Text Analysis with R for Students of Literature

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Contents

0. Preprocessing.

Loading the first text file.

```
library(quanteda)
```

```
Package version: 3.2.1
Unicode version: 13.0
ICU version: 69.1

Parallel computing: 8 of 8 threads used.

See https://quanteda.io for tutorials and examples.
```

```
library(readtext)
library(stringi)
data_macbeth <- texts(readtext("https://www.gutenberg.org/files/1533/1533-0.txt"))
names(data_macbeth) <- "Macbeth"
```

Separate content from metadata and extract the header information.

```
start_v <- stri_locate_first_fixed(data_macbeth, "SCENE I. An open Place.")[1]
end_v <- stri_locate_last_fixed(data_macbeth, "[_Flourish. Exeunt._]")[1]
novel_v <- stri_sub(data_macbeth, start_v, end_v)
novel_v = gsub("€", "", novel_v)
novel_v = gsub("", "", novel_v)
```

Reprocessing the content for lowercase text.

```
novel_lower_v <- char_tolower(novel_v)
macbeth_word_v <- tokens(novel_lower_v, remove_punct = TRUE) %>% as.character()
total_length <- length(macbeth_word_v)
```

1. Analyse and study the occurrence of words related with love or positive feelings in general.

Beginning the analysis.

```
length(macbeth_word_v[which(macbeth_word_v == "love")])
```

```
[1] 19
```

Same thing using kwic().

```
nrow(kwic(novel_lower_v, pattern = "love"))
```

```
[1] 19
```

```
nrow(kwic(novel_lower_v, pattern = "love*")) # Includes words like "love"
```

```
[1] 25
```

```
(total_love_hits <- nrow(kwic(novel_lower_v, pattern = "^love{0,1}$", valuetype = "regex")))
```

```
[1] 19
```

```
total_love_hits / ntoken(novel_lower_v, remove_punct = TRUE)
```

```
     text1
0.00104453
```

2. Make frequency plots.

Ten most frequent words.

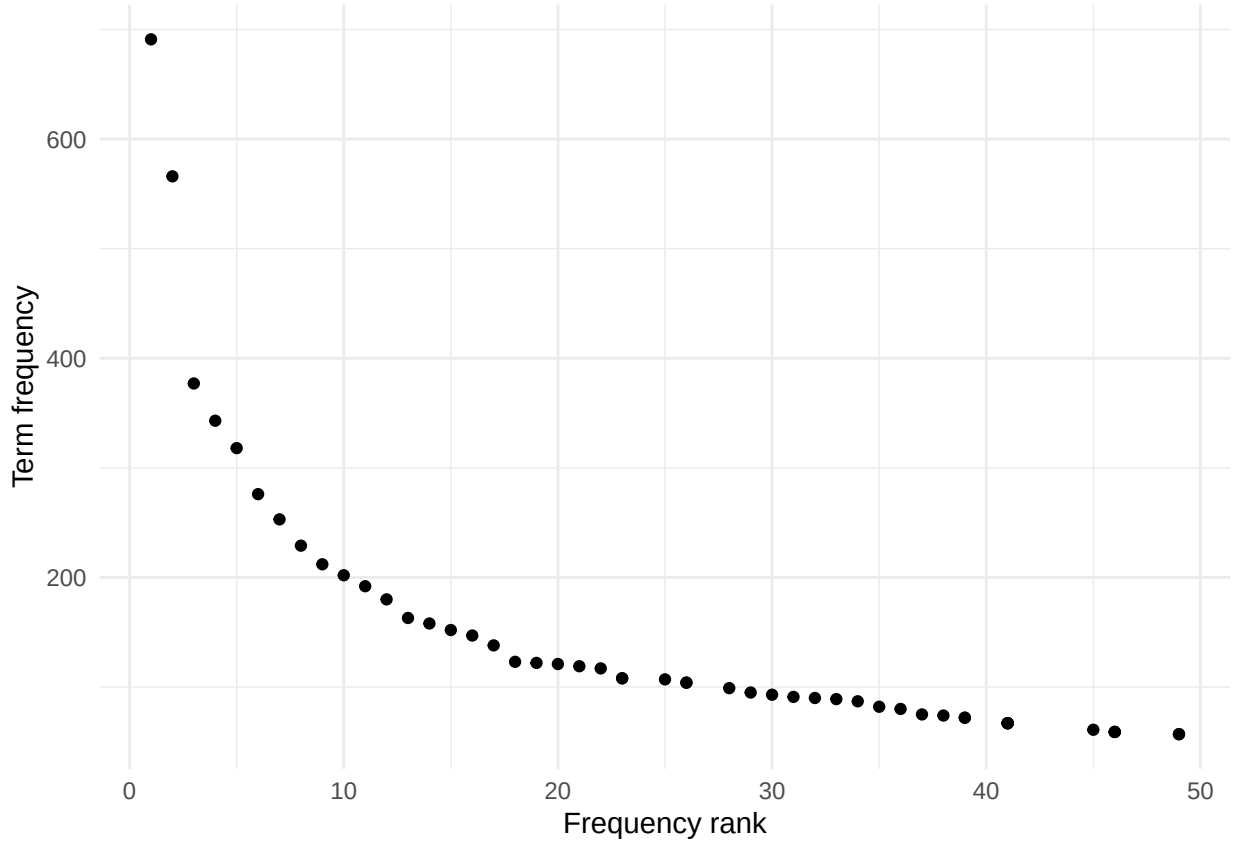
```
macbeth_dfm <- dfm(novel_lower_v, remove_punct = TRUE)
library("quanteda.textstats")
textstat_frequency(macbeth_dfm, n = 10)
```

```
   feature frequency rank docfreq group
1      the       691    1       1   all
2      and       566    2       1   all
3       to       377    3       1   all
4       of       343    4       1   all
5        i       318    5       1   all
6  macbeth       276    6       1   all
7        a       253    7       1   all
8     that       229    8       1   all
9       in       212    9       1   all
10     you       202   10       1   all
```

Plot frequency of 50 most frequent terms.

```
library(ggplot2)
theme_set(theme_minimal())

textstat_frequency(macbeth_dfm, n = 50) %>%
  ggplot(aes(x = rank, y = frequency)) +
  geom_point() +
  labs(x = "Frequency rank", y = "Term frequency")
```




```
sorted_macbeth_freqs_t <- topfeatures(macbeth_dfm, n = nfeat(macbeth_dfm))
```

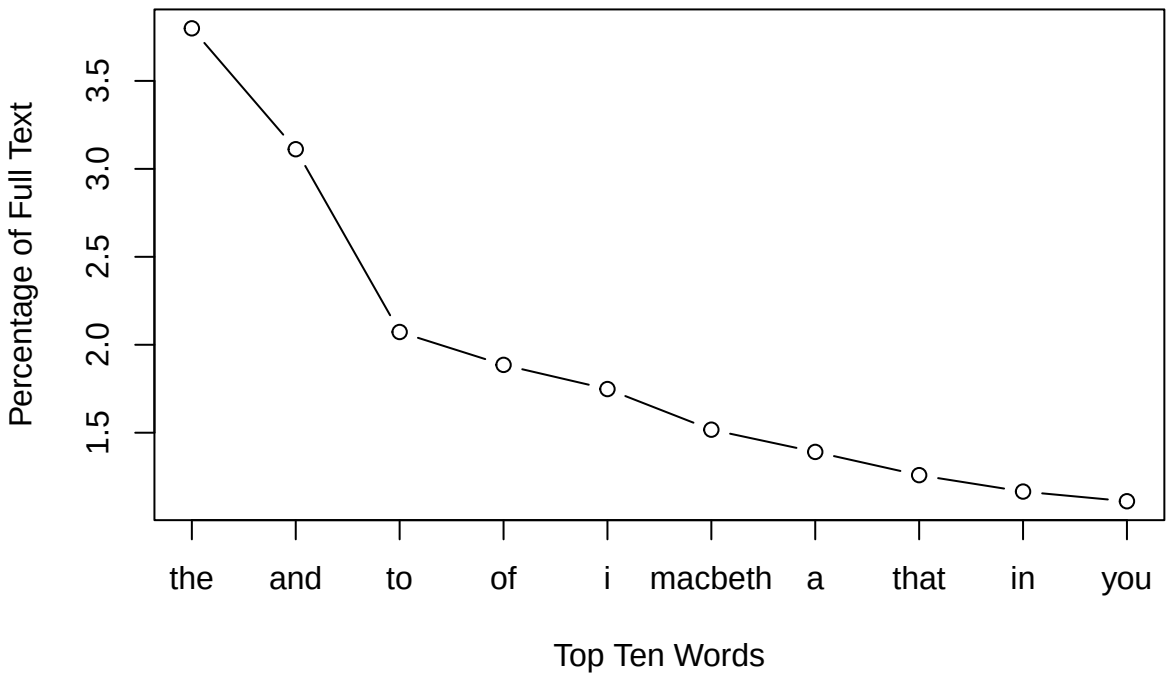
Recycling.

```
sorted_macbeth_rel_freqs_t <- sorted_macbeth_freqs_t / sum(sorted_macbeth_freqs_t) * 100
```

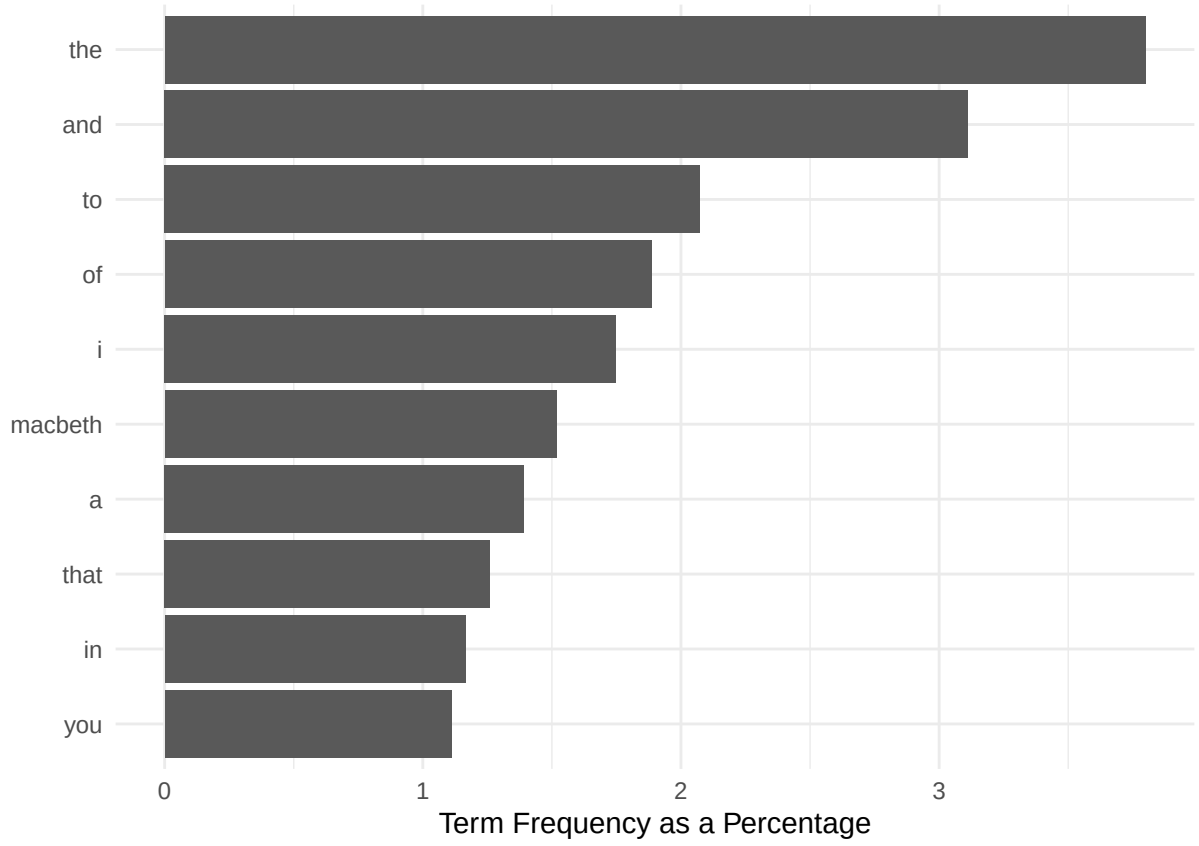
By weighting the dfm directly.

```
macbeth_dfm_pct <- dfm_weight(macbeth_dfm, scheme = "prop") * 100

plot(sorted_macbeth_rel_freqs_t[1:10], type = "b",
     xlab = "Top Ten Words", ylab = "Percentage of Full Text", xaxt = "n")
axis(1,1:10, labels = names(sorted_macbeth_rel_freqs_t[1:10]))
```




```
textstat_frequency(macbeth_dfm_pct, n = 10) %>%
  ggplot(aes(x = reorder(feature, -rank), y = frequency)) +
  geom_bar(stat = "identity") + coord_flip() +
  labs(x = "", y = "Term Frequency as a Percentage")
```



3. Compare word frequency data of words like “he”, “she”, “him”, “her” and show also relative frequencies.

Frequencies of “he”, “she”, “him” and “her”.

```
sorted_macbeth_freqs_t[c("he", "she", "him", "her")]
```

```
 he she him her
117  19  91  43
```

Another method: indexing the dfm.

```
macbeth_dfm[, c("he", "she", "him", "her")]
```

```
Document-feature matrix of: 1 document, 4 features (0.00% sparse) and 0 docvars.
       features
docs     he she him her
  text1 117  19  91  43
```

Term frequency ratios.

```
sorted_macbeth_freqs_t["him"] / sorted_macbeth_freqs_t["her"]
```

```
     him
2.116279
```

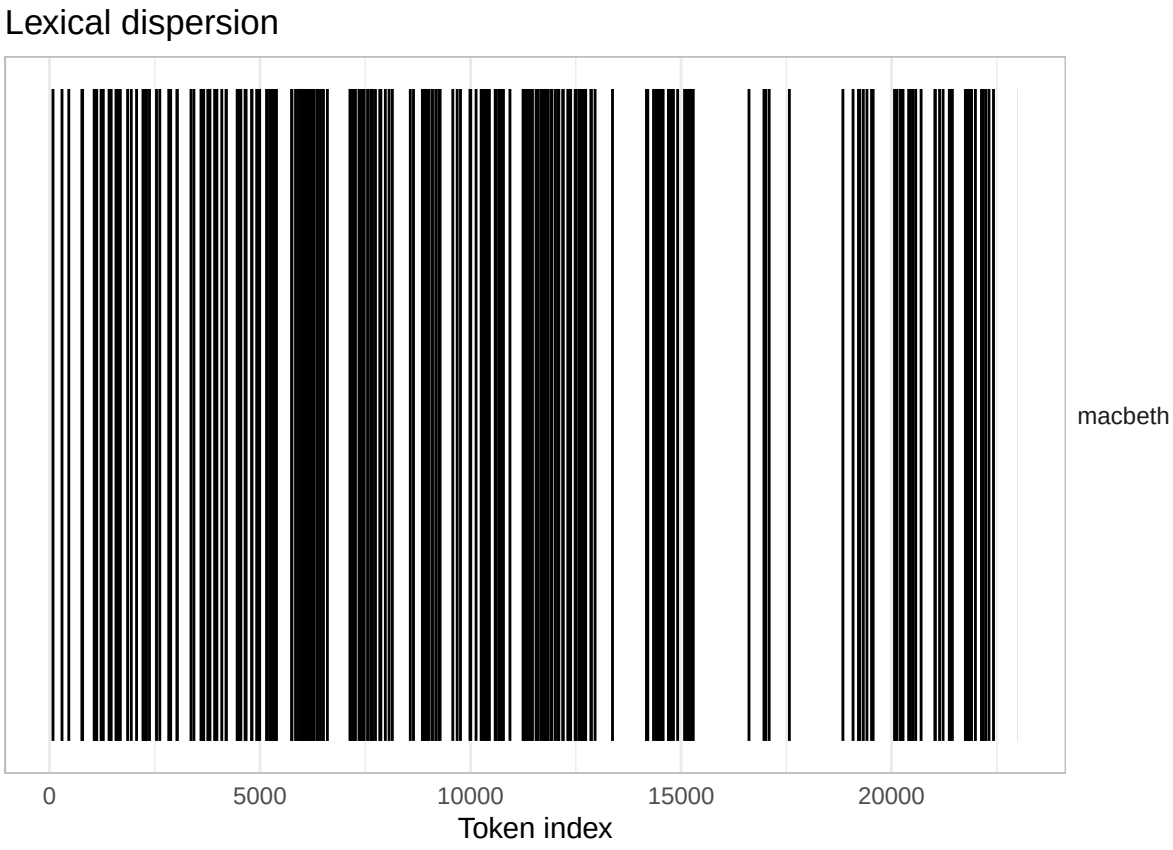
```
sorted_macbeth_freqs_t["he"] / sorted_macbeth_freqs_t["she"]
```

```
      he
6.157895
```

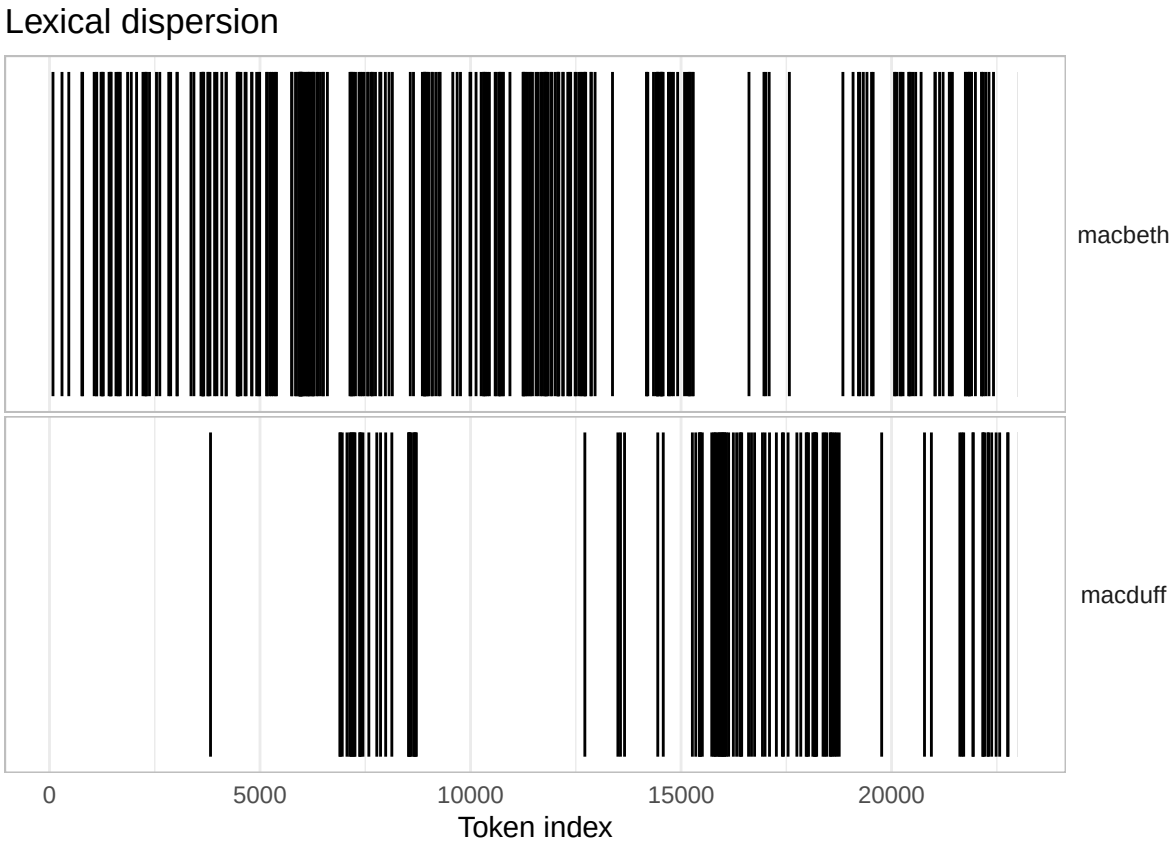
4. Make a token distribution analysis.

Dispersion plots using words from tokenized corpus for dispersion.

```
library("quanteda.textplots")
textplot_xray(kwic(novel_v, pattern = "macbeth")) +
  ggtitle("Lexical dispersion")
```




```
textplot_xray(
  kwic(novel_v, pattern = "macbeth"),
  kwic(novel_v, pattern = "macduff")) +
  ggtitle("Lexical dispersion")
```



5. Identify chapter breaks.

Identify the chapter break locations.

```
chap_positions_v <- kwic(novel_v, phrase(c("SCENE")), valuetype = "regex")$from
head(chap_positions_v)
```

```
[1]    1  128  796 2391 3015 3797
```

```
chap_positions_v
```

```
 [1]     1   128   796  2391  3015  3797  4162  5036  5745  6635  8301  8774
[13] 10295 10898 11231 12904 13253 13773 15422 16408 18882 19721 20061 20756
[25] 21016 21598 21738 22125
```

Identifying chapter breaks.

```
chapters_corp <-
  corpus(novel_v) %>%
  corpus_segment(pattern = "SCENE\\s*.*\\n", valuetype = "regex")
summary(chapters_corp, 10)
```

```
Corpus consisting of 28 documents, showing 10 documents:

     Text Types Tokens Sentences
  text1.1    67    120        25
  text1.2   361    660        52
  text1.3   591   1589       145
  text1.4   316    613        45
  text1.5   373    771        54
  text1.6   203    355        26
  text1.7   416    862        53
  text1.8   339    699        52
  text1.9   367    884       103
 text1.10   618   1660       163
                                        pattern
                      SCENE I. An open Place.\n
                  SCENE II. A Camp near Forres.\n
                           SCENE III. A heath.\n
         SCENE IV. Forres. A Room in the Palace.\n
 SCENE V. Inverness. A Room in Macbethâs Castle.\n
          SCENE VI. The same. Before the Castle.\n
     SCENE VII. The same. A Lobby in the Castle.\n
    SCENE I. Inverness. Court within the Castle.\n
                           SCENE II. The same.\n
                          SCENE III. The same.\n
```

```
docvars(chapters_corp, "pattern") <- stringi::stri_trim_right(docvars(chapters_corp, "pattern"))
docnames(chapters_corp) <- docvars(chapters_corp, "pattern")
```

7. Show some measures of lexical variety.

Mean word frequency.

Length of the book in chapters.

```
ndoc(chapters_corp)
```

```
[1] 28
```

Chapter names.

```
docnames(chapters_corp) %>% head()
```

```
[1] "SCENE I. An open Place."
[2] "SCENE II. A Camp near Forres."
[3] "SCENE III. A heath."
[4] "SCENE IV. Forres. A Room in the Palace."
[5] "SCENE V. Inverness. A Room in Macbethâs Castle."
[6] "SCENE VI. The same. Before the Castle."
```

For first few chapters.

```
ntoken(chapters_corp) %>% head()
```

```
                        SCENE I. An open Place.
                                            120
                   SCENE II. A Camp near Forres.
                                            660
                              SCENE III. A heath.
                                           1589
          SCENE IV. Forres. A Room in the Palace.
                                            613
SCENE V. Inverness. A Room in Macbethâs Castle.
                                            771
           SCENE VI. The same. Before the Castle.
                                            355
```

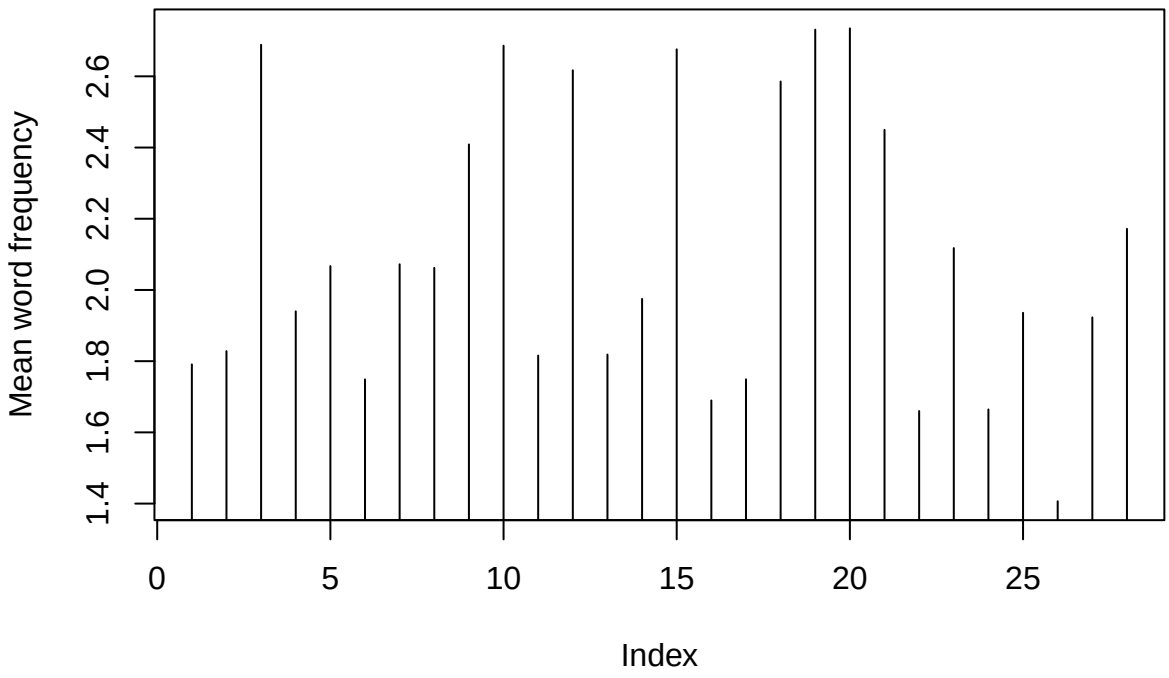
Average.

```
(ntoken(chapters_corp) / ntype(chapters_corp)) %>% head()
```

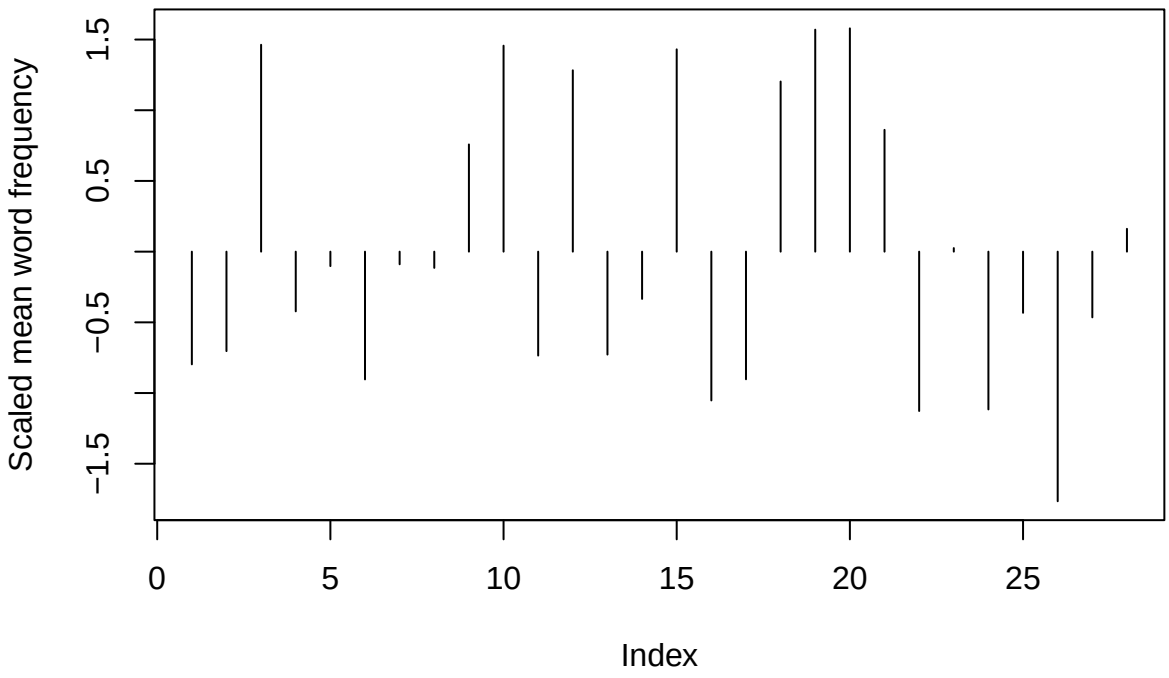
```
                        SCENE I. An open Place.
                                      1.791045
                   SCENE II. A Camp near Forres.
                                      1.828255
                              SCENE III. A heath.
                                      2.688663
          SCENE IV. Forres. A Room in the Palace.
                                      1.939873
SCENE V. Inverness. A Room in Macbethâs Castle.
                                      2.067024
           SCENE VI. The same. Before the Castle.
                                      1.748768
```

Extracting Word Usage Means.

```
(ntoken(chapters_corp) / ntype(chapters_corp)) %>%
  plot(type = "h", ylab = "Mean word frequency")
```




```
(ntoken(chapters_corp) / ntype(chapters_corp)) %>%
  scale() %>%
  plot(type = "h", ylab = "Scaled mean word frequency")
```



Ranking the values.

```
mean_word_use_m <- (ntoken(chapters_corp) / ntype(chapters_corp))
sort(mean_word_use_m, decreasing = TRUE) %>% head()
```

```
     SCENE III. England. Before the Kingâs Palace.
                                          2.734739
       SCENE II. Fife. A Room in Macduffâs Castle.
                                          2.731092
                               SCENE III. A heath.
                                          2.688663
                             SCENE III. The same.
                                          2.686084
SCENE IV. The same. A Room of state in the Palace.
                                          2.675806
            SCENE I. Forres. A Room in the Palace.
                                          2.616984
```

Calculating the TTR.

```
dfm(chapters_corp) %>%
  textstat_lexdiv(measure = "TTR") %>%
  head(n = 10)
```

```
                                          document       TTR
```

```
1                          SCENE I. An open Place. 0.6321839
2                    SCENE II. A Camp near Forres. 0.6057143
3                              SCENE III. A heath. 0.4022436
4           SCENE IV. Forres. A Room in the Palace. 0.5472837
5  SCENE V. Inverness. A Room in Macbethâs Castle. 0.5078616
6            SCENE VI. The same. Before the Castle. 0.6289753
7       SCENE VII. The same. A Lobby in the Castle. 0.4945205
8      SCENE I. Inverness. Court within the Castle. 0.5222816
9                              SCENE II. The same. 0.4580925
10                            SCENE III. The same. 0.4247439
```

8. Calculate the Hapax Richness.

Create a dfm.

```
chap_dfm <- dfm(chapters_corp)
```

Hapaxes per document.

```
rowSums(chap_dfm == 1) %>% head()
```

```
                         SCENE I. An open Place.
                                              45
                   SCENE II. A Camp near Forres.
                                             249
                              SCENE III. A heath.
                                             329
          SCENE IV. Forres. A Room in the Palace.
                                             196
SCENE V. Inverness. A Room in Macbethâs Castle.
                                             235
           SCENE VI. The same. Before the Castle.
                                             141
```

As a proportion.

```
hapax_proportion <- rowSums(chap_dfm == 1) / ntoken(chap_dfm)
head(hapax_proportion)
```

```
                         SCENE I. An open Place.
                                       0.3750000
                   SCENE II. A Camp near Forres.
                                       0.3772727
                              SCENE III. A heath.
                                       0.2070485
          SCENE IV. Forres. A Room in the Palace.
                                       0.3197390
SCENE V. Inverness. A Room in Macbethâs Castle.
                                       0.3047990
           SCENE VI. The same. Before the Castle.
                                       0.3971831
```

```
barplot(hapax_proportion, beside = TRUE, col = "grey", names.arg = seq_len(ndoc(chap_dfm)))
```