Assignment 10 by Team 3

Ashutosh Agarwal, Shun-Lung Chang, Pooja Natu

This study was conducted in R. The source code can be found here.

1. Convert the html to text files and separate the individual news items. The individual press release items serve as documents.

```
colnames(text_df)
```

```
[1] "id"   "text" "year"
```

```
text_df[2]
```

```
# A tibble: 638 x 1
                                                                           text
                                                                          <chr>
 1 Wissenschaft jenseits von Science Fiction: Jacobs University beteiligt sich
 2 Sozialer Mehrwert durch Musik? Begleitstudie der Jacobs University zur Symb
 3 Leibniz-Preis für Jacobs-Professorin Antje Boetius Dec , Antje Boetius, sei
 4 Neuer Förderpreis der Stiftung Mercator für Studierende der Jacobs Universi
 5 Management mit Zukunft: TiasNimbas Business School und Jacobs University st
 6 Deutscher Hochschulverband ernennt Katja Windt zur »Hochschullehrerin des J
 7 Der persönliche Eindruck zählt: Studienberater aus vier Kontinenten informi
 8 Spintronik: Physikerteam gelingt Nachweis eines nano-mechanischen Torsionse
 9 „Neue malerische Wendungen": University Club der Jacobs University zeigt ab
10 RWE startet CO-Konversions-Pilotanlage auf Basis einer von der Jacobs Unive
# ... with 628 more rows
```

2. Remove stop words and perform stemming.

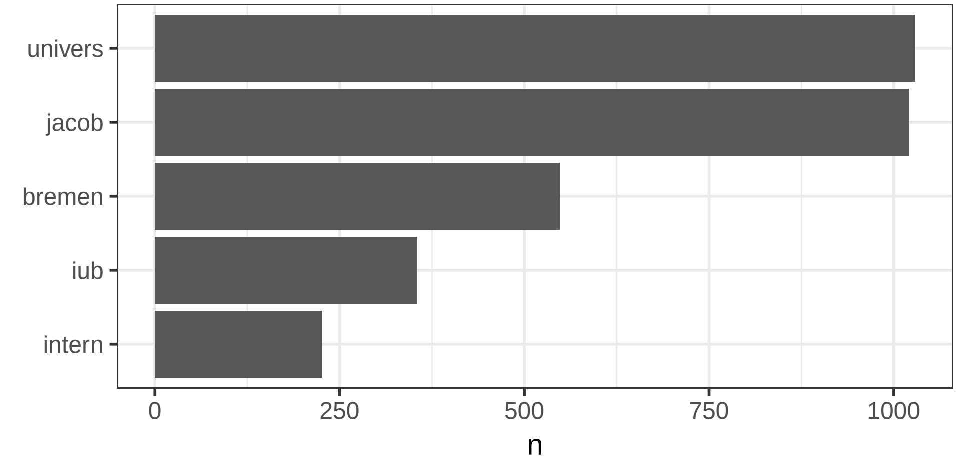
```
t <- text_df %>%
    unnest_tokens(word, text) %>%
    anti_join(tibble(word = c(stopwords("de"), stopwords("en")))) %>%
    mutate(stemmed_word = wordStem(word))
```

```
Joining, by = "word"
```

id	year	word	stemmed_word
1	2008	wissenschaft	wissenschaft
1	2008	jenseits	jenseit
1	2008	science	scienc
1	2008	fiction	fiction
1	2008	jacobs	jacob
1	2008	university	univers

3. Perform a frequency analysis to compute the term-document (TD) matrix. What are the most common terms?

```
top_5_words <- t %>%
    group_by(stemmed_word) %>%
    count(sort = TRUE) %>%
    ungroup() %>%
    slice(1:5)
```



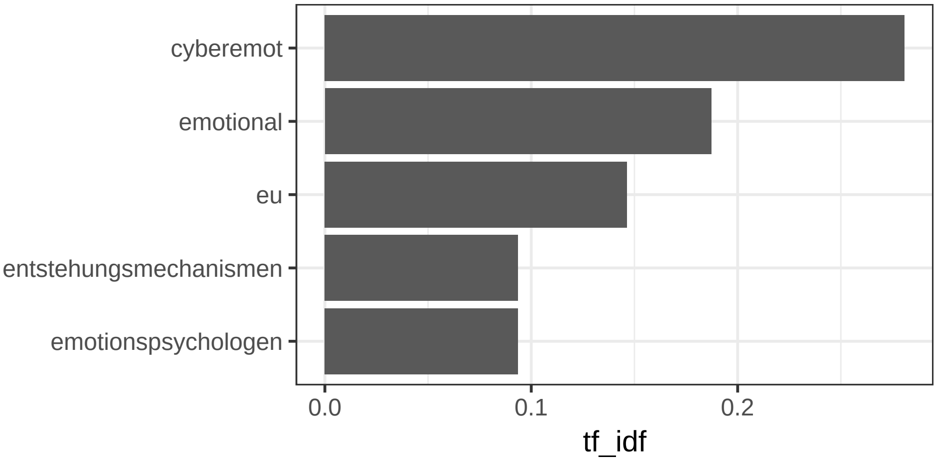
```
word_counts <- t %>%
    group_by(id, stemmed_word) %>%
    count() %>%
    arrange(id, -n) %>%
    ungroup()

td <- word_counts %>% spread(stemmed_word, n, fill = 0) %>%
    select(-id) %>%
    as.matrix()
```

univers	jacob	bremen	iub	intern
3	3	0	0	0
2	2	5	0	0
1	2	2	0	0
1	2	0	0	1
2	2	2	0	0
1	1	1	0	0
2	3	1	0	0
2	1	1	0	0
4	3	1	0	0
3	3	1	0	0

4. Compute inverse-document frequency (IDF) and term importance (TI). What are now the most common terms?

```
tf_idf <- word_counts %>%
    bind_tf_idf(term = stemmed_word, document = id, n = n)
```

id	stemmed_word	n	tf	idf	tf_idf
1	cyberemot	3	0.0434783	6.4583383	0.2807973
1	eu	3	0.0434783	3.3672958	0.1464042
1	jacob	3	0.0434783	0.3490907	0.0151779
1	univers	3	0.0434783	0.1022306	0.0044448
1	emotional	2	0.0289855	6.4583383	0.1871982
1	projekt	2	0.0289855	2.4693542	0.0715755



5. Compute pairwise cosine and Euclidean distance between all documents.

```r
cos_dist <- dist2(td, method = 'cosine')
euc_dist <- dist2(td, method = 'euclidean')
```

```r
cos_dist[1:3, 1:3] %>% kable()
```

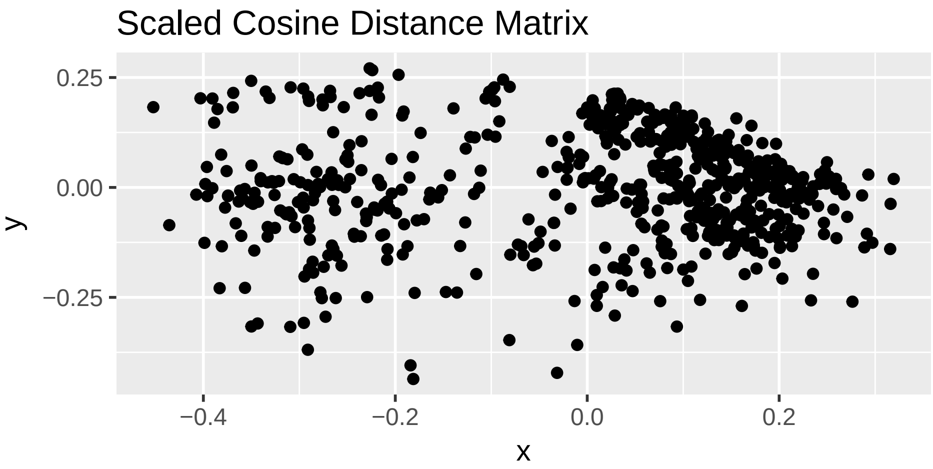
1	2	3
0.0000000	0.8578515	0.8455115
0.8578515	0.0000000	0.7659177
0.8455115	0.7659177	0.0000000

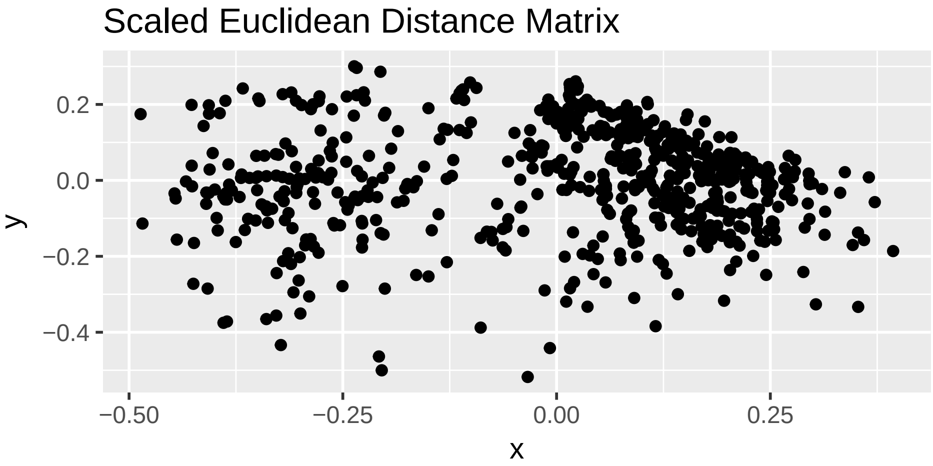
```r
euc_dist[1:3, 1:3] %>% kable()
```

0.000000	1.309848	1.300393
1.309848	0.000000	1.237673
1.300393	1.237673	0.000000

6. Apply a multi-dimensional scaling approach to the distance matrix and render a 2D scatterplot. Compare the two distance metrics.

```r
cos_dist_fit <- cmdscale(cos_dist, k = 2)
euc_dist_fit <- cmdscale(euc_dist, k = 2)
```

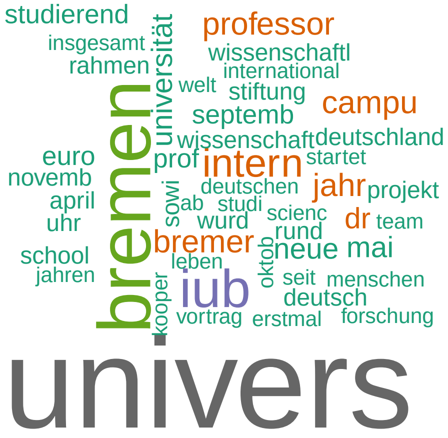




7. Capture the year of release during parsing and color code the scatterplot by time. Produce a Word Cloud for each year.

```
create_wordcloud <- function(year) {
    d <- t %>%
        filter(year == year) %>%
        group_by(stemmed_word) %>%
        count() %>%
        ungroup()

    wordcloud(words = d$stemmed_word, freq = d$n,
              max.words = 50, colors = brewer.pal(8, "Dark2"))
}
```

```
create_wordcloud(2015)
```


studierend
insgesamt
rahmen
universität
professor
wissenschaftl
international
welt
stiftung
campu
septemb
wissenschaft
deutschland
euro
prof
intern
startet
novemb
deutschen
jahr
projekt
april
sowi
ab
studi
scienc
uhr
wurd
dr
team
rund
bremen
bremer
neue
mai
school
leben
oktob
jahren
iub
seit
menschen
deutsch
kooper
vortrag
erstmal
forschung
univers