Solution slides Part 4
Introduction to R & Data for Humanities

Afternoon session

Text-mining with Tidyverse

Exercise 11

11a.

```{r}

# Excercise 11a. Can you set the number of words in each n-gram to 2 in the code below? This allows us to examine pairs of two consecutive words, called 'bigrams' in Austen's novels

library(dplyr)
library(tidytext)
library(janeaustenr)

austen_bigrams <- austen_books() %>%
  unnest_tokens(bigram, text, token = "ngrams", n = 2)

austen_bigrams
```

book <fctr>	bigram <chr>
Sense & Sensibility	was at
Sense & Sensibility	at norland
Sense & Sensibility	norland park
Sense & Sensibility	park in
Sense & Sensibility	in the
Sense & Sensibility	the centre
Sense & Sensibility	centre of
Sense & Sensibility	their property
Sense & Sensibility	property where
Sense & Sensibility	where for

31-40 of 675,025 rows

Previous 1 2 3 4 5 6 ... 100 Next

Notice that these bigrams overlap: "norland park" is one token, while "park in" is another.

11b.

The output here is based on running the piece of code in blue.

```{r}

# Exercise 11b.When we count our bigrams using dlpyr's count(), we see that a lot of the most common bigrams are pairs of common words, like stop words. Run this code and you'll see…


austen_bigrams %>%
  count(bigram, sort = TRUE)

# We are of course not only interested in the stop word bigrams. So let's filter our n-grams with tidyr's separate() and remove cases where either word is a stop word. Run it!

library(tidyr)

bigrams_separated <- austen_bigrams %>%
  separate(bigram, c("word1", "word2"), sep = " ")

bigrams_filtered <- bigrams_separated %>%
  filter(!word1 %in% stop_words$word) %>%
  filter(!word2 %in% stop_words$word)

# new bigram counts:
bigram_counts <- bigrams_filtered %>%
  count(word1, word2, sort = TRUE)

bigram_counts
```

bigram <chr>	n <int>
NA	12242
of the	2853
to be	2670
in the	2221
it was	1691
i am	1485
she had	1405
of her	1363
to the	1315
she was	1309

1-10 of 193,210 rows

Previous 1 2 3 4 5 6 … 100 Next

11b. (resumed)

```
# We are of course not only interested in the stop word bigrams. So let's filter our n-grams with tidyr's separate() and remove cases where either word is a stop word. Run it!

library(tidyr)

bigrams_separated <- austen_bigrams %>%
  separate(bigram, c("word1", "word2"), sep = " ")

bigrams_filtered <- bigrams_separated %>%
  filter(!word1 %in% stop_words$word) %>%
  filter(!word2 %in% stop_words$word)

# new bigram counts:
bigram_counts <- bigrams_filtered %>%
  count(word1, word2, sort = TRUE)

bigram_counts
```

Looks familiar? Again with the proper nouns, that is: names!

word1 <chr>	word2 <chr>	n <int>
NA	*NA*	12242
sir	thomas	266
miss	crawford	196
captain	wentworth	143
miss	woodhouse	143
frank	churchill	114
lady	russell	110
sir	walter	108
lady	bertram	101
miss	fairfax	98

1-10 of 28,975 rows

Previous 1 2 3 4 5 6 ... 100 Next

11c.

```
# Exercise 11c. We will now use tidyr's unite() function to recombine the columns into one. Using the
"separate/filter/count/unite" combination lets us find the most common bigrams not containing stop-words. Run the code below.


bigrams_united <- bigrams_filtered %>%
  unite(bigram, word1, word2, sep = " ")

bigrams_united
```

book <fctr>	bigram <chr>
Sense & Sensibility	fortune independent
Sense & Sensibility	father's inheriting
Sense & Sensibility	thousand pounds
Sense & Sensibility	remaining moiety
Sense & Sensibility	wife's fortune
Sense & Sensibility	NA NA
Sense & Sensibility	gentleman died
Sense & Sensibility	destroyed half
Sense & Sensibility	son's son
Sense & Sensibility	valuable woods

31-40 of 51,155 rows

Previous 1 2 3 4 5 6 ... 100 Next

11d.

```
# Exercise 11d. We can look at the tf-idf of bigrams across Austen's novels. These tf-idf values can be visualized within each book, just as we did for words. Can you complete the code below and produce a tibble and visualization of your results all at once?

bigram_tf_idf <- bigrams_united %>%
  count(book, bigram) %>%
  bind_tf_idf(bigram, book, n) %>%
  arrange(desc(tf_idf))

bigram_tf_idf
```

book <fctr>	bigram <chr>	n <int>	tf <dbl>	idf <dbl>	tf_idf <dbl>
Mansfield Park	sir thomas	266	0.0244238362	1.7917595	0.0437616398
Persuasion	captain wentworth	143	0.0232142857	1.7917595	0.0415944162
Mansfield Park	miss crawford	196	0.0179965109	1.7917595	0.0322454188
Persuasion	lady russell	110	0.0178571429	1.7917595	0.0319957048
Persuasion	sir walter	108	0.0175324675	1.7917595	0.0314139647
Emma	miss woodhouse	143	0.0128817224	1.7917595	0.0230809480
Northanger Abbey	miss tilney	74	0.0127828641	1.7917595	0.0229038177
Sense & Sensibility	colonel brandon	96	0.0114572145	1.7917595	0.0205285725
Sense & Sensibility	sir john	94	0.0112185225	1.7917595	0.0201008939
Emma	frank churchill	114	0.0102693451	1.7917595	0.0184001963

1-10 of 31,397 rows

Exercise 12

12a.

```r
# Exercise 12a. We want to find out what words tend to appear within each 10-line section of Austen's Pride and Prejudice.
Let's first find the Most Common Words, filtering out stop words. Can you complete the code?

austen_section_words <- austen_books() %>%
  filter(book == "Pride & Prejudice") %>%
  mutate(section = row_number() %/% 10) %>%
  filter(section > 0) %>%
  unnest_tokens(word, text) %>%
  filter(!word %in% stop_words$word)

austen_section_words
```

book <fctr>	section <dbl>	word <chr>
Pride & Prejudice	1	truth
Pride & Prejudice	1	universally
Pride & Prejudice	1	acknowledged
Pride & Prejudice	1	single
Pride & Prejudice	1	possession
Pride & Prejudice	1	fortune
Pride & Prejudice	1	wife
Pride & Prejudice	1	feelings
Pride & Prejudice	1	views
Pride & Prejudice	1	entering

1-10 of 37,240 rows

Previous 1 2 3 4 5 6 ... 100 Next

12b.

```r
# Exercise 12b.Can you complete the count by using the function mentioned above and providing it with the information on what to count?

library(widyr)

# count words co-occuring within sections
word_pairs <- austen_section_words %>%
  pairwise_count(word, section, sort = TRUE)

word_pairs
```

item1 <chr>	item2 <chr>	n <dbl>
darcy	elizabeth	144
elizabeth	darcy	144
miss	elizabeth	110
elizabeth	miss	110
elizabeth	jane	106
jane	elizabeth	106
miss	darcy	92
darcy	miss	92
elizabeth	bingley	91
bingley	elizabeth	91

1-10 of 796,008 rows

Previous 1 2 3 4 5 6 ... 100 Next

12c.

```{r}

# Excercise 12c.The syntax of the pairwise_corr() function is similar to that of pairwise_count(). Just run it!

# we need to filter for at least relatively common words first
word_cors <- austen_section_words %>%
  group_by(word) %>%
  filter(n() >= 20) %>%
  pairwise_cor(word, section, sort = TRUE)

word_cors
```

item1 <chr>	item2 <chr>	correlation <dbl>
bourgh	de	0.9508501
de	bourgh	0.9508501
pounds	thousand	0.7005808
thousand	pounds	0.7005808
william	sir	0.6644719
sir	william	0.6644719
catherine	lady	0.6633048
lady	catherine	0.6633048
forster	colonel	0.6220950
colonel	forster	0.6220950

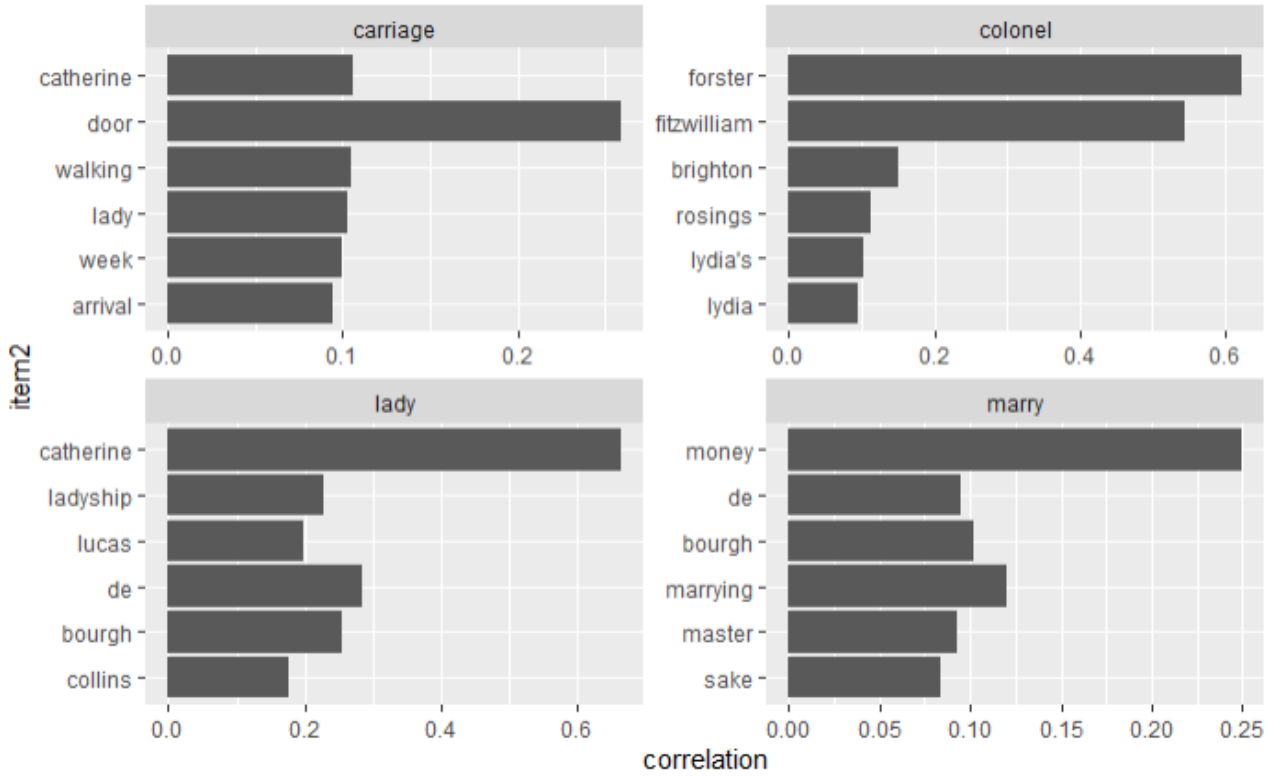
1-10 of 154,842 rows

Previous 1 2 3 4 5 6 ... 100 Next

12d.

```r
# Exercise 12d.Let's pick some interesting words and find the other words most associated with them! You can pick your own and add them to the code below. And do you remember the function we have used a few times to plot your results? Fill it in as well!

word_cors %>%
  filter(item1 %in% c("lady", "colonel", "carriage", "marry")) %>%
  group_by(item1) %>%
  slice_max(correlation, n = 6) %>%
  ungroup() %>%
  mutate(item2 = reorder(item2, correlation)) %>%
  ggplot(aes(item2, correlation)) +
  geom_bar(stat = "identity") +
  facet_wrap(~ item1, scales = "free") +
  coord_flip()
```



One of the word correlations that stand out (both in the tibble in exercise 12c and in this visualization, is the one between "marry" and "money". This could be a semantic relationship to explore in further analyses.