EDS 231: Assignment 3

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04/24/2022

Load Libraries

The code chunk below loads libraries used in this homework's R code.

```
packages=c("quanteda.sentiment",
           "quanteda.textstats",
           "tidyverse",
           "tidytext",
           "lubridate",
           "here",
           "wordcloud", #visualization of common words in the data set
           "reshape2",
           "knitr",
           "reshape",
           "patchwork",
           "MetBrewer",
           "dplyr",
           "sentimentr",
           "quanteda")

for (i in packages) {
  if (require(i,character.only=TRUE)==FALSE) {
    install.packages(i,repos='http://cran.us.r-project.org')
  }
  else {
    require(i,character.only=TRUE)
  }
}
```

Import Data

The code chunk below calls data from the GitHub of my EDS 242 instructor. The data is Twitter data that includes tweets about International Panel on Climate Change (IPCC) from select dates before and after the publication of the 2022 IPCC report. The chunk also does some cleaning for the first parts of the homework. raw_tweets is used throughout.

```
raw_tweets <- read.csv("https://raw.githubusercontent.com/MaRo406/EDS_231-text-sentiment/main/dat/IPCC_t

dat<- raw_tweets[,c(4,6)] # Extract Date and Title fields

tweets <- tibble(text = dat$Title,
                 id = seq(1:length(dat$Title)),
```

```
                 date = as.Date(dat$Date,'%m/%d/%y'))
```

Part 1

Think about how to further clean a twitter data set. Let's assume that the mentions of twitter accounts is not useful to us. Remove them from the text field of the tweets tibble.

Remove mentions

The code chunk below cleans data containing tweet content by removing mentions, stop words, numbers, and meaningless URL bits so that the text analysis can focus on words meaningful to analyzing IPCC text and sentiment.

```
#remove mentions
tweets$text <- str_remove(tweets$text, "@[a-z,A-Z]*")
tweets$text <- str_remove(tweets$text, "[:digit:]")

#tokenise tweets and remove stop words
words <- tweets %>%
  select(id, date, text) %>%
  unnest_tokens(output = word, input = text, token = "words") %>%
  anti_join(stop_words, by = "word")

#clean tokens
##remove numbers
clean_tokens <- str_remove_all(words$word, "[:digit:]")
##remove mentions
clean_tokens <- str_remove_all(clean_tokens, "@[a-z,A-Z]*")
##removes appostrophes
clean_tokens <- gsub("'s", '', clean_tokens)
## remove weird twitter and internet things
clean_tokens <- str_remove_all(clean_tokens, "https")
clean_tokens <- str_remove_all(clean_tokens, "t.co")

words$clean <- clean_tokens

#remove the empty strings
tib <-subset(words, clean != "")

#reassign
words <- tib
```

Part 2

Compare the ten most common terms in the tweets per day. Do you notice anything interesting?

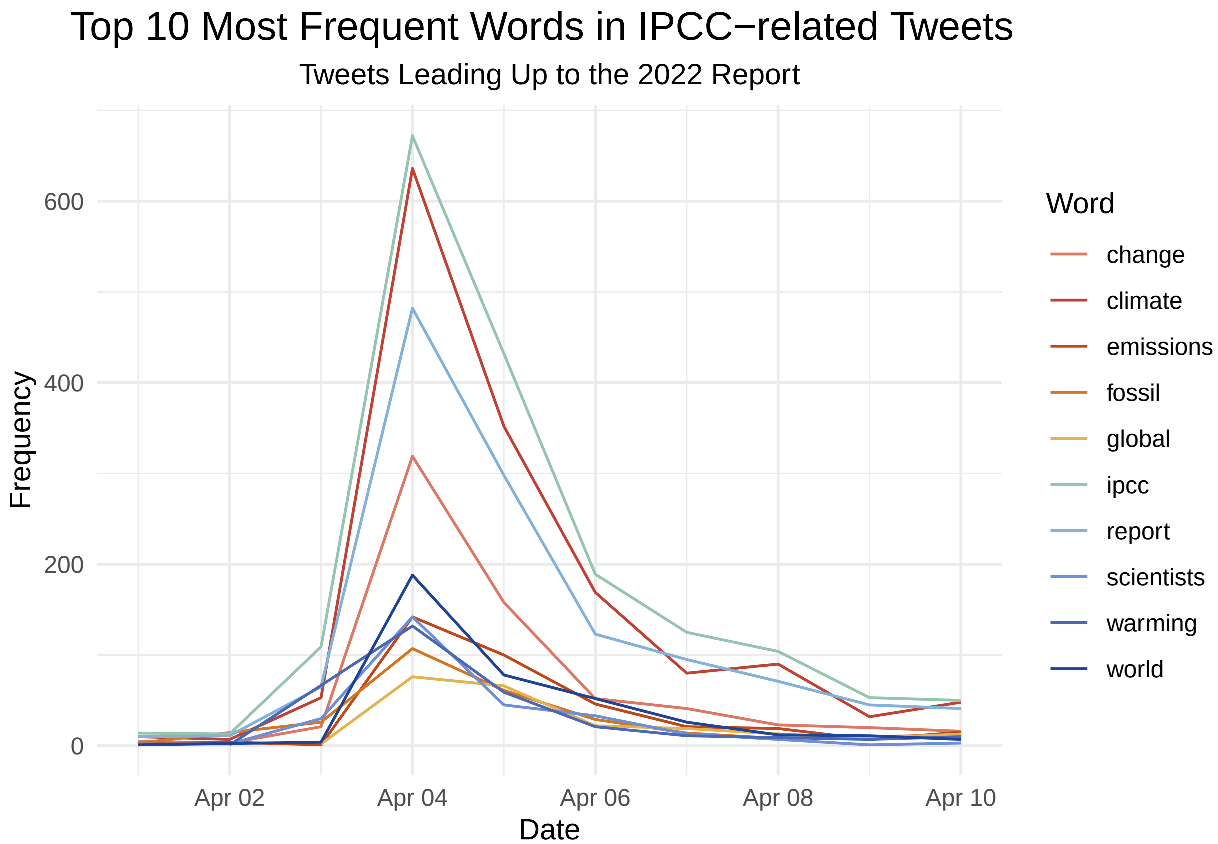
```
#select the top 10 used words
words_freq <- words %>%
  group_by(clean) %>%
  summarise(freq = n()) %>%
   top_n(10) %>%
  select(clean)
```

```
## Selecting by freq
```

```
#join with full dataset to return frquency of those words / day
top_10_words <- inner_join(words_freq, words, by = "clean") %>%
  group_by(date, clean) %>%
  summarize(freq = n())
```

```
## `summarise()` has grouped output by 'date'. You can override using the
## `.groups` argument.
```

```
ggplot(data = top_10_words, aes(x = date, y = freq)) +
  geom_line(aes(color = clean)) +
  theme_minimal() +
  labs(title = "Top 10 Most Frequent Words in IPCC-related Tweets",
       subtitle = "Tweets Leading Up to the 2022 Report",
       x = "Date",
       y = "Frequency",
       color = "Word") +
  theme(plot.title = element_text(hjust = 0.7, size = 15),
        plot.subtitle = element_text(hjust = 0.5)) +
  scale_color_manual(values = met.brewer("Nizami", n = 10))
```



I notice that there is a spike in all the top 10 words on April 4th, when the report is published. I assume this is because there is lots of coverage on this day compared to others.

“IPCC”, “report”, and “climate” are all the most frequent words the day the report is published and tend to stay highest for several days after, even as the frequency of all words declines.

Part 3

Adjust the wordcloud in the "wordcloud" chunk by coloring the positive and negative words so they are identifiable.

```
words %>%
inner_join(get_sentiments("bing")) %>%
count(word, sentiment, sort = TRUE) %>%
acast(word ~ sentiment, value.var = "n", fill = 0) %>%
comparison.cloud(colors = c("darkslateblue", "goldenrod"),
                 max.words = 100)
```

Part 4

Let's say we are interested in the most prominent entities in the Twitter discussion. Which are the top 10 most tagged accounts in the data set. Hint: the "explore_hashtags" chunk is a good starting point.

```
corpus <- corpus(dat$Title)

tokens <- tokens(corpus)

#clean it up
tokens <- tokens(tokens, remove_punct = TRUE,
                      remove_numbers = TRUE)

tokens <- tokens_select(tokens, stopwords('english'),selection='remove') #stopwords lexicon built in to

tokens <- tokens_wordstem(tokens)

tokens <- tokens_tolower(tokens)

at_tweets <- tokens(corpus, remove_punct = TRUE) %>%
               tokens_keep(pattern = "@*")

dfm_at<- dfm(at_tweets) #document feature matrix

tstat_freq <- textstat_frequency(dfm_at, n = 100)

#tidytext gives us tools to convert to tidy from non-tidy formats
at_tib<- tidy(dfm_at)

at_tib %>%
   group_by(term) %>%
  summarise(n()) %>%
  top_n(10) %>%
  knitr::kable()
```

```
## Selecting by n()
```

term	n()
@antonioguterres	16
@conversationedu	10
@ipcc	9
@ipcc_ch	131
@logicalindians	38
@nytimes	14
@potus	13
@un	12
@yahoo	14
@youtube	11

Part 5

The Twitter data download comes with a variable called "Sentiment" that must be calculated by Brandwatch. Use your own method to assign each tweet a polarity score (Positive, Negative, Neutral) and compare your classification to Brandwatch's (hint: you'll need to revisit the "raw_tweets" data frame).

Use my method

```
#give raw tweets element id
raw_tweets_trimmed <- data.frame(element_id = seq(1:length(raw_tweets$Title)),
                        Date = raw_tweets$Date,
                        Title = raw_tweets$Title)

tweets_text <- raw_tweets_trimmed$Title

tweet_sent <- sentiment(tweets_text) %>%
  group_by(element_id) %>%
  summarise(mean_sent = mean(sentiment))
```

```
## Warning: Each time `sentiment` is run it has to do sentence boundary disambiguation when a
## raw `character` vector is passed to `text.var`. This may be costly of time and
## memory.  It is highly recommended that the user first runs the raw `character`
## vector through the `get_sentences` function.
```

```
#join with sentence data
tweet_sent <- inner_join(raw_tweets_trimmed, tweet_sent, by = "element_id")
```

Use the Bing sentiment analysis lexicon.

```
bing_sent <- get_sentiments('bing') #grab the bing sentiment lexicon from tidytext

#test
head(bing_sent, n = 5) %>%
  kable()
```

word	sentiment
2-faces	negative
abnormal	negative
abolish	negative
abominable	negative
abominably	negative

```
# catgorize for ggplot
tweet_cat <- tweet_sent %>%
  mutate(sent_cat = case_when(
    mean_sent < 0 ~ "negative",
    mean_sent == 0 ~ "neutral",
    mean_sent > 0 ~ "positive"
  ))

raw_tweets <- raw_tweets %>%
  mutate(element_id = seq(1:length(Title)))
```

```
all_sent <- full_join(tweet_cat, raw_tweets, by = "element_id", copy = TRUE) %>%
  mutate_all(na_if, "")
```

Plot both methods and compare

```
p1 <- ggplot(data = all_sent, aes(x = sent_cat)) +
  geom_bar(stat = "count",
           aes(fill = sent_cat),
           show.legend = FALSE) +
  theme_classic() +
  labs(title = "Scout's Classification of IPCC Tweet Senitment",
       x = "Sentiment",
       y = "Frequency of Tweet Sentiment") +
  theme(plot.title = element_text(size = 12)) +
  scale_fill_manual(values = met.brewer("Degas", 3))

p2 <- ggplot(data = all_sent, aes(x = Sentiment)) +
  geom_bar(stat = "count",
           aes(fill = Sentiment),
           show.legend = FALSE) +
  theme_classic() +
  theme(plot.title = element_text(size = 12)) +
  labs(title = "Brandwatch Classification of IPCC Tweet Sentiment",
       y = "Frequency of Tweet Sentiment") +
  scale_fill_manual(values = met.brewer("Degas", n = 3))

p1+p2
```