "\n", file=Trans, sep=",")
close(Trans)
```

Append the remaining lists of Tokens into the csv file

```
Trans <- file(TransactionTweetsFile, open = "a")
for(i in 2:nrow(Search_DF)){
  Tokens <- tokenizers::tokenize_words(Search_DF$text[i], stopwords =
stopwords::stopwords('en'),
                                     lowercase = TRUE, strip_punct = TRUE,
strip_numeric = TRUE,
                                     simplify = TRUE)
  cat(unlist(str_squish(Tokens)), "\n", file=Trans, sep=",")

}
close(Trans)
```

Read and inspect transactions

```
TweetTrans <- read.transactions(TransactionTweetsFile, rm.duplicates = FALSE,
                                format = "basket",
                                sep=",")

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## Warning in asMethod(object): removing duplicated items in transactions
```

```r
arules::inspect(head(TweetTrans))
```

```
##     items
## [1] {billionth,
##      cps,
##      custody,
##      david,
##      everyon,
##      full,
##      going,
##      https,
##      jdtoxq85cs,
##      separation,
##      t.co,
##      time}
## [2] {blm,
##      deaf,
##      illegal,
##      let,
##      mlb,
##      nyc,
##      occupation,
##      pitch,
##      sundayvibes,
##      threatened,
##      throw,
##      tone,
##      trump,
##      want,
##        yankees}
## [3] {better,
##        bob,
##        cha,
##        gop,
##        https,
##        idiot,
##        lawmaker,
##        make,
##        president,
##        says,
##        sponge,
##        t.co,
##        told,
##        trump,
##        woulda,
##        zlhxkcv9xv}
## [4] {artist,
##        blackisking,
##        blacklivesmatter,
##        hidden,
##        https,
##        poverty,
##        pxu1glz6xw,
##        rendition,
##        resistancetaskforce,
##        street,
##        t.co}
## [5] {alle,
##        dass,
##        der,
##        dieser,
##        es,
##        geschichte,
##        gewinnt,
##        murraydo,
##        nie,
##        noch,
##        präsident,
##        rt,
##        trump,
##        um,
##        usa,
##        verlieren,
##        verliert,
##        war,
##        wichtig,
##        wir}
## [6] {5m6fppdlu1,
##        coronavirus,
##      desantis,
##      eru5bwqpv9,
##      florida,
##      followed,
##      https,
##      ravaged,
##      ron,
##      scientists,
##      sidelined,
##      t.co,
##      trump}
```

```
Sample_Trans <- sample(TweetTrans, 50)
summary(Sample_Trans)
```

```
## transactions as itemMatrix in sparse format with
##  50 rows (elements/itemsets/transactions) and
##  8370 columns (items) and a density of 0.001538829
##
## most frequent items:
##              rt           trump           https            t.co
realdonaldtrump
##              36              30              19              18
5
##         (Other)
##             536
##
## element (itemset/transaction) length distribution:
## sizes
##  4  7  8  9 10 11 12 13 14 15 17 18 20 21 23
##  1  2  2  3  2  7  8  8  7  2  1  3  1  1  2
##
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    4.00   11.00   12.50   12.88   14.00   23.00
##
## includes extended item information - examples:
##           labels
## 1        __huo__
## 2   __verlaine__
## 3 _daniellew___
```

Clean-up

Remove some frequently appearing words like t.co, rt, https (and it's nice to see that no one has been posting 'http://' links)

```
TweetDF <- read.csv(TransactionTweetsFile, header = FALSE, sep=",")
head(TweetDF)
```

```
##            V1        V2         V3        V4        V5                  V6
## 1       david     going separation billionth      time                 cps
## 2     yankees     trump threatened       nyc   illegal          occupation
## 3      sponge       bob     woulda      make    better           president
## 4      street    artist  rendition    hidden   poverty resistancetaskforce
## 5          rt murrraydo   verliert     trump verlieren                 wir
## 6 coronavirus   ravaged    florida       ron  desantis           sidelined
##            V7               V8      V9   V10        V11        V12   V13
## 1        full          custody everyon https       t.co jdtoxq85cs
## 2        want              let   throw pitch       tone       deaf   mlb
## 3       idiot            trump    says   gop   lawmaker       told   cha
## 4 blackisking blacklivesmatter   https  t.co pxu1glz6xw
## 5        alle             noch     nie   der geschichte        der   usa
## 6  scientists         followed   trump https       t.co 5m6fppdlu1 https
##           V14        V15        V16  V17    V18       V19    V20 V21 V22
## 1
## 2 sundayvibes        blm
## 3       https       t.co zlhxkcv9xv
## 4
## 5         war         es    wichtig dass dieser präsident gewinnt  um
## 6        t.co eru5bwqpv9
```

```
# Convert all the columns to char
TweetDF <- TweetDF %>%
  mutate_all(as.character)
(str(TweetDF))
```

```
## 'data.frame':    3142 obs. of  22 variables:
##  $ V1 : chr  "david" "yankees" "sponge" "street" ...
##  $ V2 : chr  "going" "trump" "bob" "artist" ...
##  $ V3 : chr  "separation" "threatened" "woulda" "rendition" ...
##  $ V4 : chr  "billionth" "nyc" "make" "hidden" ...
##  $ V5 : chr  "time" "illegal" "better" "poverty" ...
##  $ V6 : chr  "cps" "occupation" "president" "resistancetaskforce" ...
##  $ V7 : chr  "full" "want" "idiot" "blackisking" ...
##  $ V8 : chr  "custody" "let" "trump" "blacklivesmatter" ...
##  $ V9 : chr  "everyon" "throw" "says" "https" ...
##  $ V10: chr  "https" "pitch" "gop" "t.co" ...
##  $ V11: chr  "t.co" "tone" "lawmaker" "pxu1glz6xw" ...
##  $ V12: chr  "jdtoxq85cs" "deaf" "told" "" ...
##  $ V13: chr  "" "mlb" "cha" "" ...
##  $ V14: chr  "" "sundayvibes" "https" "" ...
##  $ V15: chr  "" "blm" "t.co" "" ...
##  $ V16: chr  "" "" "zlhxkcv9xv" "" ...
##  $ V17: chr  "" "" "" "" ...
##  $ V18: chr  "" "" "" "" ...
##  $ V19: chr  "" "" "" "" ...
##  $ V20: chr  "" "" "" "" ...
##  $ V21: chr  "" "" "" "" ...
##  $ V22: chr  "" "" "" "" ...
```

```
## NULL
```

```
TweetDF[TweetDF == 't.co'] <- ''
TweetDF[TweetDF == 'rt'] <- ''
TweetDF[TweetDF == 'http'] <- ''
TweetDF[TweetDF == 'https'] <- ''
TweetDF[TweetDF == 'amp'] <- ''

# Clean-up with grepl
MyDF <- NULL
for (i in 1:ncol(TweetDF)) {
  MyList <- c()
  MyList <- c(MyList, grepl("[[:digit:]]", TweetDF[[i]]))
  MyDF <- cbind(MyDF, MyList)
}

TweetDF[MyDF] <- ""
# (TweetDF)
```

Save the data-frame using the write table command

```
write.table(TweetDF, file = 'UpdatedTrump_2020.csv', col.names = FALSE,
            row.names = FALSE, sep = ',')
TweetTrans <- read.transactions('UpdatedTrump_2020.csv', sep=',',
format('basket'), rm.duplicates = TRUE)

## distribution of transactions with duplicates:
## items
##   1   2   3   4   5   6
## 663 260  35  13  35   1

arules::inspect(head(TweetTrans))

##     items
## [1] {billionth,
##      cps,
##      custody,
##      david,
##      everyon,
##      full,
##      going,
##      separation,
##      time}
## [2] {blm,
##      deaf,
##      illegal,
##      let,
##      mlb,
##      nyc,
##      occupation,
##      pitch,
##      sundayvibes,
##      threatened,
##        throw,
##        tone,
##        trump,
##        want,
##        yankees}
## [3] {better,
##        bob,
##        cha,
##        gop,
##        idiot,
##        lawmaker,
##        make,
##        president,
##        says,
##        sponge,
##        told,
##        trump,
##        woulda}
## [4] {artist,
##        blackisking,
##        blacklivesmatter,
##        hidden,
##        poverty,
##        rendition,
##        resistancetaskforce,
##        street}
## [5] {alle,
##        dass,
##        der,
##        dieser,
##        es,
##        geschichte,
##        gewinnt,
##        murrraydo,
##        nie,
##        noch,
##        präsident,
##        trump,
##        um,
##        usa,
##        verlieren,
##        verliert,
##        war,
##        wichtig,
##        wir}
## [6] {coronavirus,
##        desantis,
##        florida,
##        followed,
##        ravaged,
##      ron,
##      scientists,
##      sidelined,
##      trump}
```

Association Rule Mining

Exploring apriori methods of translating transactions in a hierarchical tree-like data-structure and pruning out less popular/frequent paths. For this we will use the following support and confidence thresholds: - support-threshold = 0.025 - confidence-threshold = 0.5

```
TweetTrans_rules <- arules::apriori(TweetTrans,
                                    parameter = list(support=0.025,
confidence=0.5, minlen=3))
```

```
## Apriori
##
## Parameter specification:
##  confidence minval smax arem  aval originalSupport maxtime support minlen
##         0.5    0.1    1 none FALSE            TRUE       5   0.025      3
##  maxlen target  ext
##      10  rules TRUE
##
## Algorithmic control:
##  filter tree heap memopt load sort verbose
##     0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 78
##
## set item appearances ...[0 item(s)] done [0.00s].
## set transactions ...[7592 item(s), 3142 transaction(s)] done [0.01s].
## sorting and recoding items ... [37 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 3 4 5 6 7 8 done [0.00s].
## writing ... [980 rule(s)] done [0.00s].
## creating S4 object  ... done [0.00s].
```

```
arules::inspect(head(TweetTrans_rules))
```

```
##     lhs                                 rhs               support
confidence
## [1] {cwdydxyxxa,savethechildren}     => {_whiterabbitt_}  0.03723743 1
## [2] {_whiterabbitt_,savethechildren} => {cwdydxyxxa}      0.03723743 1
## [3] {_whiterabbitt_,cwdydxyxxa}      => {savethechildren} 0.03723743 1
## [4] {cwdydxyxxa,savethechildren}     => {dont}            0.03723743 1
## [5] {dont,savethechildren}           => {cwdydxyxxa}      0.03723743 1
## [6] {cwdydxyxxa,dont}                => {savethechildren} 0.03723743 1
##     coverage   lift     count
## [1] 0.03723743 26.85470 117
## [2] 0.03723743 26.85470 117
## [3] 0.03723743 26.85470 117
## [4] 0.03723743 26.62712 117
## [5] 0.03723743 26.85470 117
## [6] 0.03723743 26.85470 117
```

cwdydxyxxa as seen in the wordcloud was one of the popular items and this seems to be associate with saving the children or a related movement at the time.

Sorted

```
# By confidence
SortedRules_conf <- sort(TweetTrans_rules, by='confidence', decreasing=TRUE)
arules::inspect(head(SortedRules_conf))
```

```
##     lhs                                 rhs               support
confidence
## [1] {cwdydxyxxa,savethechildren}     => {_whiterabbitt_}  0.03723743 1
## [2] {_whiterabbitt_,savethechildren} => {cwdydxyxxa}      0.03723743 1
## [3] {_whiterabbitt_,cwdydxyxxa}      => {savethechildren} 0.03723743 1
## [4] {cwdydxyxxa,savethechildren}     => {dont}            0.03723743 1
## [5] {dont,savethechildren}           => {cwdydxyxxa}      0.03723743 1
## [6] {cwdydxyxxa,dont}                => {savethechildren} 0.03723743 1
##     coverage   lift     count
## [1] 0.03723743 26.85470 117
## [2] 0.03723743 26.85470 117
## [3] 0.03723743 26.85470 117
## [4] 0.03723743 26.62712 117
## [5] 0.03723743 26.85470 117
## [6] 0.03723743 26.85470 117
```

```
# By support
SortedRules_sup <- sort(TweetTrans_rules, by='support', decreasing=TRUE)
arules::inspect(head(SortedRules_sup))
```

```
##     lhs                                 rhs               support
confidence
## [1] {cwdydxyxxa,savethechildren}     => {_whiterabbitt_}  0.03723743 1
## [2] {_whiterabbitt_,savethechildren} => {cwdydxyxxa}      0.03723743 1
## [3] {_whiterabbitt_,cwdydxyxxa}      => {savethechildren} 0.03723743 1
## [4] {cwdydxyxxa,savethechildren}     => {dont}            0.03723743 1
## [5] {dont,savethechildren}           => {cwdydxyxxa}      0.03723743 1
## [6] {cwdydxyxxa,dont}                => {savethechildren} 0.03723743 1
##     coverage   lift     count
## [1] 0.03723743 26.85470 117
## [2] 0.03723743 26.85470 117
## [3] 0.03723743 26.85470 117
## [4] 0.03723743 26.62712 117
## [5] 0.03723743 26.85470 117
## [6] 0.03723743 26.85470 117
```

```
# By Lift
SortedRules_lift <- sort(TweetTrans_rules, by='lift', decreasing=TRUE)
arules::inspect(head(SortedRules_lift))
```

```
##     lhs                                 rhs               support
confidence
## [1] {richardangwin,trump}            => {resist}          0.02673456
1.0000000
## [2] {resist,trump}                   => {richardangwin}   0.02673456
0.8842105
## [3] {cwdydxyxxa,savethechildren}     => {_whiterabbitt_}  0.03723743
1.0000000
## [4] {_whiterabbitt_,savethechildren} => {cwdydxyxxa}      0.03723743
1.0000000
## [5] {_whiterabbitt_,cwdydxyxxa}      => {savethechildren} 0.03723743
1.0000000
## [6] {dont,savethechildren}           => {cwdydxyxxa}      0.03723743
1.0000000
##     coverage   lift     count
## [1] 0.02673456 33.07368  84
## [2] 0.03023552 31.21561  84
## [3] 0.03723743 26.85470 117
## [4] 0.03723743 26.85470 117
## [5] 0.03723743 26.85470 117
## [6] 0.03723743 26.85470 117
```

The two things that I chose to mine in light of the current pandemic (with respect to #Trump): - Anthony S Fauci, Director of NIAID and sentiment of Twitterati in general - Masks have possibly had a big role in the surge of COVID cases and I am curious about the tweets around this in the context - Finally, if there’s anything around the election this year

Case-1:

Using the rhs property in the appearance, let’s get the ARM for keyword ‘fauci’

```
case_one_rules <- arules::apriori(TweetTrans,
                                   parameter = list(support=0.001,
confidence=0.01, minlen=3),
                                   appearance = list(rhs='fauci'))
```

```
## Apriori
##
## Parameter specification:
##  confidence minval smax arem  aval originalSupport maxtime support minlen
##        0.01    0.1    1 none FALSE            TRUE       5   0.001      3
##  maxlen target  ext
##      10  rules TRUE
##
## Algorithmic control:
##  filter tree heap memopt load sort verbose
##     0.1 TRUE TRUE  FALSE TRUE    2    TRUE
```

```
##
## Absolute minimum support count: 3
##
## set item appearances ...[1 item(s)] done [0.00s].
## set transactions ...[7592 item(s), 3142 transaction(s)] done [0.01s].
## sorting and recoding items ... [1671 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 3 4 5 6 7 8 9 10

## Warning in arules::apriori(TweetTrans, parameter = list(support = 0.001, :
## Mining stopped (maxlen reached). Only patterns up to a length of 10
returned!

##  done [7.46s].
## writing ... [2024 rule(s)] done [3.72s].
## creating S4 object  ... done [1.02s].
```

```
arules::inspect(head(case_one_rules))
```

```
##     lhs                           rhs     support     confidence coverage
## [1] {fam,reversed}             => {fauci} 0.003500955 1          0.003500955
## [2] {charlesadler,reversed} => {fauci} 0.003500955 1          0.003500955
## [3] {damage,reversed}          => {fauci} 0.003500955 1          0.003500955
## [4] {defamation,reversed}      => {fauci} 0.003500955 1          0.003500955
## [5] {reversed,threat}          => {fauci} 0.003500955 1          0.003500955
## [6] {decision,reversed}        => {fauci} 0.003500955 1          0.003500955
##     lift     count
## [1] 174.5556 11
## [2] 174.5556 11
## [3] 174.5556 11
## [4] 174.5556 11
## [5] 174.5556 11
## [6] 174.5556 11
```

```
# By Lift
case_one_lift <- sort(case_one_rules, by='lift', decreasing=TRUE)
arules::inspect(head(case_one_lift))
```

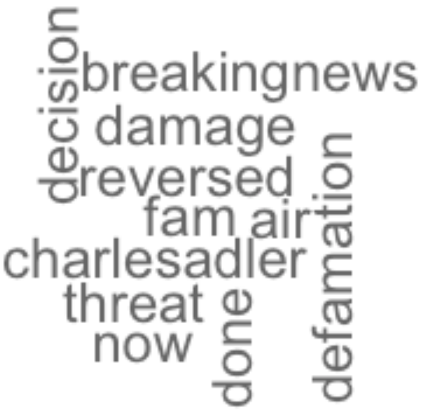
```
##     lhs                           rhs     support     confidence coverage
## [1] {fam,reversed}             => {fauci} 0.003500955 1          0.003500955
## [2] {charlesadler,reversed} => {fauci} 0.003500955 1          0.003500955
## [3] {damage,reversed}          => {fauci} 0.003500955 1          0.003500955
## [4] {defamation,reversed}      => {fauci} 0.003500955 1          0.003500955
## [5] {reversed,threat}          => {fauci} 0.003500955 1          0.003500955
## [6] {decision,reversed}        => {fauci} 0.003500955 1          0.003500955
##     lift     count
## [1] 174.5556 11
## [2] 174.5556 11
## [3] 174.5556 11
## [4] 174.5556 11
## [5] 174.5556 11
## [6] 174.5556 11
```

Plot wordcloud

```
# library(tm)
my_df1 <- DATAFRAME(case_one_rules)
case_one_words <- gsub("\\{|\\}|,"," ", my_df1$LHS)
set.seed(1234)
wordcloud(case_one_words[1:1500], min.freq=5, scale=c(1.5, .5),
random.order=FALSE, rot.per=0.25,
          colors=brewer.pal(8, "Dark2"))

## Warning in tm_map.SimpleCorpus(corpus, tm::removePunctuation):
transformation
## drops documents

## Warning in tm_map.SimpleCorpus(corpus, function(x) tm::removeWords(x,
## tm::stopwords())): transformation drops documents
```



Case-2:

Using the rhs property in the appearance, let’s get the ARM for keyword ‘masks’

```
case_two_rules <- arules::apriori(TweetTrans,
                                    parameter = list(support=0.001,
confidence=0.01, minlen=3),
                                    appearance = list(rhs='masks'))
```

```
## Apriori
##
## Parameter specification:
##  confidence minval smax arem  aval originalSupport maxtime support minlen
##        0.01    0.1    1 none FALSE            TRUE       5   0.001      3
##  maxlen target  ext
##      10  rules TRUE
##
## Algorithmic control:
##  filter tree heap memopt load sort verbose
##     0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 3
##
## set item appearances ...[1 item(s)] done [0.00s].
## set transactions ...[7592 item(s), 3142 transaction(s)] done [0.01s].
## sorting and recoding items ... [1671 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 3 4 5 6 7 8 9 10
```

```
## Warning in arules::apriori(TweetTrans, parameter = list(support = 0.001, :
## Mining stopped (maxlen reached). Only patterns up to a length of 10
returned!
```

```
##  done [6.87s].
## writing ... [14898 rule(s)] done [3.73s].
## creating S4 object  ... done [0.99s].
```

```
arules::inspect(head(case_two_rules))
```

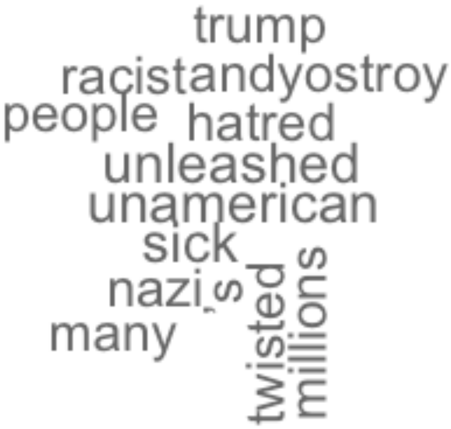
```
##     lhs                          rhs     support     confidence coverage
## [1] {unamerican,unleashed}    => {masks} 0.008274984 1          0.008274984
## [2] {sick,unamerican}         => {masks} 0.008274984 1          0.008274984
## [3] {twisted,unamerican}      => {masks} 0.008274984 1          0.008274984
## [4] {hatred,unamerican}       => {masks} 0.008274984 1          0.008274984
## [5] {millions,unamerican}     => {masks} 0.008274984 1          0.008274984
## [6] {andyostroy,unamerican} => {masks} 0.008274984 1          0.008274984
##     lift     count
## [1] 87.27778 26
## [2] 87.27778 26
## [3] 87.27778 26
## [4] 87.27778 26
## [5] 87.27778 26
## [6] 87.27778 26
```

Plot wordcloud

```
# library(tm)
my_df2 <- DATAFRAME(case_two_rules)
case_two_words <- gsub("\\{|\\}|,"," ", my_df2$LHS)
set.seed(1234)
wordcloud(case_two_words[1:1500], min.freq=3, scale=c(1.5, .5),
random.order=FALSE, rot.per=0.25,
          colors=brewer.pal(8, "Dark2"))

## Warning in tm_map.SimpleCorpus(corpus, tm::removePunctuation):
transformation
## drops documents

## Warning in tm_map.SimpleCorpus(corpus, function(x) tm::removeWords(x,
## tm::stopwords())): transformation drops documents
```



Self explanatory - likely topics revolved around Trump’s promoting/not-promoting masks (and possibly thought of as unamerican?).

Case-3:

Using the rhs property in the appearance, let’s get the ARM for keyword ‘covid’

```
# detach(package:tm, unload=TRUE)
case_three_rules <- arules::apriori(TweetTrans,
                                    parameter = list(support=0.001,
confidence=0.01, minlen=3),
                                    appearance = list(rhs='covid'))
```

```
## Apriori
##
## Parameter specification:
##  confidence minval smax arem  aval originalSupport maxtime support minlen
##        0.01    0.1    1 none FALSE            TRUE       5   0.001      3
##  maxlen target  ext
##      10  rules TRUE
##
## Algorithmic control:
##  filter tree heap memopt load sort verbose
##     0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 3
##
## set item appearances ...[1 item(s)] done [0.00s].
## set transactions ...[7592 item(s), 3142 transaction(s)] done [0.01s].
## sorting and recoding items ... [1671 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 3 4 5 6 7 8 9 10
```

```
## Warning in arules::apriori(TweetTrans, parameter = list(support = 0.001, :
## Mining stopped (maxlen reached). Only patterns up to a length of 10
returned!
```

```
##  done [6.78s].
## writing ... [7800 rule(s)] done [3.71s].
## creating S4 object  ... done [0.99s].
```

```
arules::inspect(head(case_three_rules))
```

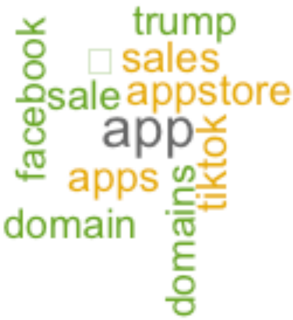
```
##     lhs                 rhs     support     confidence coverage    lift
count
## [1] {app,apps}      => {covid} 0.001273074 1          0.001273074 98.1875 4
## [2] {app,appstore} => {covid} 0.001273074 1          0.001273074 98.1875 4
## [3] {app,sales}     => {covid} 0.001273074 1          0.001273074 98.1875 4
## [4] {app,tiktok}    => {covid} 0.001273074 1          0.001273074 98.1875 4
## [5] {一,app}        => {covid} 0.001273074 1          0.001273074 98.1875 4
## [6] {app,domains}   => {covid} 0.001273074 1          0.001273074 98.1875 4
```

Plot wordcloud

```
# library(tm)
my_df3 <- DATAFRAME(case_three_rules)
case_three_words <- gsub("\\{|\\}|,"," ", my_df3$LHS)
set.seed(1234)
wordcloud(case_three_words[1:1500], min.freq=3, scale=c(1.5, .5),
random.order=FALSE, rot.per=0.25,
          colors=brewer.pal(8, "Dark2"))

## Warning in tm_map.SimpleCorpus(corpus, tm::removePunctuation):
transformation
## drops documents

## Warning in tm_map.SimpleCorpus(corpus, function(x) tm::removeWords(x,
## tm::stopwords())): transformation drops documents
```



Displaying results from Apriori

```
# plot (SortedRules_sup[1:50], method='graph', shading='confidence')
```

NOTE: I was having a lot of trouble with getting the visualize to work. Getting an error related to loading data.tables which is needed for arulesViz. I also spent hours upgrading my MAC to Catalina yet, no luck! Excerpt below: > install.packages('data.table') . .

** testing if installed package can be loaded from temporary location Error: package or namespace load failed for 'data.table' in library.dynam(lib, package, package.lib): shared object 'datatable.so' not found