01-tidy-text.R

mojmir

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```
text <- c(
  "Because I could not stop for Death -",
  "He kindly stopped for me -",
  "The Carriage held but just Ourselves -",
  "and Immortality"
)

text
```

```
## [1] "Because I could not stop for Death -"
## [2] "He kindly stopped for me -"
## [3] "The Carriage held but just Ourselves -"
## [4] "and Immortality"
```

```
library(dplyr)
text_df <- tibble(line = 1:4, text = text)

text_df
```

```
## # A tibble: 4 x 2
##    line text
##   <int> <chr>
## 1     1 Because I could not stop for Death -
## 2     2 He kindly stopped for me -
## 3     3 The Carriage held but just Ourselves -
## 4     4 and Immortality
```

```
## A token is a meaningful unit of text, most often a word, that we are interested in using for further
```

```
library(tidytext)

text_df %>%
  unnest_tokens(word, text)
```

```
## # A tibble: 20 x 2
##     line word
##    <int> <chr>
##  1     1 because
##  2     1 i
##  3     1 could
##  4     1 not
##  5     1 stop
##  6     1 for
##  7     1 death
##  8     2 he
```

```
##  9     2 kindly
## 10     2 stopped
## # ... with 10 more rows
```

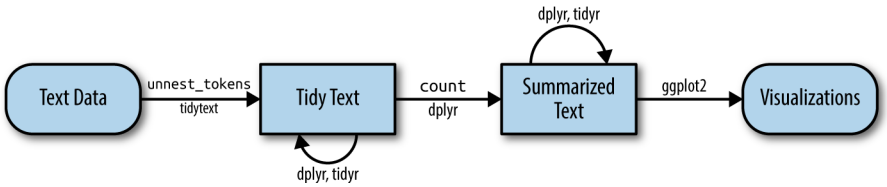


Figure 1: A flowchart of a typical text analysis using tidy data principles. This chapter shows how to summarize and visualize text using these tools.

```
library(janeaustenr)
library(dplyr)
library(stringr)

original_books <- austen_books() %>%
  group_by(book) %>%
  mutate(
    linenumber = row_number(),
    chapter = cumsum(str_detect(text, regex("^chapter [\\divxlc]",
      ignore_case = TRUE
    )))
  ) %>%
  ungroup()

original_books
```

```
## # A tibble: 73,422 x 4
##    text                  book                linenumber chapter
##    <chr>                 <fct>                    <int>   <int>
##  1 "SENSE AND SENSIBILITY" Sense & Sensibility          1       0
##  2 ""                    Sense & Sensibility          2       0
##  3 "by Jane Austen"      Sense & Sensibility          3       0
##  4 ""                    Sense & Sensibility          4       0
##  5 "(1811)"              Sense & Sensibility          5       0
##  6 ""                    Sense & Sensibility          6       0
##  7 ""                    Sense & Sensibility          7       0
##  8 ""                    Sense & Sensibility          8       0
##  9 ""                    Sense & Sensibility          9       0
## 10 "CHAPTER 1"           Sense & Sensibility         10       1
## # ... with 73,412 more rows
```

```
library(tidytext)
tidy_books <- original_books %>%
  unnest_tokens(word, text)

tidy_books
```

```
## # A tibble: 725,055 x 4
##    book                linenumber chapter word
##    <fct>                    <int>   <int> <chr>
##  1 Sense & Sensibility          1       0 sense
##  2 Sense & Sensibility          1       0 and
```

```
##  3 Sense & Sensibility          1       0 sensibility
##  4 Sense & Sensibility          3       0 by
##  5 Sense & Sensibility          3       0 jane
##  6 Sense & Sensibility          3       0 austen
##  7 Sense & Sensibility          5       0 1811
##  8 Sense & Sensibility         10       1 chapter
##  9 Sense & Sensibility         10       1 1
## 10 Sense & Sensibility         13       1 the
## # ... with 725,045 more rows
```

```
data(stop_words)

tidy_books <- tidy_books %>%
  anti_join(stop_words)
```

```
tidy_books %>%
  count(word, sort = TRUE)
```

```
## # A tibble: 13,914 x 2
##    word       n
##    <chr>  <int>
##  1 miss    1855
##  2 time    1337
##  3 fanny    862
##  4 dear     822
##  5 lady     817
##  6 sir      806
##  7 day      797
##  8 emma     787
##  9 sister   727
## 10 house    699
## # ... with 13,904 more rows
```

```
library(ggplot2)

tidy_books %>%
  count(word, sort = TRUE) %>%
  filter(n > 600) %>%
  mutate(word = reorder(word, n)) %>%
  ggplot(aes(word, n)) +
  geom_col() +
  xlab(NULL) +
  coord_flip()
```

```
## To learn more about gutenbergr, check out the [package's tutorial at rOpenSci](https://ropensci.org/
```

```
library(gutenbergr)
##
hgwells <- gutenberg_download(c(35, 36, 5230, 159))
```

```
tidy_hgwells <- hgwells %>%
  unnest_tokens(word, text) %>%
  anti_join(stop_words)
```

```
tidy_hgwells %>%
  count(word, sort = TRUE)
```

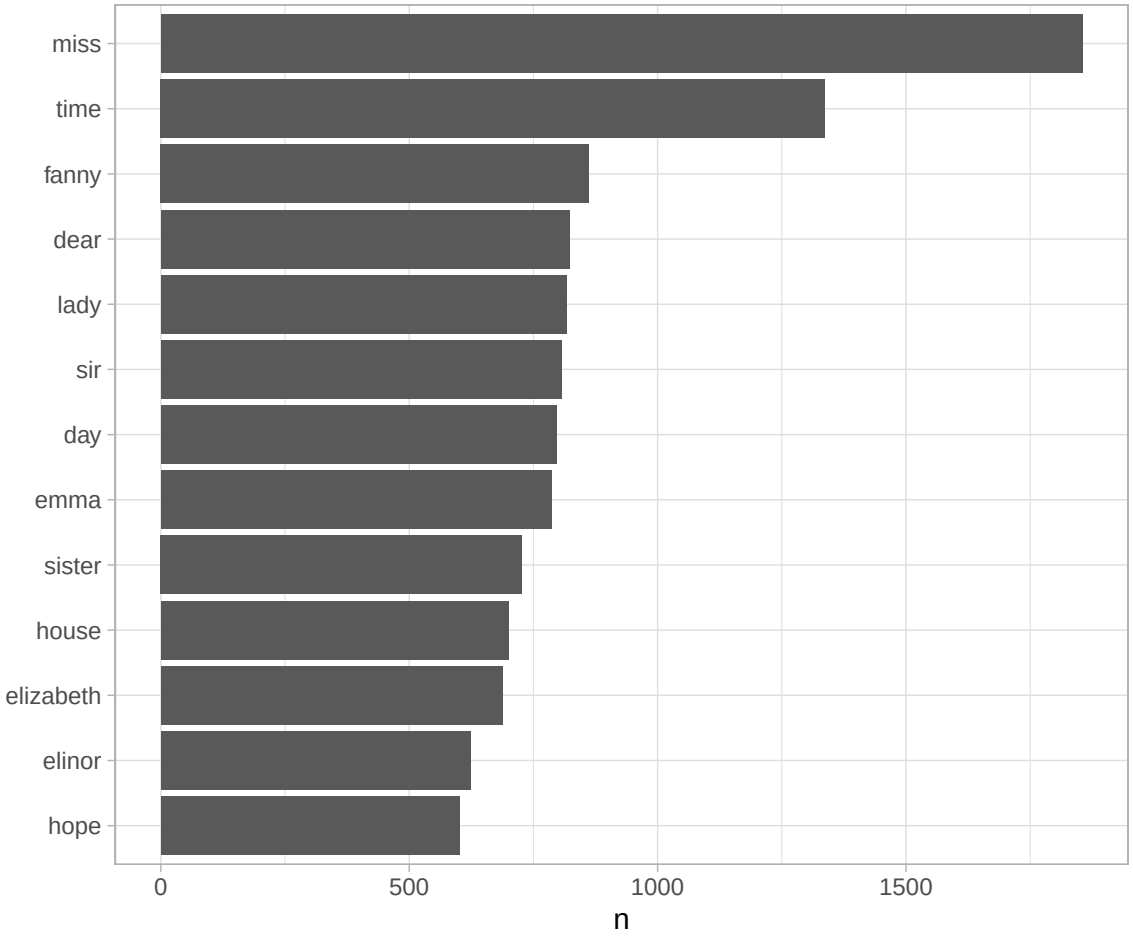


Figure 2: The most common words in Jane Austen's novels

```
## # A tibble: 11,769 x 2
##    word       n
##    <chr>  <int>
##  1 time     454
##  2 people   302
##  3 door     260
##  4 heard    249
##  5 black    232
##  6 stood    229
##  7 white    222
##  8 hand     218
##  9 kemp     213
## 10 eyes     210
## # ... with 11,759 more rows
```

```
bronte <- gutenberg_download(c(1260, 768, 969, 9182, 767))
```

```
tidy_bronte <- bronte %>%
  unnest_tokens(word, text) %>%
  anti_join(stop_words)
```

```
tidy_bronte %>%
  count(word, sort = TRUE)
```

```
## # A tibble: 23,050 x 2
##    word       n
##    <chr>  <int>
##  1 time    1065
##  2 miss     855
##  3 day      827
##  4 hand     768
##  5 eyes     713
##  6 night    647
##  7 heart    638
##  8 looked   601
##  9 door     592
## 10 half     586
## # ... with 23,040 more rows
```

```
library(tidyr)

frequency <- bind_rows(
  mutate(tidy_bronte, author = "Brontë Sisters"),
  mutate(tidy_hgwells, author = "H.G. Wells"),
  mutate(tidy_books, author = "Jane Austen")
) %>%
  mutate(word = str_extract(word, "[a-z']+")) %>%
  count(author, word) %>%
  group_by(author) %>%
  mutate(proportion = n / sum(n)) %>%
  select(-n) %>%
  spread(author, proportion) %>%
  gather(author, proportion, `Brontë Sisters`:`H.G. Wells`)
```

```
library(scales)
```

```
# expect a warning about rows with missing values being removed
ggplot(frequency, aes(x = proportion, y = `Jane Austen`, color = abs(`Jane Austen` - proportion))) +
  geom_abline(color = "gray40", lty = 2) +
  geom_jitter(alpha = 0.1, size = 2.5, width = 0.3, height = 0.3) +
  geom_text(aes(label = word), check_overlap = TRUE, vjust = 1.5) +
  scale_x_log10(labels = percent_format()) +
  scale_y_log10(labels = percent_format()) +
  scale_color_gradient(limits = c(0, 0.001), low = "darkslategray4", high = "gray75") +
  facet_wrap(~author, ncol = 2) +
  theme(legend.position = "none") +
  labs(y = "Jane Austen", x = NULL)
```

Figure 3: Comparing the word frequencies of Jane Austen, the Brontë sisters, and H.G. Wells

```
cor.test(
  data = frequency[frequency$author == "Brontë Sisters", ],
  ~ proportion + `Jane Austen`
)
```

```
##
##  Pearson's product-moment correlation
##
## data:  proportion and Jane Austen
## t = 119.65, df = 10404, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.7527869 0.7689642
## sample estimates:
##       cor
## 0.7609938
```

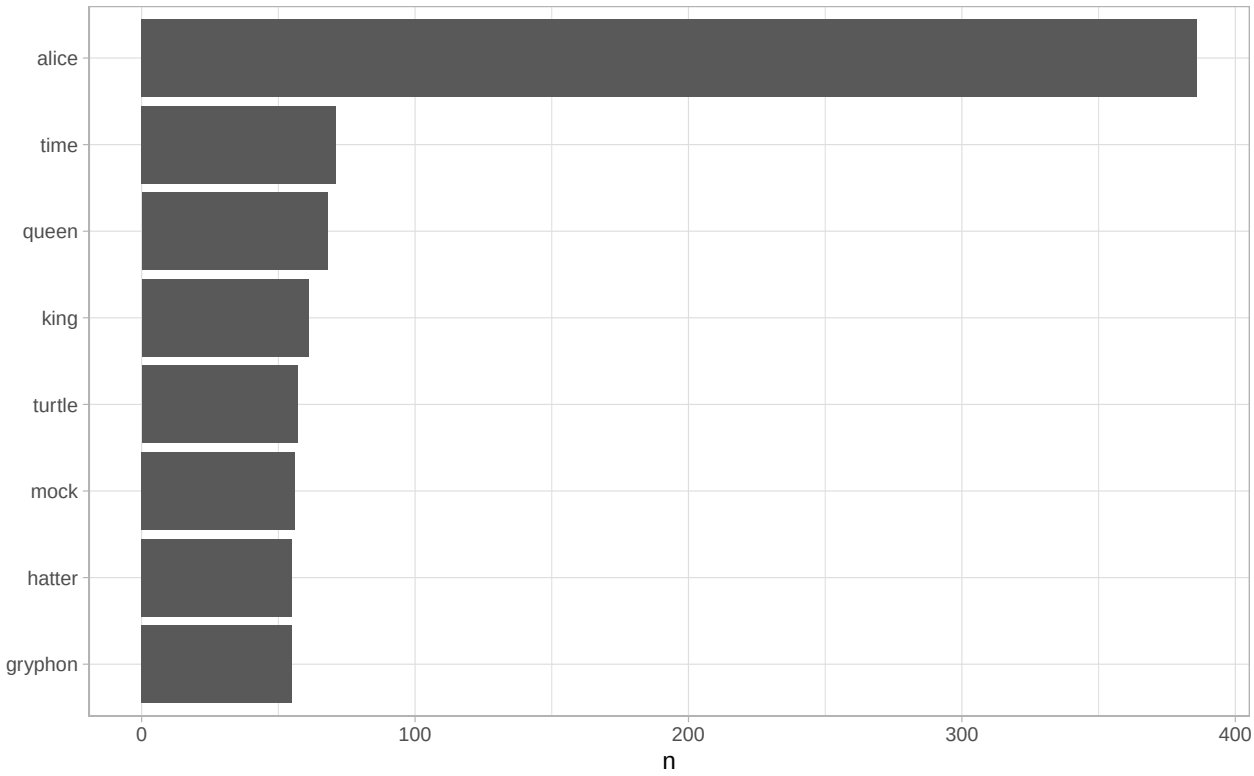
```r
cor.test(
  data = frequency[frequency$author == "H.G. Wells", ],
  ~ proportion + `Jane Austen`
)
```

```
##
##  Pearson's product-moment correlation
##
## data:  proportion and Jane Austen
## t = 36.441, df = 6053, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.4032800 0.4445987
## sample estimates:
##       cor
## 0.4241601
```

```r
## Own example: Alice

alice <- gutenberg_download(11)

tidy_alice <- alice %>%
  unnest_tokens(word, text) %>%
  anti_join(stop_words)

tidy_alice %>%
  count(word, sort = TRUE)
```

```
## # A tibble: 2,165 x 2
##    word        n
##    <chr>   <int>
##  1 alice     386
##  2 time       71
##  3 queen      68
##  4 king       61
##  5 turtle     57
##  6 mock       56
##  7 gryphon    55
##  8 hatter     55
##  9 head       49
## 10 voice      48
## # ... with 2,155 more rows
```

```r
library(ggplot2)

tidy_alice %>%
  count(word, sort = TRUE) %>%
  filter(n > 50) %>%
  mutate(word = reorder(word, n)) %>%
  ggplot(aes(word, n)) +
  geom_col() +
  xlab(NULL) +
  coord_flip()
```




```
count_alice <- tidy_alice %>%
  count(word, sort = TRUE)

count_wells <- tidy_hgwells %>%
  count(word, sort = TRUE)

library(ggplot2)

# Error in data.frame(count_alice$n, count_wells$n) :
# arguments imply differing number of rows: 2165, 11769
# let's prune

count_wells <- count_wells[1:2165, ]

# df <- data.frame(count_alice$n,count_wells$n)

cor(count_alice$n, count_wells$n, method = "spearman")
```

```
## [1] 0.9325155
```

```
cor.test(count_alice$n, count_wells$n, method = "spearman", alternative = "greater")
```

```
##
##  Spearman's rank correlation rho
##
## data:  count_alice$n and count_wells$n
## S = 114136991, p-value < 2.2e-16
## alternative hypothesis: true rho is greater than 0
## sample estimates:
##       rho
```

```
## 0.9325155
```