Advanced Machine Learning - Final Project

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Twitter API has a limit of 200 tweets; therefore, the team had to utilize the following website to pull Trump historic tweets from:

http://www.trumptwitterarchive.com

This site allowed the team to pull tweets from a specific time frame. For the scope of this project, the team pulled the Twitter data around the time frame of COVID-19 (January 1, 2020 to Present)

```
# Import Trump's historic tweets

require(readxl)

## Loading required package: readxl

Trump_Tweets_Test <- read_excel("Trump_Tweets_2020.xlsx")

head(Trump_Tweets_Test)

## # A tibble: 6 x 8
##   source text  created_at          retweet_count favorite_count is_retweet
##   <chr>  <chr> <dttm>                      <dbl>          <dbl> <lgl>
## 1 Twitt… "RT … 2020-04-30 20:26:30          8420              0 TRUE
## 2 Twitt… "RT … 2020-04-30 19:58:53          8421              0 TRUE
## 3 Twitt… "Ove… 2020-04-30 18:25:29         16688          63862 FALSE
## 4 Twitt… "RT … 2020-04-30 16:32:58          8583              0 TRUE
## 5 Twitt… "RT … 2020-04-30 16:32:52          6159              0 TRUE
## 6 Twitt… "RT … 2020-04-30 14:37:07         18099              0 TRUE
## # … with 2 more variables: id_str <dbl>, week_no <dbl>
```

Next, we will only select the date and text columns.

```
require(tidytext)

## Loading required package: tidytext

require(tidyr)

## Loading required package: tidyr

require(dplyr)

## Loading required package: dplyr
```

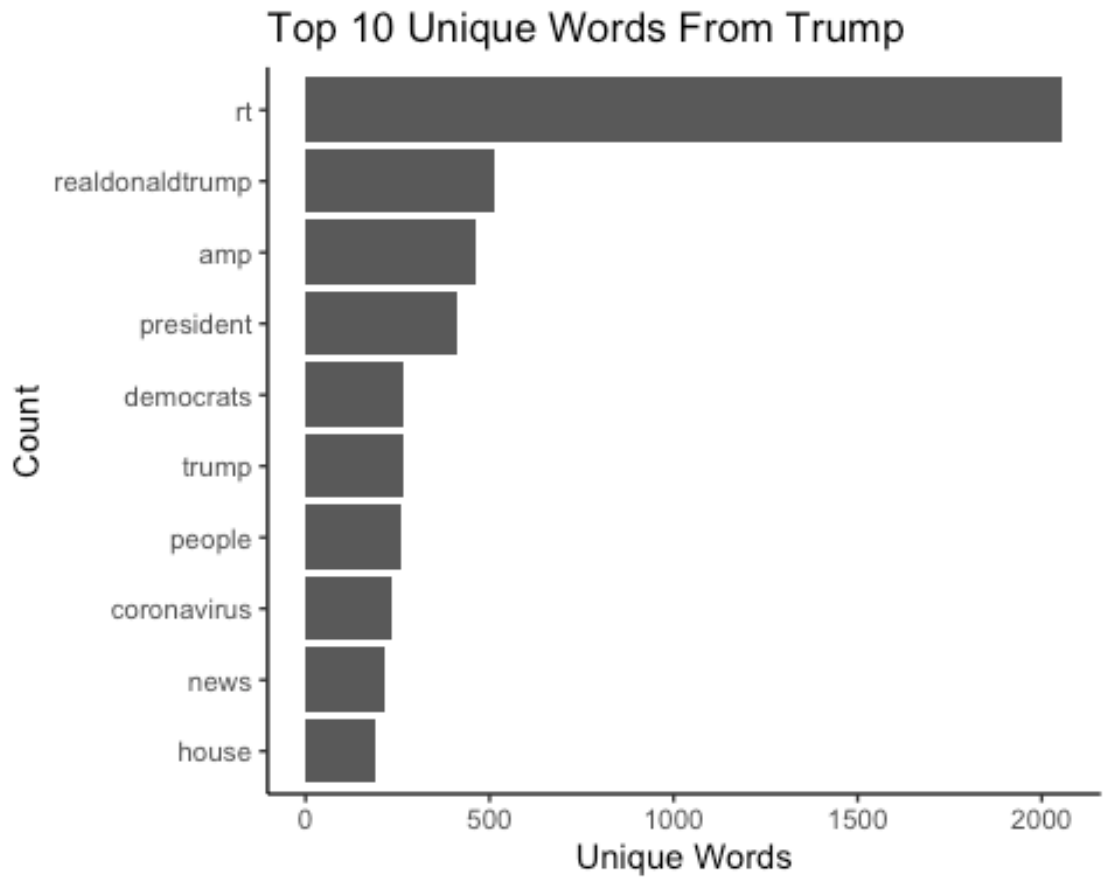
```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

require(rtweet)

## Loading required package: rtweet

tweets.Trump <- Trump_Tweets_Test %>% select(created_at, text)
```

Now, we will have to clean up the tweets by: 1. Converting to lowercase 2. Revert words to stem words 3. Removing "https://" links 4. Removing punctuation 5. Removing stop words

```
# Remove hyperlink elements

tweets.Trump$stripped_text <- gsub("http\\S+","",tweets.Trump$text)

# Convert words to lowercase, remove punctutation, and create an id for each
tweet

tweets.Trump.stem <- tweets.Trump %>%
  select(stripped_text) %>%
  unnest_tokens(word, stripped_text)

# Remove stop words from the output

cleaned.tweets.Trump <- tweets.Trump.stem %>%
  anti_join(stop_words)

## Joining, by = "word"

# Review the results

head(cleaned.tweets.Trump)

## # A tibble: 6 x 1
##   word
##   <chr>
## 1 rt
## 2 whitehouse
## 3 live
## 4 potus
## 5 delivers
## 6 remarks
```

We can now look at the most popular words during this time frame

```
require(ggplot2)

## Loading required package: ggplot2

# Reveal the top 10 words during this timeframe

top_words <- cleaned.tweets.Trump %>%
  count(word, sort = TRUE) %>%
  top_n(10) %>%
  mutate(word = reorder(word, n)) %>%
  ggplot(aes(x = word, y = n)) +
  geom_col() +
  xlab(NULL) +
  coord_flip() +
  theme_classic() +
  labs(x = "Count",
       y = "Unique Words",
       title = "Top 10 Unique Words From Trump")

## Selecting by n

print(top_words)
```



Next, a sentitment analysis will be performed on the tweets.

Below shows example words that are considered “positive” (values greater than 0) and “negative” (values less than 0). Afinn will be used since it takes a score of the total words in the Tweet.

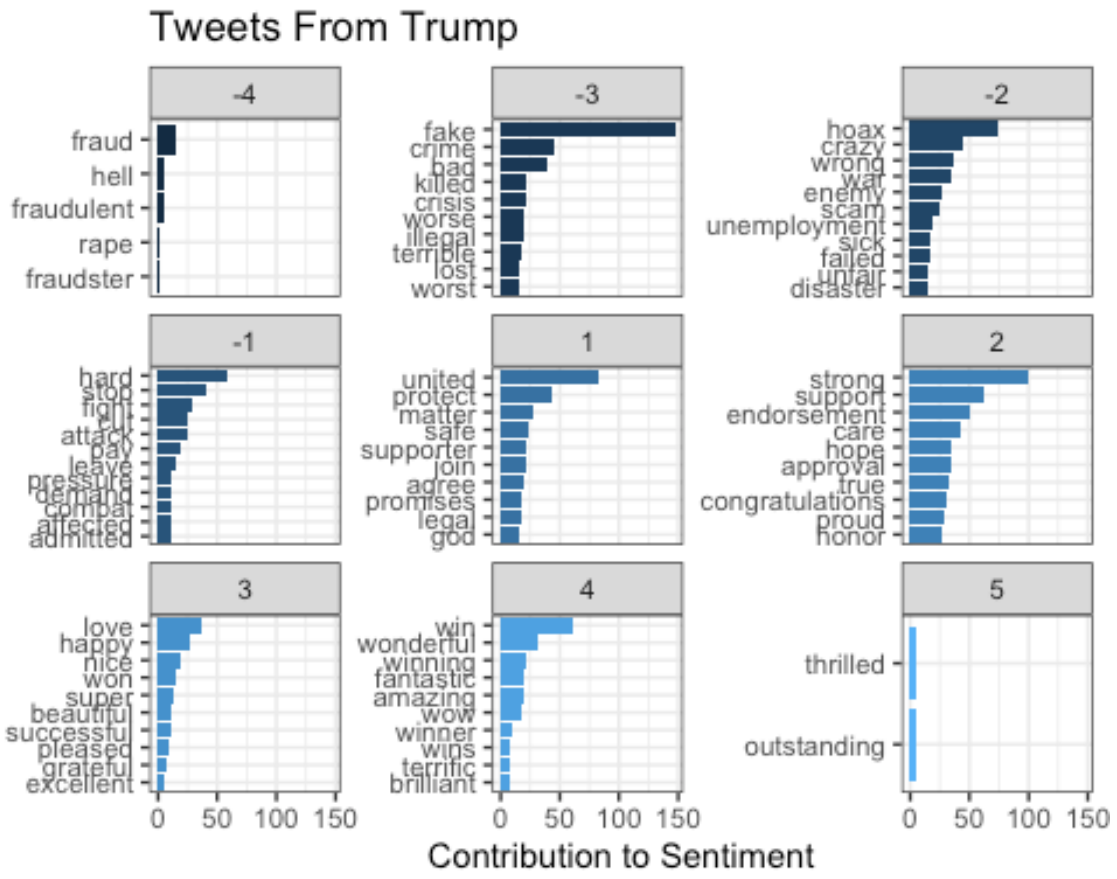
```
require(tidytext)
require(textdata)

## Loading required package: textdata

# Examples of postiive words

get_sentiments("afinn") %>%
  filter(value == "3")

## # A tibble: 172 x 2
##    word         value
##    <chr>        <dbl>
##  1 admire           3
##  2 admired          3
##  3 admires          3
##  4 admiring         3
##  5 adorable         3
##  6 adore            3
##  7 adored           3
##  8 adores           3
##  9 affection        3
## 10 affectionate     3
## # … with 162 more rows

# Examples of negative words

get_sentiments("afinn") %>%
  filter(value == "-3")

## # A tibble: 264 x 2
##    word        value
##    <chr>       <dbl>
##  1 abhor          -3
##  2 abhorred       -3
##  3 abhorrent      -3
##  4 abhors         -3
##  5 abuse          -3
##  6 abused         -3
##  7 abuses         -3
##  8 abusive        -3
##  9 acrimonious    -3
## 10 agonise        -3
## # … with 254 more rows
```

Next, we will perform the sentitment analysis on the summation of all tweets with the "Afinn" lexicon.

```
# Sentiment analysis with "Afinn" lexicon.

afinn.tweets.Trump <- cleaned.tweets.Trump %>%
  inner_join(get_sentiments("afinn")) %>%
  count(word, value, sort = TRUE) %>%
  ungroup()

## Joining, by = "word"

afinn.tweets.Trump

## # A tibble: 809 x 3
##    word        value     n
##    <chr>       <dbl> <int>
##  1 fake           -3   147
##  2 strong          2   100
##  3 united          1    83
##  4 hoax           -2    75
##  5 support         2    62
##  6 win             4    62
##  7 hard           -1    58
##  8 endorsement     2    51
##  9 crime          -3    46
## 10 crazy          -2    44
## # … with 799 more rows
```

This chart will show a summary of all words Tweets during the desired timeframe and plot out the frequency of each word used.

```
# Summary count of all words tweeted

afinn.tweets.Trump %>%
  group_by(value) %>%
  top_n(10) %>%
  ungroup() %>%
  mutate(word = reorder(word, n)) %>%
  ggplot(aes(word, n, fill = value)) +
  geom_col(show.legend = FALSE) +
  facet_wrap(~value, scales = "free_y") +
  labs(title = "Tweets From Trump",
       y = "Contribution to Sentiment",
       x = NULL) +
  coord_flip() +
  theme_bw()

## Selecting by n
```



However, we are more considered about the sentiment of each Tweet itself. Therefore, we will need to get a total score for each Tweet. The code for this is shown below.

```
# Sentiment Score for Each Tweet

sentiment.afinn <- function(twt){
  twt_tbl = tibble(text = twt) %>%
    mutate(
      stripped_text = gsub("http\\S+","", text)
    ) %>%
    unnest_tokens(word, stripped_text) %>%
    anti_join(stop_words) %>%
    inner_join(get_sentiments("afinn")) %>%
    count(word, value, sort = TRUE) %>%
    ungroup() %>%
    mutate(
      score = value
    )

  # Calculate total score for each tweet
  sent.score = case_when(
    nrow(twt_tbl) == 0 ~ 0,
    nrow(twt_tbl) > 0 ~ sum(twt_tbl$score)
```

```
  )

  # Keep track of tweets that contain no words from afinn list

  zero.type = case_when(
    # Type 1 Means No Words at all
    nrow(twt_tbl) == 0 ~ "Type 1",
    # Type 2 Means Sum of All Words = 0
    nrow(twt_tbl) > 0 ~ "Type 2"
  )

  list(score = sent.score, type = zero.type, twt_tbl = twt_tbl)
}
```

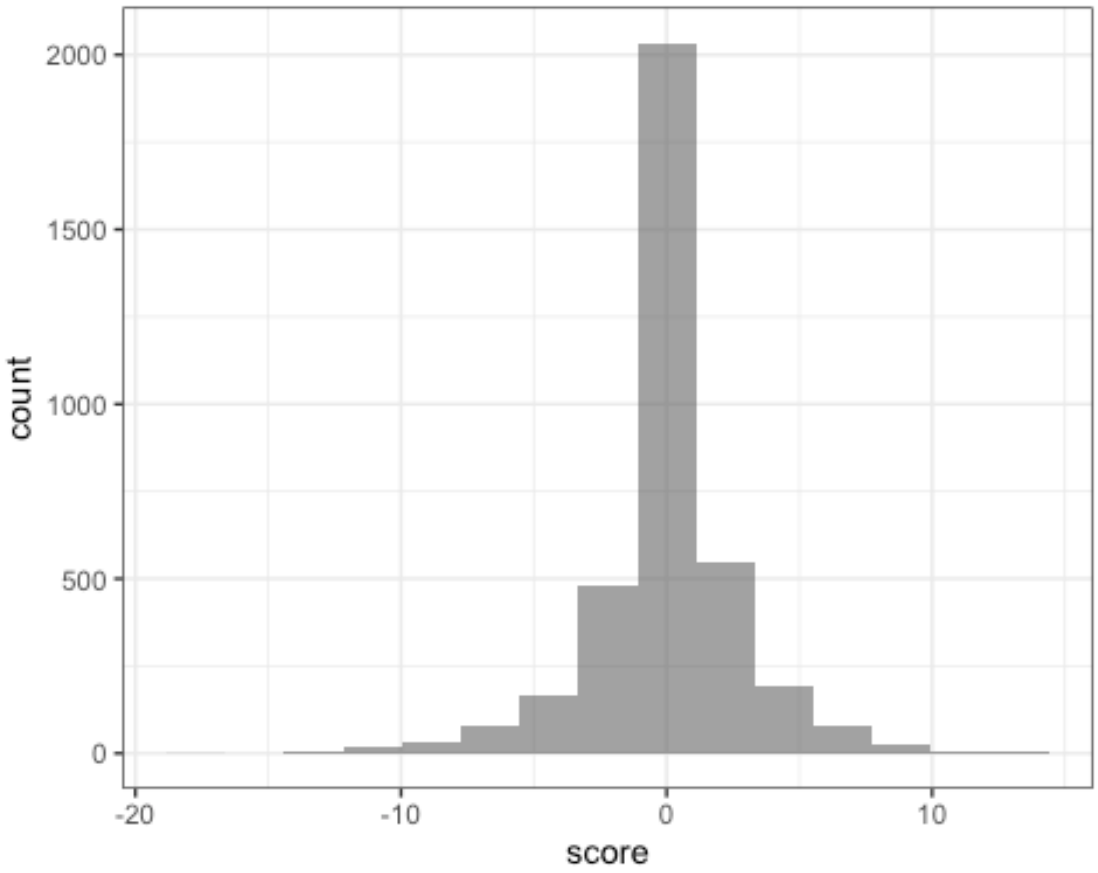
Now we will apply the function to the Tweets

```
# Apply the function to the set of tweets

Trump.tweets.sent <- lapply(Trump_Tweets_Test$text, function(x){sentiment.afi
nn(x)})


require(dplyr)
require(purrr)

## Loading required package: purrr

##
## Attaching package: 'purrr'

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

Trump_sentiment <- bind_rows(
  tibble(
    date = Trump_Tweets_Test$created_at,
    score = unlist(map(Trump.tweets.sent, "score")),
    type = unlist(map(Trump.tweets.sent, "type")),
    tweet = Trump_Tweets_Test$text
  )
)

Trump_sentiment

## # A tibble: 3,673 x 4
##    date                score type   tweet
##    <dttm>              <dbl> <chr>  <chr>
##  1 2020-04-30 20:26:30     0 Type 1 "RT @WhiteHouse: LIVE: POTUS Delivers
Remar…
##  2 2020-04-30 19:58:53     2 Type 2 "RT @StevenTDennis: Trump gets bump in
```

```
late…
##  3 2020-04-30 18:25:29     0 Type 1 "Over 120 MILLION Economic Impact Paym
ents …
##  4 2020-04-30 16:32:58     0 Type 1 "RT @WhiteHouse: President @realDonald
Trump…
##  5 2020-04-30 16:32:52    -1 Type 2 "RT @WhiteHouse: President @realDonald
Trump…
##  6 2020-04-30 14:37:07    -3 Type 2 "RT @JudiciaryGOP: We already knew tha
t Jam…
##  7 2020-04-30 14:09:10    -3 Type 2 "We can’t let the Fake News and their
partn…
##  8 2020-04-30 13:17:50     0 Type 1 "RT @RepStefanik: Just announced: over
$33 …
##  9 2020-04-30 13:16:56     0 Type 1 "RT @RepLizCheney: Speaker Pelosi stil
l ref…
## 10 2020-04-30 13:16:43     2 Type 2 "RT @RepLizCheney: Safeguarding our na
tion’…
## # … with 3,663 more rows
```

Now we can plot out a histogram of the sentiments for review.

```
require(ggplot2)

# Plot of the tweet sentitments

ggplot(Trump_sentiment, aes(x = score)) +
  geom_histogram(bins = 15, alpha = 0.6) +
  theme_bw()
```



We will also export the result as a CSV, so we can attempt to plot out the results in another software program.

```
# Return a CSV of the file

write.csv(Trump_sentiment,"sentitments.csv",row.names = TRUE)
```

The exported CSV files were then analyzed in Excel to create visually appealing graphs for our story.