Text Analysis of Correlaid

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Seperate Analysis on Each Article ## P-Value Article We want to analyze the passage from https://correlaid.org/blog/posts/understand-p-values.

```
library(tidytext)
```

```
## Warning: package 'tidytext' was built under R version 3.4.4
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.4.4
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(stringr)
```

```
## Warning: package 'stringr' was built under R version 3.4.4
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.4.4
```

```
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 3.4.4
```

```
correlaid_txt <- read.delim("correlaid_pvalue.txt")
correlaid_txt <- data.frame(lapply(correlaid_txt, as.character), stringsAsFactors=FALSE)
colnames(correlaid_txt) <- c("text")
correlaid_txt %>% unnest_tokens(output = word,input = text) -> token_correlaid

data("stop_words")
token_correlaid %>%
  anti_join(stop_words) -> tidy_correlaid
```

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

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

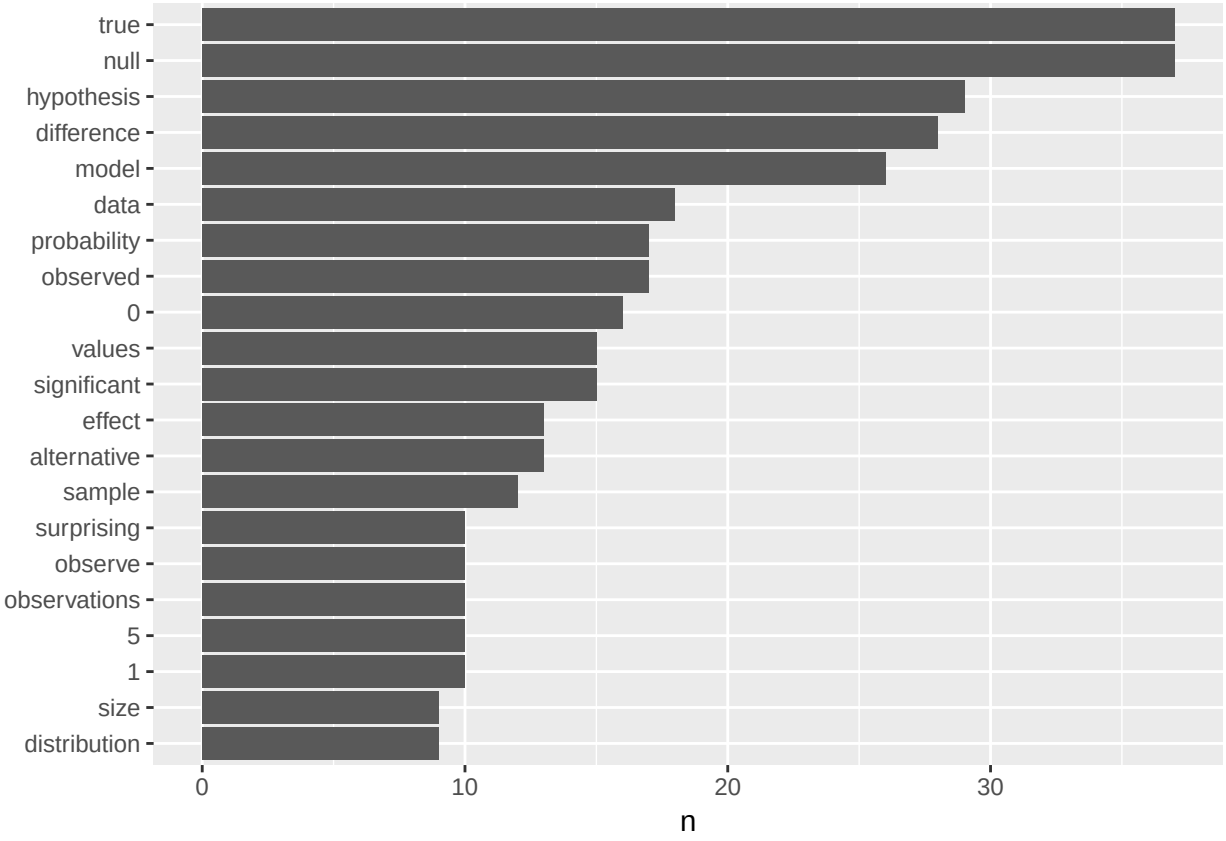
```
## Warning: package 'bindrcpp' was built under R version 3.4.4
```

```
## # A tibble: 282 x 2
##    word            n
##    <chr>       <int>
##  1 null           37
```

```
##  2 true           37
##  3 hypothesis     29
##  4 difference     28
##  5 model          26
##  6 data           18
##  7 observed       17
##  8 probability    17
##  9 0              16
## 10 significant    15
## # ... with 272 more rows
```

```
tidy_correlaid %>%
  count(word,sort=TRUE) %>%
  top_n(20) %>%
  mutate(word=reorder(word,n)) %>%  #reorder
  ggplot(aes(word, n)) +
  geom_col() +
  xlab(NULL) +
  coord_flip()
```

```
## Selecting by n
```



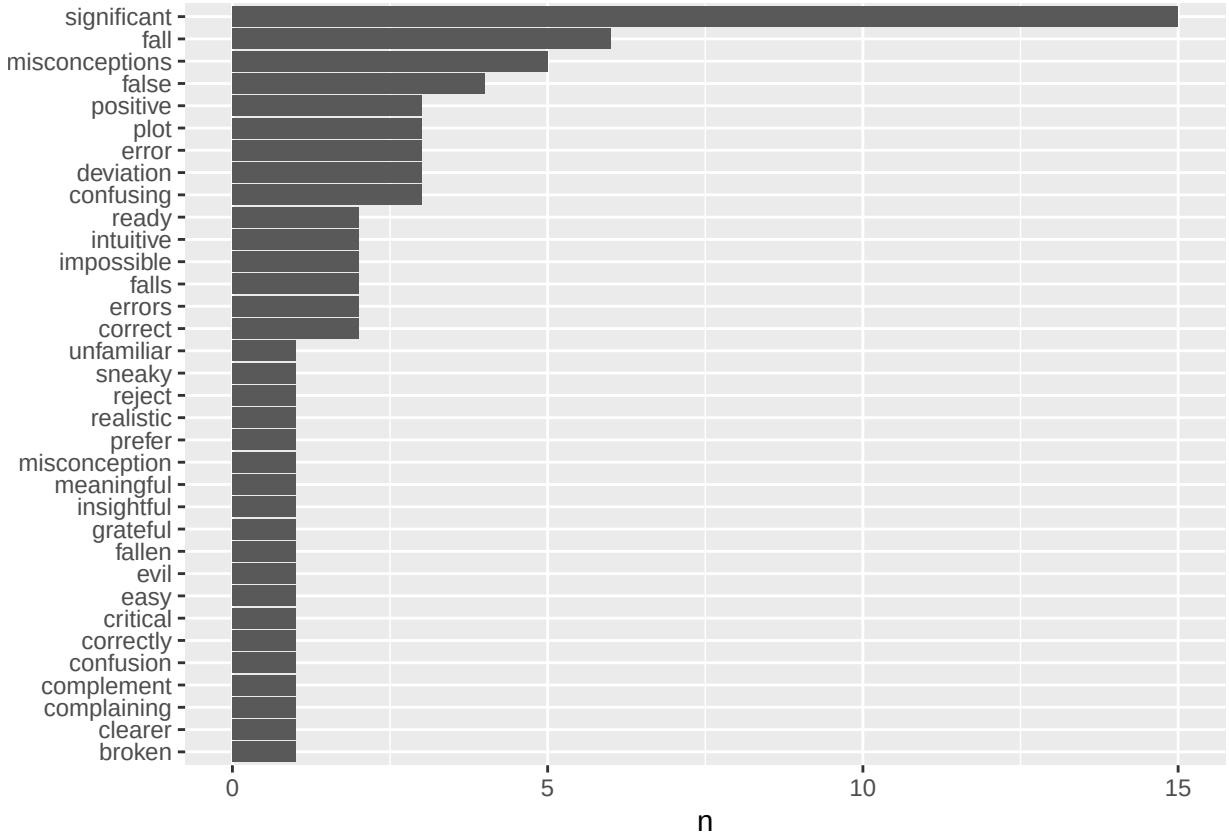
After eliminating the stop words in the article, we order the words appeared in the passage by frequency and we made a ggplot to show the 20 most frequent words appear in the article.

```
sentiment_correlaid <- tidy_correlaid %>%  #With Bing
  inner_join(get_sentiments("bing"))%>%
  mutate(method = "Bing")
```

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

```
sentiment_correlaid %>%
  count(word,sort=TRUE) %>%
  top_n(20) %>%
  mutate(word=reorder(word,n)) %>%
  ggplot(aes(word, n)) +
  geom_col() +
  xlab(NULL) +
  coord_flip()
```

```
## Selecting by n
```



In order to get an odea of the passage's sentiment on P-Value, we applied Bing sentiment package, and made a ggplot of the top 20 sentimental words in the article. The first one "significant" is about 3 times more frequent than the second word in order. That should be due to the term "statistically significant". Then we want to compare the results from the other two packages of sentimenal words: AFINN and NRC.

```
sentiment_correlaid_AF <- tidy_correlaid %>%
  inner_join(get_sentiments("afinn"))%>%
  mutate(method = "AFINN")
```

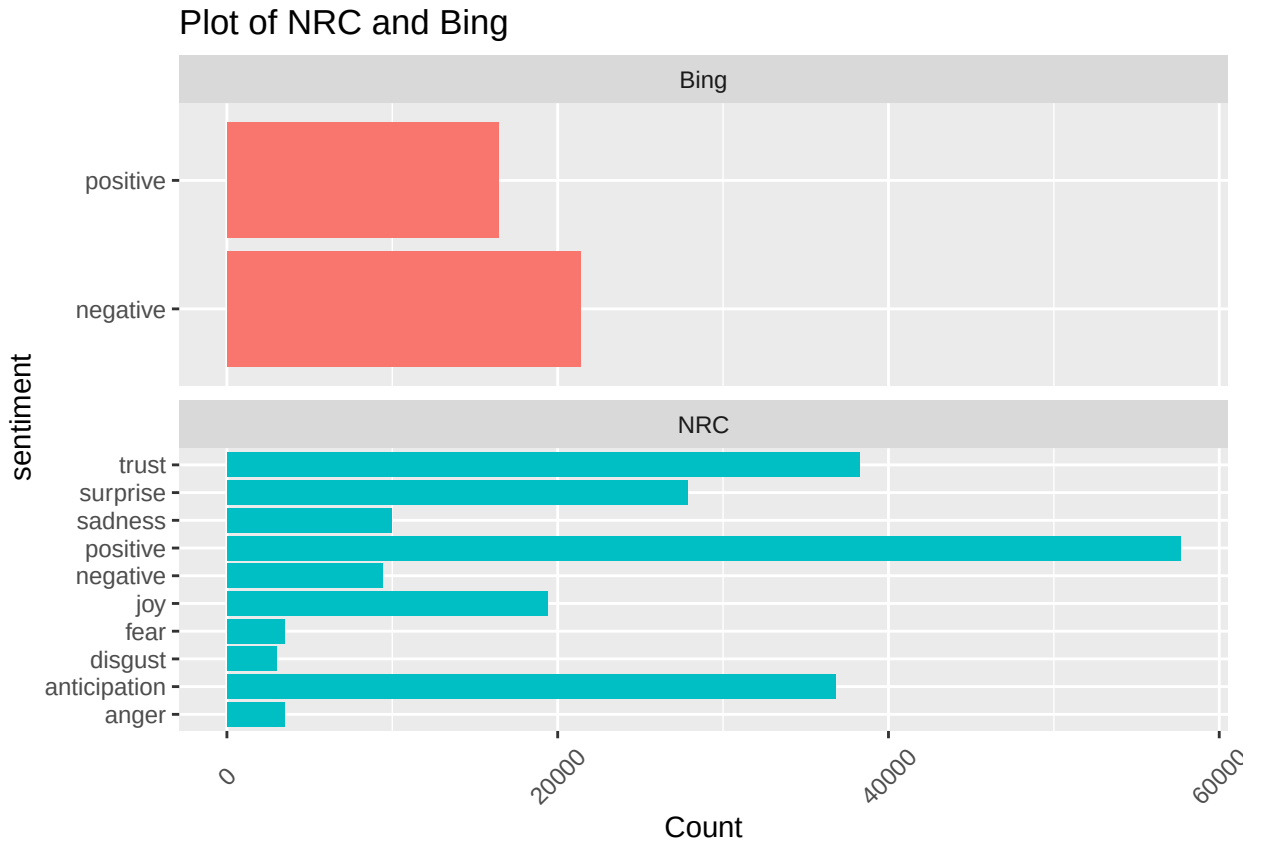
```
## Joining, by = "word"
```

```
sentiment_correlaid_NRC <- tidy_correlaid %>%
  inner_join(get_sentiments("nrc"))%>%
  mutate(method = "NRC")
```

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

```
bind_rows(sentiment_correlaid,
          sentiment_correlaid_NRC) %>%
```

```
  mutate(Count=n()) -> three_pack
ggplot(aes(sentiment, Count,fill = method),data=three_pack) +
  geom_col(show.legend = FALSE)+
  facet_wrap(~method, ncol = 1, scales = "free_y")+
  theme(axis.text.x = element_text(angle = 45, hjust = 0.5, vjust = 0.5))+
  coord_flip()+
  ggtitle("Plot of NRC and Bing")
```

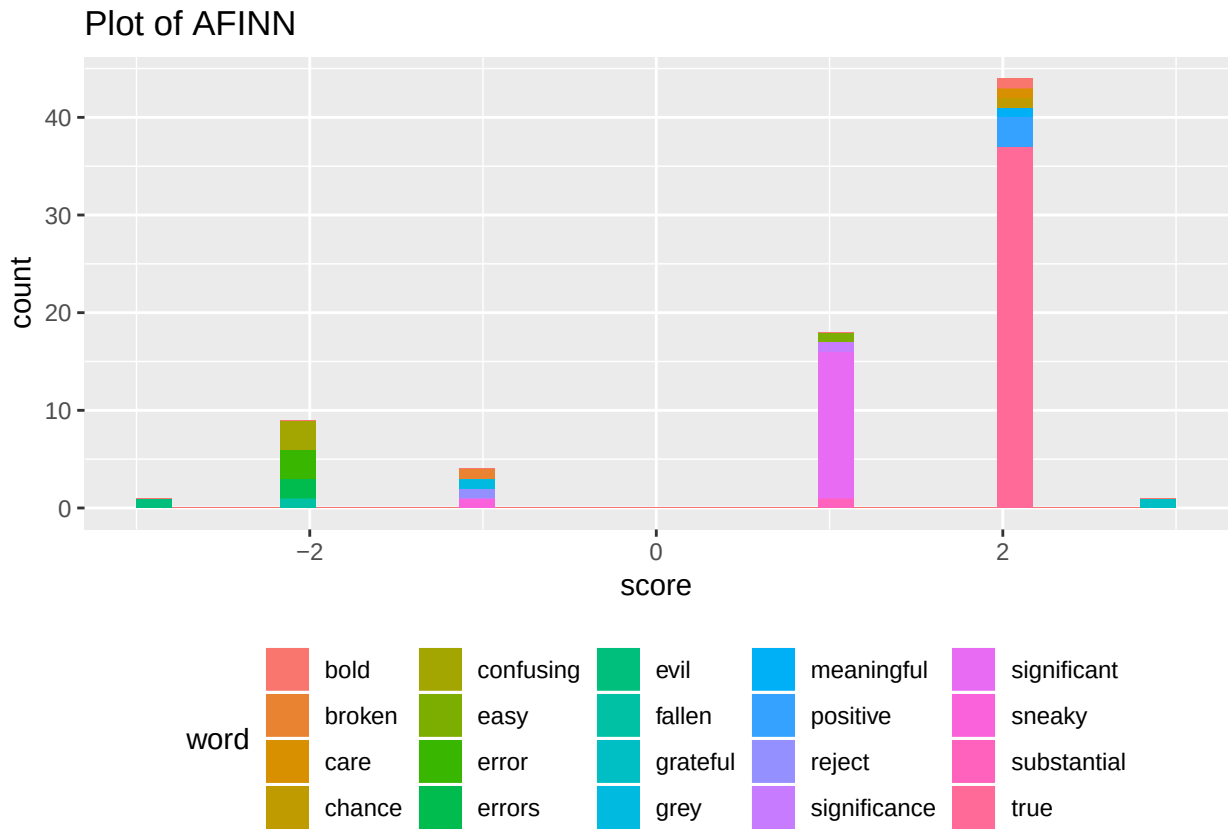



```
#Because AFINN's results are in numerical continuous scale, so we draw a seperate plot for it.

sentiment_correlaid_AF %>%
  ggplot()+
  geom_histogram(aes(x=score,fill=word),stat="bin",show.legend = TRUE)+
  theme(legend.position="bottom")+
  scale_alpha_discrete(breaks=c(-3,-2,-1,0,1,2,3))+
  ggtitle("Plot of AFINN")
```

```
## Warning: Using alpha for a discrete variable is not advised.
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



We want to also see the wordcloud.

```
library(wordcloud)
```

```
## Warning: package 'wordcloud' was built under R version 3.4.4
```

```
## Loading required package: RColorBrewer
```

```
tidy_correlaid %>%
  count(word) %>%
  with(wordcloud(word, n, max.words = 100))
```

```
## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'let's' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'let's' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'let's' in 'mbcsToSbcs': dot substituted for <99>
```

```
## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'let's' in 'mbcsToSbcs': dot substituted
## for <e2>
```

```
## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'let's' in 'mbcsToSbcs': dot substituted
## for <80>
```

```
## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'let's' in 'mbcsToSbcs': dot substituted
## for <99>
```

```
## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : font metrics unknown for Unicode character U+2019

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'don't' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'don't' in 'mbcsToSbcs': dot substituted for <80>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'don't' in 'mbcsToSbcs': dot substituted for <99>

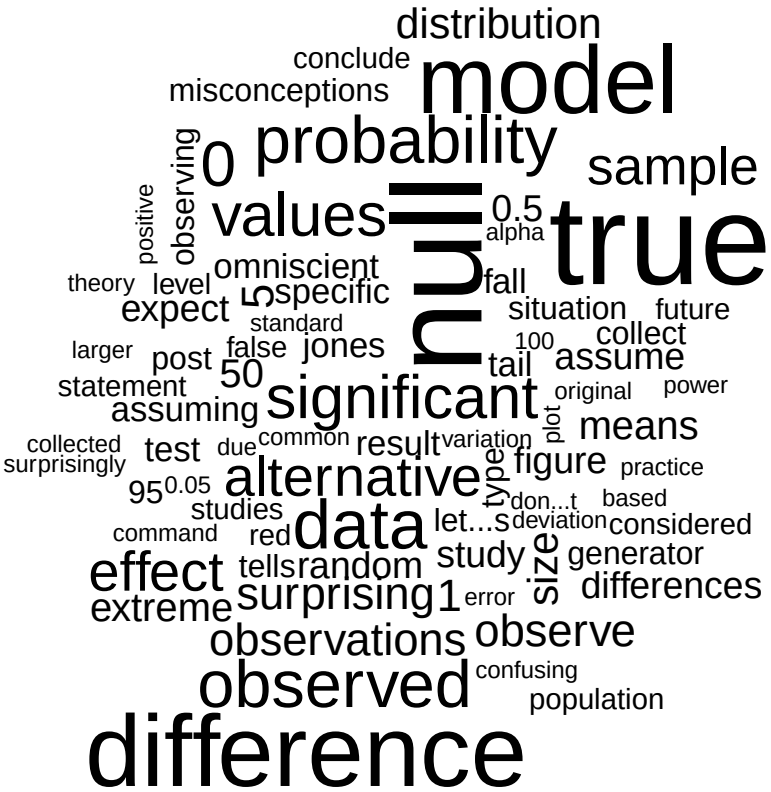
## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'don't' in 'mbcsToSbcs': dot substituted
## for <e2>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'don't' in 'mbcsToSbcs': dot substituted
## for <80>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'don't' in 'mbcsToSbcs': dot substituted
## for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : font metrics unknown for Unicode character U+2019

## Warning in wordcloud(word, n, max.words = 100): hypothesis could not be fit
## on page. It will not be plotted.
```




```
library(reshape2)
```

```
## Warning: package 'reshape2' was built under R version 3.4.3
```

```
##
## Attaching package: 'reshape2'
```

```
## The following object is masked from 'package:tidyr':
##
##     smiths
```

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

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

From the Data to the Story Article

We want to analyze the passage from https://correlaid.org/blog/posts/journocode-workflow.

```
library(tidytext)
library(dplyr)
library(stringr)
library(ggplot2)

correlaid_txt2 <- read.delim("correlaid_fromdatatostory.txt")
correlaid_txt2 <- data.frame(lapply(correlaid_txt2, as.character), stringsAsFactors=FALSE)
colnames(correlaid_txt2) <- c("text")
correlaid_txt2 %>% unnest_tokens(output = word,input = text) -> token_correlaid2

data("stop_words")
token_correlaid2 %>%
  anti_join(stop_words) -> tidy_correlaid2
```

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

```
tidy_correlaid2 %>%
  count(word,sort=TRUE)
```

```
## # A tibble: 285 x 2
##    word          n
##    <chr>     <int>
##  1 data         35
##  2 column       11
##  3 district     11
##  4 merge        10
##  5 analysis      9
##  6 id            9
##  7 shapefile     9
##  8 ids           8
##  9 age           7
## 10 let's         6
## # ... with 275 more rows
```

```
tidy_correlaid2 %>%
  count(word,sort=TRUE) %>%
  top_n(20) %>%
  mutate(word=reorder(word,n)) %>%  #reorder
  ggplot(aes(word, n)) +
  geom_col() +
  xlab(NULL) +
  coord_flip()
```

```
## Selecting by n
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let’s' in 'mbcsToSbcs': dot substituted for <99>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we’ll' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we’ll' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we’ll' in 'mbcsToSbcs': dot substituted for <99>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <99>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <99>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <99>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for <99>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for <99>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x,
## x$y, : conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for
## <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x,
## x$y, : conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for
## <80>

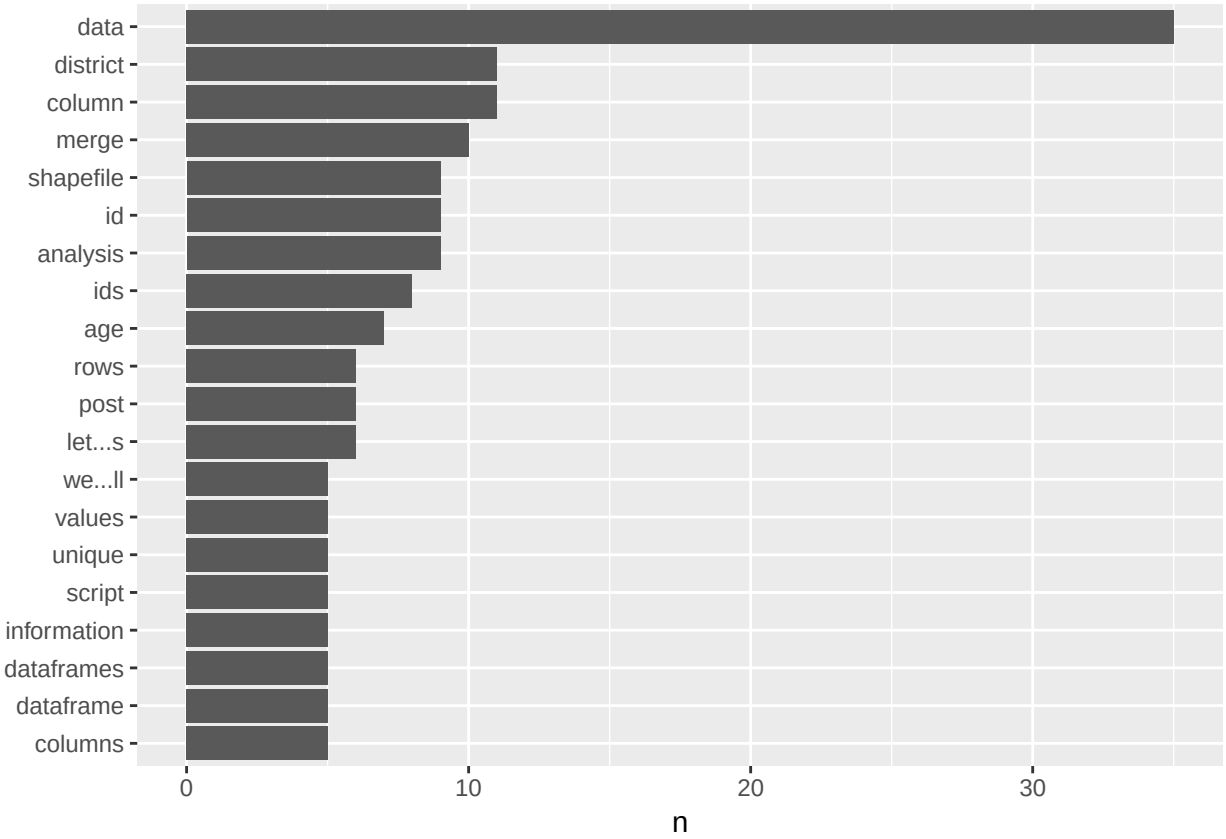
## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x,
## x$y, : conversion failure on 'we'll' in 'mbcsToSbcs': dot substituted for
## <99>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x,
## x$y, : conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for
## <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x,
## x$y, : conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for
```

```
## <80>
```

```
## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x,
## x$y, : conversion failure on 'let's' in 'mbcsToSbcs': dot substituted for
## <99>
```



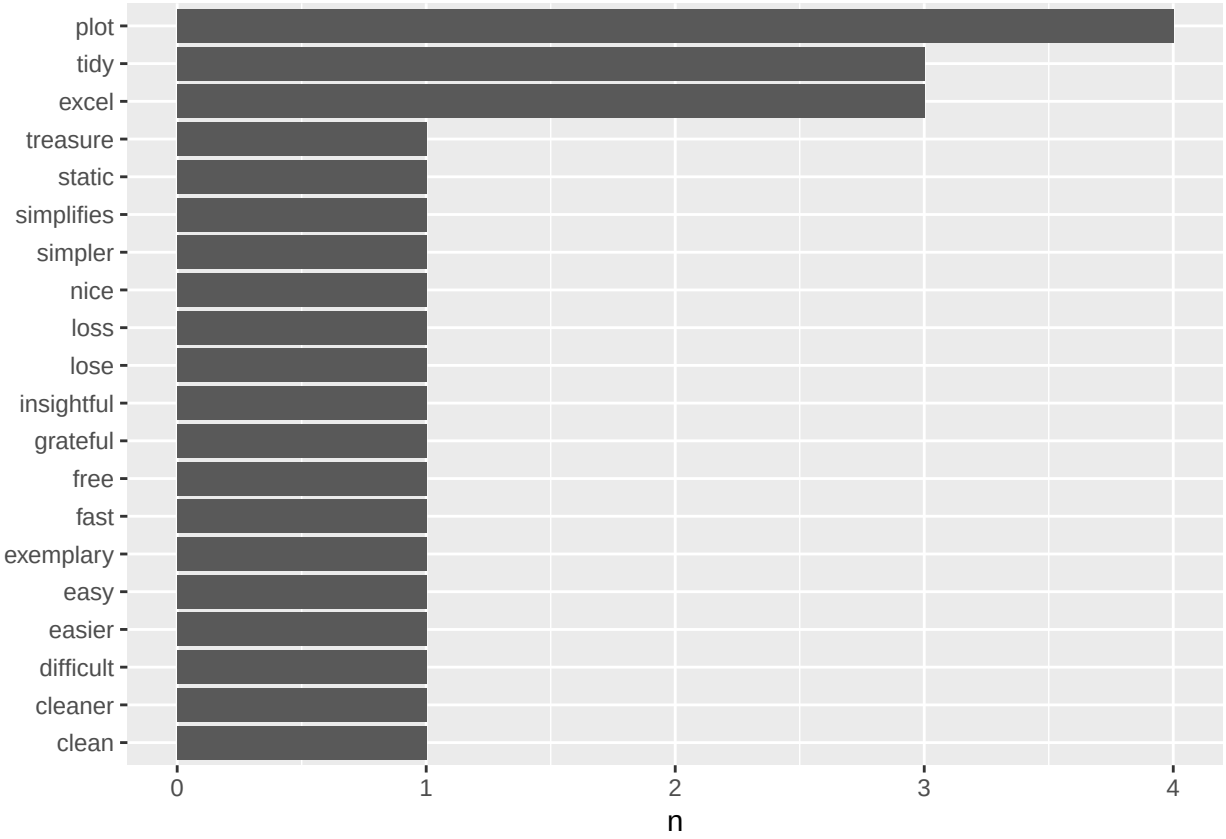
After eliminating the stop words in the article, we order the words appeared in the passage by frequency and we made a ggplot to show the 20 most frequent words appear in the article.

```
sentiment_correlaid2 <- tidy_correlaid2 %>%  #With Bing
  inner_join(get_sentiments("bing"))%>%
  mutate(method = "Bing")
```

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

```
sentiment_correlaid2 %>%
  count(word,sort=TRUE) %>%
  top_n(20) %>%
  mutate(word=reorder(word,n)) %>%
  ggplot(aes(word, n)) +
  geom_col() +
  xlab(NULL) +
  coord_flip()
```

```
## Selecting by n
```



In order to get an odea of the passage's sentiment on this article, we applied Bing sentiment package, and made a ggplot of the top 20 sentimental words in the article. The first three are "plot", "excel" and "tidy", which is reasonable because this is a tutorial of R. Then we want to compare the results from the other two packages of sentimenal words: AFINN and NRC.

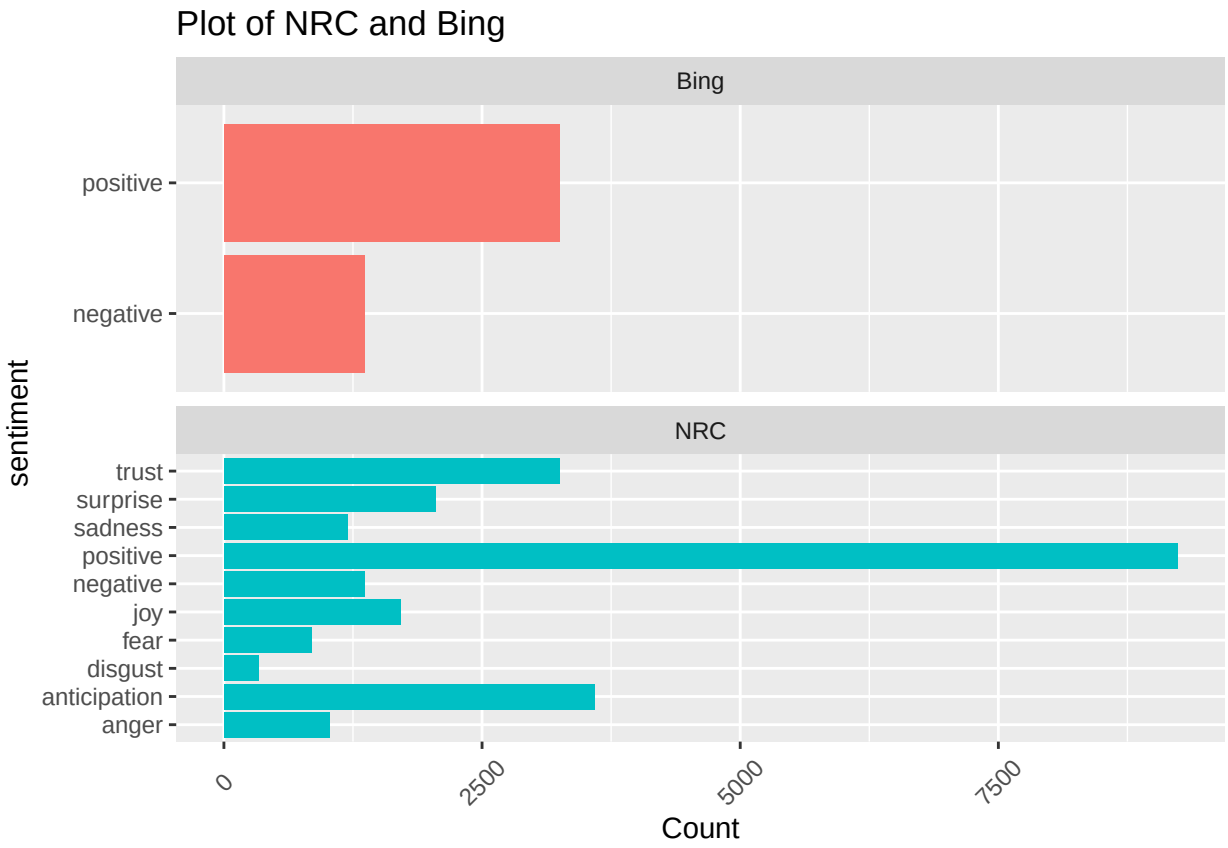
```
sentiment_correlaid_AF2 <- tidy_correlaid2 %>%
  inner_join(get_sentiments("afinn"))%>%
  mutate(method = "AFINN")
```

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

```
sentiment_correlaid_NRC2 <- tidy_correlaid2 %>%
  inner_join(get_sentiments("nrc"))%>%
  mutate(method = "NRC")
```

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

```
bind_rows(sentiment_correlaid2,
          sentiment_correlaid_NRC2) %>%
  mutate(Count=n()) -> three_pack2
ggplot(aes(sentiment, Count,fill = method),data=three_pack2) +
  geom_col(show.legend = FALSE)+
  facet_wrap(~method, ncol = 1, scales = "free_y")+
  theme(axis.text.x = element_text(angle = 45, hjust = 0.5, vjust = 0.5))+
  coord_flip()+
  ggtitle("Plot of NRC and Bing")
```

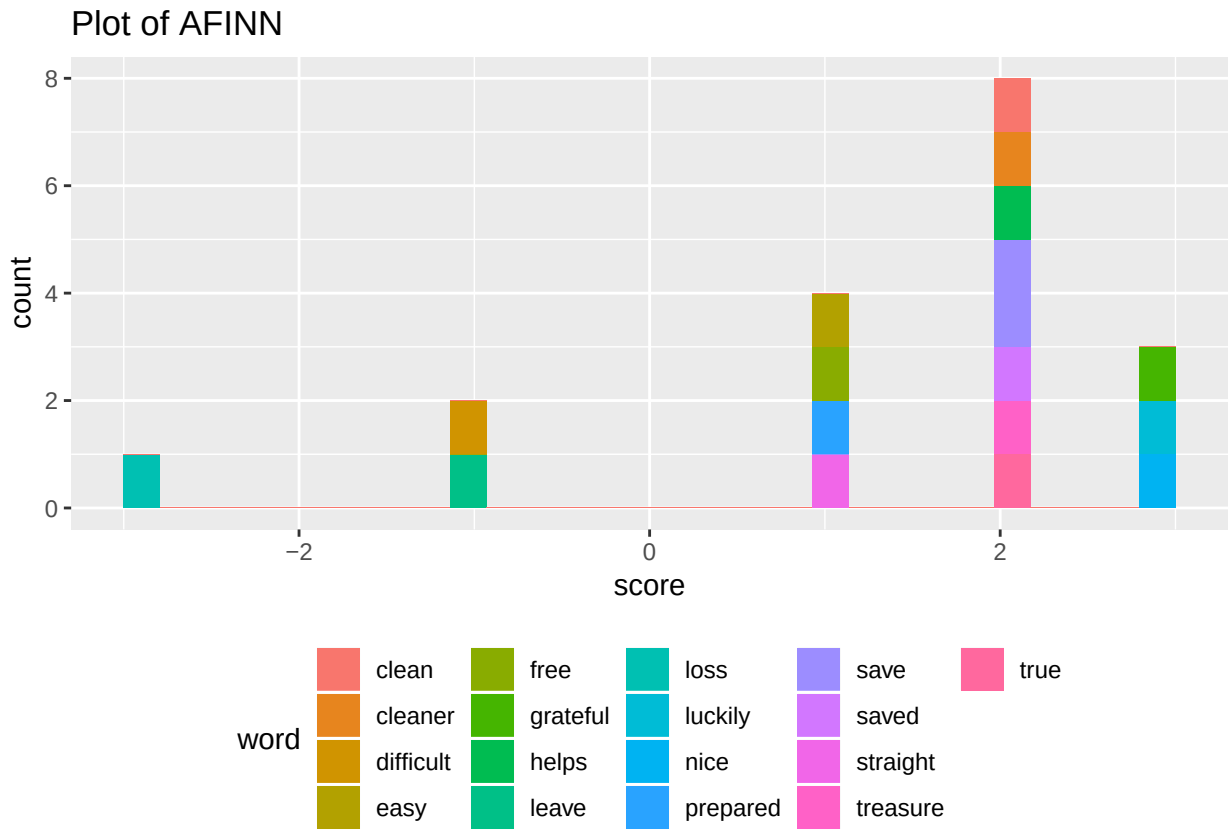



```
#Because AFINN's results are in numerical continuous scale, so we draw a seperate plot for it.

sentiment_correlaid_AF2 %>%
  ggplot()+
  geom_histogram(aes(x=score,fill=word),stat="bin",show.legend = TRUE)+
  theme(legend.position="bottom")+
  scale_alpha_discrete(breaks=c(-3,-2,-1,0,1,2,3))+
  ggtitle("Plot of AFINN")
```

```
## Warning: Using alpha for a discrete variable is not advised.
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



We want to also see the wordcloud.

```
library(wordcloud)
tidy_correlaid2 %>%
  count(word) %>%
  with(wordcloud(word, n, max.words = 100))
```

```
## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'district's' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'district's' in 'mbcsToSbcs': dot substituted for <80>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'district's' in 'mbcsToSbcs': dot substituted for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt
## = rotWord * : conversion failure on 'district's' in 'mbcsToSbcs': dot
## substituted for <e2>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt
## = rotWord * : conversion failure on 'district's' in 'mbcsToSbcs': dot
## substituted for <80>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt
## = rotWord * : conversion failure on 'district's' in 'mbcsToSbcs': dot
## substituted for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : font metrics unknown for Unicode character U+2019

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
```

```
## 'let’s' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'let’s' in 'mbcsToSbcs': dot substituted for <80>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'let’s' in 'mbcsToSbcs': dot substituted for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'let’s' in 'mbcsToSbcs': dot substituted
## for <e2>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'let’s' in 'mbcsToSbcs': dot substituted
## for <80>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'let’s' in 'mbcsToSbcs': dot substituted
## for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : font metrics unknown for Unicode character U+2019

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'we’ll' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'we’ll' in 'mbcsToSbcs': dot substituted for <80>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'we’ll' in 'mbcsToSbcs': dot substituted for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'we’ll' in 'mbcsToSbcs': dot substituted
## for <e2>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'we’ll' in 'mbcsToSbcs': dot substituted
## for <80>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'we’ll' in 'mbcsToSbcs': dot substituted
## for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : font metrics unknown for Unicode character U+2019

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'isn’t' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'isn’t' in 'mbcsToSbcs': dot substituted for <80>

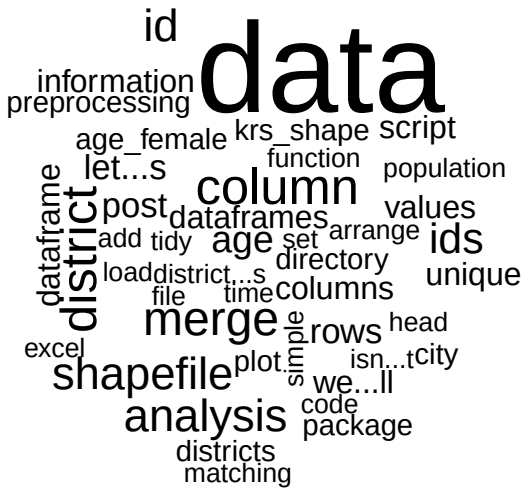
## Warning in strwidth(words[i], cex = size[i], ...): conversion failure on
## 'isn’t' in 'mbcsToSbcs': dot substituted for <99>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'isn’t' in 'mbcsToSbcs': dot substituted
## for <e2>

## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'isn’t' in 'mbcsToSbcs': dot substituted
## for <80>
```

```
## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : conversion failure on 'isn't' in 'mbcsToSbcs': dot substituted
## for <99>
```

```
## Warning in text.default(x1, y1, words[i], cex = size[i], offset = 0, srt =
## rotWord * : font metrics unknown for Unicode character U+2019
```




```
library(reshape2)
tidy_correlaid2 %>%
  inner_join(get_sentiments("bing")) %>%
  count(word, sentiment, sort = TRUE) %>%
  acast(word ~ sentiment, value.var = "n", fill = 0) %>%
  comparison.cloud(colors = c("black", "red"),
                   max.words = 100)
```

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

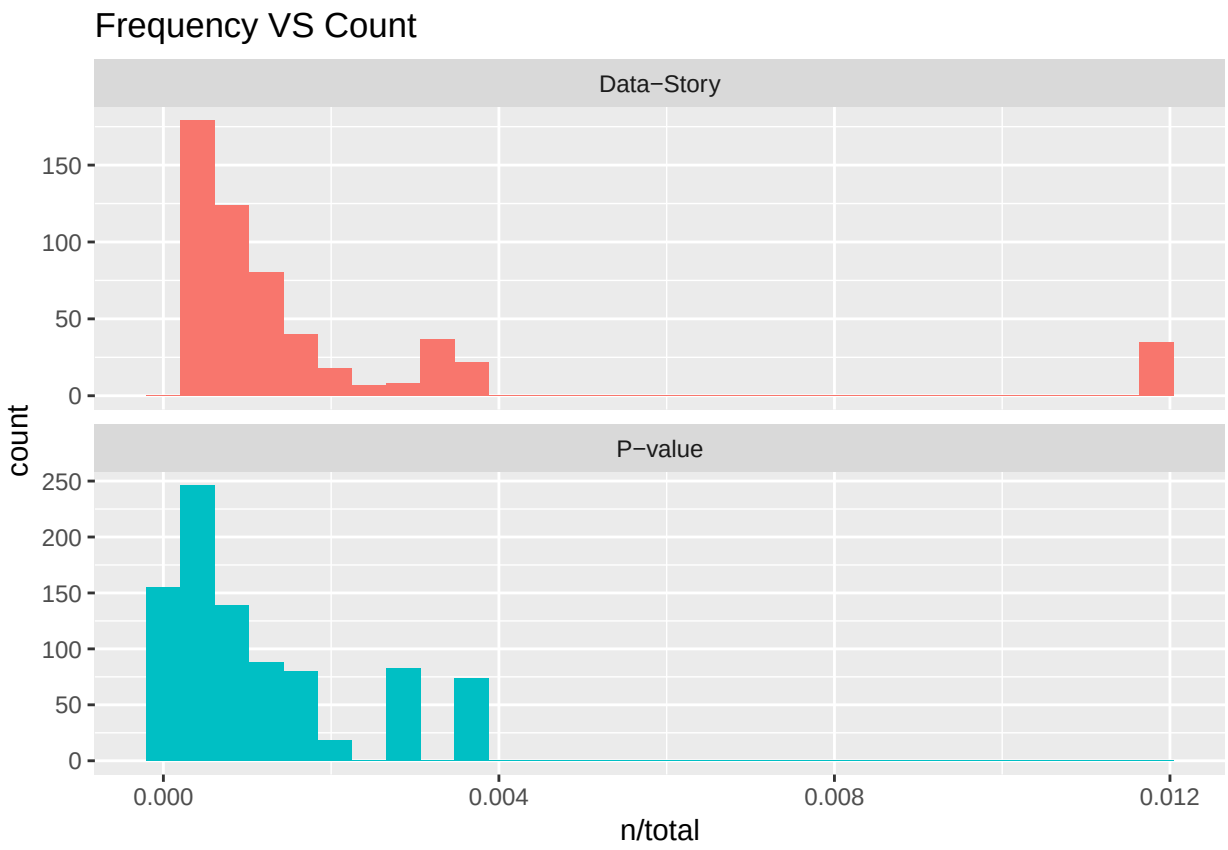
Combined Analysis on Two Articles To find important words for the context by decreasing the weight for commonly used words, we apply bind_tf_idf function for these two article.

```
tidy_correlaid %>% group_by(word) %>%
  mutate(n=n()) %>%
  mutate(article="P-value") %>%
  arrange(n)-> correlaid_words
tidy_correlaid2 %>% group_by(word) %>%
  mutate(n=n()) %>%
  mutate(article="Data-Story") %>%
  arrange(n) -> correlaid_words2
total_words <- rbind(correlaid_words,correlaid_words2)
total_words %>% group_by(article) %>%
```

```
  mutate(total=sum(n)) %>%
  mutate(rank=row_number(), `term frequency`= n/total) %>%
  arrange(desc(`term frequency`))-> all_words
#all_words has all information we need to do tf_idf analysis.

ggplot(all_words, aes(n/total, fill = article)) +
  geom_histogram(show.legend = FALSE) +
  facet_wrap(~article, nrow = 2, scales = "free_y")+
  ggtitle("Frequency VS Count")
```

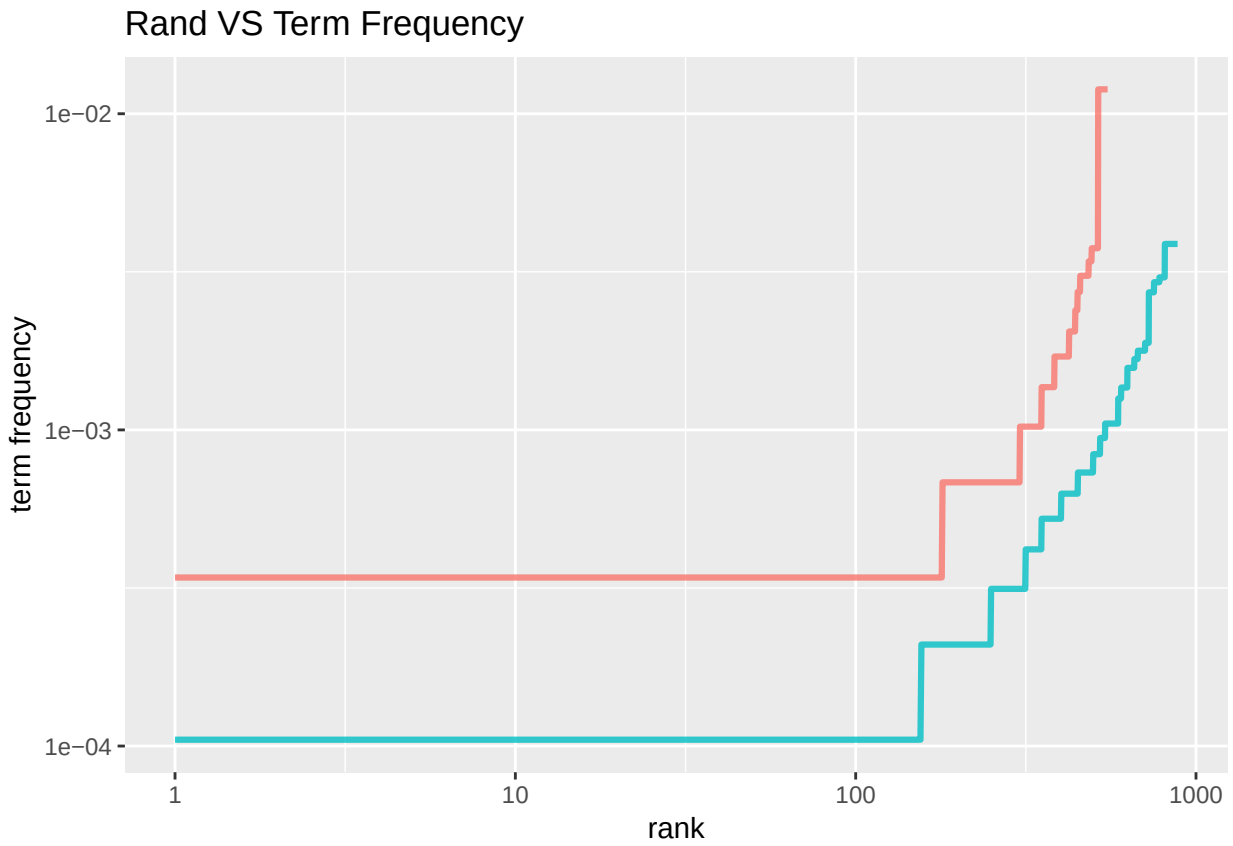
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```
correlaid_words <- correlaid_words %>% mutate(proportion=n/sum(n))
correlaid_words2 <- correlaid_words2 %>% mutate(proportion=n/sum(n))
```

We can see that the tails are not so long and these two article exhibit similar distribution. Their peaks are at similar points.

```
ggplot(all_words,aes(rank, `term frequency`, color = article)) + geom_line(size = 1.1, alpha = 0.8, sho
  scale_x_log10() +
  scale_y_log10()+
  ggtitle("Rand VS Term Frequency")
```



The result is totally opposite to the Zipf's Law, which states that a word appears is inversely proportional to its rank.

Then we apply bind_tf_idf function to find the important words for the content of each document by decreasing the weight for commonly used words and increasing the weight for words that not used very much.

```
all_words <- all_words %>% bind_tf_idf(word, article, n)
```

N-grams and Correlations We want to check the words as bigrams from now on.

```
correlaid_bigrams <- correlaid_txt %>% unnest_tokens(bigram, text, token = "ngrams", n = 2) #for p-valu
correlaid_bigrams2 <- correlaid_txt2 %>% unnest_tokens(bigram, text, token = "ngrams", n = 2) #for data

#Seperate the bigrams into two words
bigrams_separated <- correlaid_bigrams %>%
separate(bigram, c("word1", "word2"), sep = " ")
bigrams_separated2 <- correlaid_bigrams2 %>%
separate(bigram, c("word1", "word2"), sep = " ")
#Eliminate stop words
bigrams_filtered <- bigrams_separated %>% filter(!word1 %in% stop_words$word) %>% filter(!word2 %in% sto
bigrams_filtered2 <- bigrams_separated2 %>% filter(!word1 %in% stop_words$word) %>% filter(!word2 %in% s
#Then unite them into bigrams
bigrams_united <- bigrams_filtered %>% unite(bigram, word1, word2, sep = " ")
bigrams_united2 <- bigrams_filtered2 %>% unite(bigram, word1, word2, sep = " ")
bigrams_united %>% mutate(article="P-Value") -> bigrams_united
bigrams_united2 %>% mutate(article="Data-Story") -> bigrams_united2
```

Then we apply bind_tf_idf function to find the important bigrams.

```
total_bigrams <- rbind(bigrams_united,bigrams_united2)
total_bigrams %>%
  mutate(n=n()) %>%
  bind_tf_idf(bigram, article, n)
```

```
##                       bigram    article   n          tf        idf
## 1             null hypothesis    P-Value 439 0.003891051 -2.3025851
## 2             null hypothesis    P-Value 439 0.003891051 -2.3025851
## 3             null hypothesis    P-Value 439 0.003891051 -2.3025851
## 4                   text books    P-Value 439 0.003891051  0.6931472
## 5              power analysis    P-Value 439 0.003891051  0.6931472
## 6           analysis software    P-Value 439 0.003891051  0.6931472
## 7             horizontal axis    P-Value 439 0.003891051  0.6931472
## 8            calculated based    P-Value 439 0.003891051  0.6931472
## 9         normal distribution    P-Value 439 0.003891051  0.6931472
## 10                sample size    P-Value 439 0.003891051 -1.0986123
## 11            null hypothesis    P-Value 439 0.003891051 -2.3025851
## 12                 null model    P-Value 439 0.003891051 -2.0149030
## 13            null hypothesis    P-Value 439 0.003891051 -2.3025851
## 14                 post i've    P-Value 439 0.003891051  0.6931472
## 15              i've recently    P-Value 439 0.003891051  0.6931472
## 16          recently realized    P-Value 439 0.003891051  0.6931472
## 17                lot clearer    P-Value 439 0.003891051  0.6931472
## 18                 null model    P-Value 439 0.003891051 -2.0149030
## 19              model assuming    P-Value 439 0.003891051  0.0000000
## 20         standard deviation    P-Value 439 0.003891051 -0.4054651
## 21             test comparing    P-Value 439 0.003891051  0.6931472
## 22                      sd 1    P-Value 439 0.003891051  0.0000000
## 23                effect size    P-Value 439 0.003891051  0.0000000
## 24                 null model    P-Value 439 0.003891051 -2.0149030
## 25              true standard    P-Value 439 0.003891051  0.6931472
## 26         standard deviation    P-Value 439 0.003891051 -0.4054651
## 27                sample size    P-Value 439 0.003891051 -1.0986123
## 28                 null model    P-Value 439 0.003891051 -2.0149030
## 29                 raw scores    P-Value 439 0.003891051  0.6931472
## 30                 null model    P-Value 439 0.003891051 -2.0149030
## 31                sample size    P-Value 439 0.003891051 -1.0986123
## 32             size increases    P-Value 439 0.003891051  0.6931472
## 33               collect 5000    P-Value 439 0.003891051  0.6931472
## 34            50 observations    P-Value 439 0.003891051 -0.9162907
## 35                 null model    P-Value 439 0.003891051 -2.0149030
## 36                 null model    P-Value 439 0.003891051 -2.0149030
## 37                      0 due    P-Value 439 0.003891051  0.6931472
## 38              larger sample    P-Value 439 0.003891051  0.6931472
## 39                sample size    P-Value 439 0.003891051 -1.0986123
## 40              sample closer    P-Value 439 0.003891051  0.6931472
## 41                 0 compared    P-Value 439 0.003891051  0.6931472
## 42                 null model    P-Value 439 0.003891051 -2.0149030
## 43            50 observations    P-Value 439 0.003891051 -0.9162907
## 44                colored red    P-Value 439 0.003891051  0.6931472
## 45              represent 2.5    P-Value 439 0.003891051  0.6931472
## 46                  left tail    P-Value 439 0.003891051  0.6931472
## 47             0 representing    P-Value 439 0.003891051  0.6931472
## 48                alpha level    P-Value 439 0.003891051  0.0000000
```

```
## 49              vertical axis    P-Value 439 0.003891051  0.6931472
## 50               curves let's    P-Value 439 0.003891051  0.6931472
## 51               let's assume    P-Value 439 0.003891051 -0.4054651
## 52         figure visualizing    P-Value 439 0.003891051  0.6931472
## 53                 null model    P-Value 439 0.003891051 -2.0149030
## 54          observation falls    P-Value 439 0.003891051  0.6931472
## 55                tailed test    P-Value 439 0.003891051  0.6931472
## 56                 null model    P-Value 439 0.003891051 -2.0149030
## 57             collected 5000    P-Value 439 0.003891051  0.6931472
## 58          5000 observations    P-Value 439 0.003891051  0.6931472
## 59               collected 50    P-Value 439 0.003891051  0.6931472
## 60            50 observations    P-Value 439 0.003891051 -0.9162907
## 61             address common    P-Value 439 0.003891051  0.6931472
## 62      common misconceptions    P-Value 439 0.003891051 -0.4054651
## 63     alternative hypothesis    P-Value 439 0.003891051 -0.9162907
## 64          alternative model    P-Value 439 0.003891051 -1.2527630
## 65               let's assume    P-Value 439 0.003891051 -0.4054651
## 66             knowing entity    P-Value 439 0.003891051  0.0000000
## 67                 paul meehl    P-Value 439 0.003891051  0.6931472
## 68             knowing entity    P-Value 439 0.003891051  0.0000000
## 69          entity omniscient    P-Value 439 0.003891051  0.6931472
## 70           omniscient jones    P-Value 439 0.003891051 -1.0986123
## 71            50 observations    P-Value 439 0.003891051 -0.9162907
## 72    observations omniscient    P-Value 439 0.003891051  0.0000000
## 73           omniscient jones    P-Value 439 0.003891051 -1.0986123
## 74              expected data    P-Value 439 0.003891051  0.6931472
## 75               data pattern    P-Value 439 0.003891051  0.6931472
## 76             null hypothesis    P-Value 439 0.003891051 -2.3025851
## 77                  grey line    P-Value 439 0.003891051  0.6931472
## 78          alternative model    P-Value 439 0.003891051 -1.2527630
## 79             model assuming    P-Value 439 0.003891051  0.0000000
## 80                 0.5 exists    P-Value 439 0.003891051  0.6931472
## 81                 black line    P-Value 439 0.003891051  0.6931472
## 82           omniscient jones    P-Value 439 0.003891051 -1.0986123
## 83            true difference    P-Value 439 0.003891051  0.6931472
## 84               larger let's    P-Value 439 0.003891051  0.6931472
## 85               let's assume    P-Value 439 0.003891051 -0.4054651
## 86            50 observations    P-Value 439 0.003891051 -0.9162907
## 87    observations omniscient    P-Value 439 0.003891051  0.0000000
## 88           omniscient jones    P-Value 439 0.003891051 -1.0986123
## 89                jones tells    P-Value 439 0.003891051 -0.4054651
## 90                 null model    P-Value 439 0.003891051 -2.0149030
## 91          alternative model    P-Value 439 0.003891051 -1.2527630
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## 93      common misconceptions    P-Value 439 0.003891051 -0.4054651
## 94         values interpreted    P-Value 439 0.003891051  0.6931472
## 95             null hypothesis    P-Value 439 0.003891051 -2.3025851
## 96                  true let's    P-Value 439 0.003891051  0.6931472
## 97         significant result    P-Value 439 0.003891051 -1.0986123
## 98             null hypothesis    P-Value 439 0.003891051 -2.3025851
## 99           omniscient jones    P-Value 439 0.003891051 -1.0986123
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## 102         alternative model    P-Value 439 0.003891051 -1.2527630
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## 104     extremely surprising    P-Value 439 0.003891051  0.6931472
## 105          null hypothesis    P-Value 439 0.003891051 -2.3025851
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## 107          hypothesis true    P-Value 439 0.003891051  0.6931472
## 108   alternative hypothesis    P-Value 439 0.003891051 -0.9162907
## 109          null hypothesis    P-Value 439 0.003891051 -2.3025851
## 110          null hypothesis    P-Value 439 0.003891051 -2.3025851
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## 114                    sd 1    P-Value 439 0.003891051  0.0000000
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## 123        extreme assuming    P-Value 439 0.003891051  0.6931472
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## 180               jones tells    P-Value 439 0.003891051 -0.4054651
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## 182        significant result    P-Value 439 0.003891051 -1.0986123
## 183            false positive    P-Value 439 0.003891051 -0.4054651
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## 186                 1 errors    P-Value 439 0.003891051  0.6931472
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## 193                  1 error    P-Value 439 0.003891051 -0.4054651
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## 209            future studies    P-Value 439 0.003891051 -0.4054651
## 210       specific situation    P-Value 439 0.003891051 -0.9162907
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## 424              dig deeper Data-Story 439 0.005494505  0.6931472
## 425           data analysis Data-Story 439 0.005494505  0.6931472
## 426           methods we've Data-Story 439 0.005494505  0.6931472
```

```
## 427               we've shown Data-Story 439 0.005494505  0.6931472
## 428               entire code Data-Story 439 0.005494505  0.6931472
## 429               github page Data-Story 439 0.005494505  0.0000000
## 430     questions suggestions Data-Story 439 0.005494505  0.6931472
## 431             feedback feel Data-Story 439 0.005494505  0.6931472
## 432                 feel free Data-Story 439 0.005494505  0.6931472
## 433             comment we'll Data-Story 439 0.005494505  0.6931472
## 434               answer fast Data-Story 439 0.005494505  0.6931472
## 435           post originally Data-Story 439 0.005494505  0.0000000
## 436                cross post Data-Story 439 0.005494505  0.0000000
## 437           insightful post Data-Story 439 0.005494505  0.0000000
## 438             original blog Data-Story 439 0.005494505  0.0000000
## 439                 blog post Data-Story 439 0.005494505  0.0000000
##          tf_idf
## 1   -0.008959475
## 2   -0.008959475
## 3   -0.008959475
## 4    0.002697071
## 5    0.002697071
## 6    0.002697071
## 7    0.002697071
## 8    0.002697071
## 9    0.002697071
## 10  -0.004274756
## 11  -0.008959475
## 12  -0.007840090
## 13  -0.008959475
## 14   0.002697071
## 15   0.002697071
## 16   0.002697071
## 17   0.002697071
## 18  -0.007840090
## 19   0.000000000
## 20  -0.001577685
## 21   0.002697071
## 22   0.000000000
## 23   0.000000000
## 24  -0.007840090
## 25   0.002697071
## 26  -0.001577685
## 27  -0.004274756
## 28  -0.007840090
## 29   0.002697071
## 30  -0.007840090
## 31  -0.004274756
## 32   0.002697071
## 33   0.002697071
## 34  -0.003565334
## 35  -0.007840090
## 36  -0.007840090
## 37   0.002697071
## 38   0.002697071
## 39  -0.004274756
## 40   0.002697071
```

```
## 41   0.002697071
## 42  -0.007840090
## 43  -0.003565334
## 44   0.002697071
## 45   0.002697071
## 46   0.002697071
## 47   0.002697071
## 48   0.000000000
## 49   0.002697071
## 50   0.002697071
## 51  -0.001577685
## 52   0.002697071
## 53  -0.007840090
## 54   0.002697071
## 55   0.002697071
## 56  -0.007840090
## 57   0.002697071
## 58   0.002697071
## 59   0.002697071
## 60  -0.003565334
## 61   0.002697071
## 62  -0.001577685
## 63  -0.003565334
## 64  -0.004874564
## 65  -0.001577685
## 66   0.000000000
## 67   0.002697071
## 68   0.000000000
## 69   0.002697071
## 70  -0.004274756
## 71  -0.003565334
## 72   0.000000000
## 73  -0.004274756
## 74   0.002697071
## 75   0.002697071
## 76  -0.008959475
## 77   0.002697071
## 78  -0.004874564
## 79   0.000000000
## 80   0.002697071
## 81   0.002697071
## 82  -0.004274756
## 83   0.002697071
## 84   0.002697071
## 85  -0.001577685
## 86  -0.003565334
## 87   0.000000000
## 88  -0.004274756
## 89  -0.001577685
## 90  -0.007840090
## 91  -0.004874564
## 92   0.002697071
## 93  -0.001577685
## 94   0.002697071
```

```
## 95  -0.008959475
## 96   0.002697071
## 97  -0.004274756
## 98  -0.008959475
## 99  -0.004274756
## 100 -0.001577685
## 101  0.000000000
## 102 -0.004874564
## 103 -0.007840090
## 104  0.002697071
## 105 -0.008959475
## 106 -0.008959475
## 107  0.002697071
## 108 -0.003565334
## 109 -0.008959475
## 110 -0.008959475
## 111  0.002697071
## 112  0.002697071
## 113  0.002697071
## 114  0.000000000
## 115  0.002697071
## 116  0.002697071
## 117  0.002697071
## 118  0.002697071
## 119  0.002697071
## 120 -0.001577685
## 121  0.002697071
## 122  0.002697071
## 123  0.002697071
## 124 -0.008959475
## 125  0.002697071
## 126  0.002697071
## 127  0.002697071
## 128  0.002697071
## 129 -0.008959475
## 130  0.002697071
## 131  0.002697071
## 132 -0.002697071
## 133 -0.008959475
## 134 -0.003565334
## 135  0.002697071
## 136  0.002697071
## 137  0.002697071
## 138 -0.008959475
## 139  0.002697071
## 140  0.002697071
## 141  0.000000000
## 142  0.002697071
## 143 -0.008959475
## 144  0.000000000
## 145  0.002697071
## 146  0.002697071
## 147 -0.007840090
## 148 -0.004274756
```

```
## 149 -0.002697071
## 150 -0.004274756
## 151 -0.002697071
## 152  0.002697071
## 153  0.002697071
## 154  0.002697071
## 155 -0.008959475
## 156  0.002697071
## 157 -0.002697071
## 158  0.002697071
## 159  0.002697071
## 160  0.002697071
## 161  0.002697071
## 162 -0.007840090
## 163  0.002697071
## 164  0.002697071
## 165  0.002697071
## 166  0.002697071
## 167  0.002697071
## 168  0.002697071
## 169  0.000000000
## 170  0.000000000
## 171  0.002697071
## 172  0.002697071
## 173 -0.002697071
## 174 -0.001577685
## 175 -0.001577685
## 176  0.002697071
## 177  0.002697071
## 178  0.002697071
## 179 -0.004274756
## 180 -0.001577685
## 181 -0.008959475
## 182 -0.004274756
## 183 -0.001577685
## 184  0.002697071
## 185 -0.002697071
## 186  0.002697071
## 187 -0.002697071
## 188 -0.001577685
## 189  0.002697071
## 190  0.002697071
## 191  0.002697071
## 192 -0.002697071
## 193 -0.001577685
## 194 -0.004274756
## 195  0.002697071
## 196 -0.001577685
## 197  0.002697071
## 198  0.002697071
## 199 -0.004274756
## 200  0.002697071
## 201 -0.001577685
## 202  0.002697071
```

```
## 203  0.002697071
## 204  0.002697071
## 205  0.000000000
## 206  0.000000000
## 207 -0.001577685
## 208 -0.003565334
## 209 -0.001577685
## 210 -0.003565334
## 211 -0.007840090
## 212 -0.004874564
## 213  0.002697071
## 214  0.002697071
## 215  0.002697071
## 216 -0.003565334
## 217  0.002697071
## 218 -0.004274756
## 219  0.002697071
## 220  0.002697071
## 221  0.002697071
## 222 -0.004874564
## 223 -0.004874564
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## 228  0.002697071
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## 231  0.002697071
## 232 -0.003565334
## 233 -0.003565334
## 234 -0.008959475
## 235 -0.003565334
## 236 -0.003565334
## 237  0.002697071
## 238  0.002697071
## 239 -0.004274756
## 240  0.002697071
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## 245  0.002697071
## 246  0.002697071
## 247  0.002697071
## 248 -0.001577685
## 249  0.002697071
## 250  0.002697071
## 251  0.000000000
## 252  0.002697071
## 253  0.002697071
## 254  0.000000000
## 255  0.000000000
## 256  0.000000000
```

```
## 257  0.000000000
## 258  0.003808501
## 259  0.003808501
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## 262  0.003808501
## 263  0.003808501
## 264  0.003808501
## 265  0.003808501
## 266  0.000000000
## 267  0.003808501
## 268  0.003808501
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## 278  0.000000000
## 279  0.003808501
## 280  0.003808501
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## 282  0.000000000
## 283  0.003808501
## 284  0.003808501
## 285  0.003808501
## 286  0.003808501
## 287  0.003808501
## 288  0.003808501
## 289  0.003808501
## 290  0.003808501
## 291 -0.002227830
## 292 -0.005034564
## 293  0.003808501
## 294  0.003808501
## 295  0.000000000
## 296  0.003808501
## 297  0.003808501
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## 301  0.003808501
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## 306  0.003808501
## 307  0.003808501
## 308  0.003808501
## 309  0.000000000
## 310  0.000000000
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```
## 311  0.003808501
## 312  0.003808501
## 313  0.003808501
## 314  0.000000000
## 315  0.003808501
## 316  0.003808501
## 317  0.003808501
## 318  0.003808501
## 319 -0.002227830
## 320 -0.005034564
## 321  0.000000000
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## 342  0.003808501
## 343  0.000000000
## 344  0.003808501
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## 346  0.003808501
## 347  0.003808501
## 348  0.003808501
## 349  0.003808501
## 350  0.003808501
## 351 -0.005034564
## 352  0.003808501
## 353  0.003808501
## 354  0.003808501
## 355  0.003808501
## 356  0.003808501
## 357  0.003808501
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## 359  0.003808501
## 360  0.003808501
## 361  0.003808501
## 362  0.003808501
## 363  0.003808501
## 364  0.000000000
```

```
## 365  0.003808501
## 366  0.003808501
## 367  0.003808501
## 368  0.000000000
## 369  0.003808501
## 370  0.003808501
## 371  0.000000000
## 372  0.003808501
## 373  0.003808501
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## 375  0.003808501
## 376  0.003808501
## 377  0.003808501
## 378  0.000000000
## 379  0.003808501
## 380  0.003808501
## 381  0.003808501
## 382 -0.002227830
## 383  0.000000000
## 384  0.003808501
## 385  0.003808501
## 386  0.003808501
## 387  0.000000000
## 388  0.003808501
## 389  0.003808501
## 390  0.003808501
## 391  0.003808501
## 392  0.003808501
## 393  0.003808501
## 394 -0.005034564
## 395 -0.005034564
## 396  0.000000000
## 397  0.003808501
## 398  0.003808501
## 399  0.003808501
## 400  0.003808501
## 401  0.000000000
## 402  0.000000000
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## 406  0.003808501
## 407  0.003808501
## 408  0.003808501
## 409  0.003808501
## 410  0.003808501
## 411  0.003808501
## 412  0.003808501
## 413  0.000000000
## 414  0.003808501
## 415  0.003808501
## 416  0.003808501
## 417  0.000000000
## 418  0.003808501
```

```
## 419  0.003808501
## 420  0.003808501
## 421  0.003808501
## 422  0.003808501
## 423  0.003808501
## 424  0.003808501
## 425  0.003808501
## 426  0.003808501
## 427  0.003808501
## 428  0.003808501
## 429  0.000000000
## 430  0.003808501
## 431  0.003808501
## 432  0.003808501
## 433  0.003808501
## 434  0.003808501
## 435  0.000000000
## 436  0.000000000
## 437  0.000000000
## 438  0.000000000
## 439  0.000000000
```

Using bigrams to do sentiments analysis. If we do seperate analysis on both article about "not" words.

```
AFINN <- get_sentiments("afinn")
not_words <- bigrams_separated %>%
filter(word1 == "not") %>%
inner_join(AFINN, by = c(word2 = "word")) %>% count(word2, score, sort = TRUE) %>% ungroup()

not_words %>%
  mutate(contribution = n * score) %>%
  arrange(desc(abs(contribution)))
```

```
## # A tibble: 1 x 4
##   word2 score     n contribution
##   <chr> <int> <int>        <int>
## 1 true      2     3            6
```

In this P-Value article, only one word is follwed by "not".

```
not_words2 <- bigrams_separated2 %>%
  filter(word1 == "not") %>%
  inner_join(AFINN, by = c(word2 = "word")) %>%
  count(word2, score, sort = TRUE) %>% ungroup()

not_words2 %>%
  mutate(contribution = n * score) %>%
  arrange(desc(abs(contribution)))
```

```
## # A tibble: 0 x 4
## # ... with 4 variables: word2 <chr>, score <int>, n <int>,
## #   contribution <int>
```

And in this Data to Story article, on word is followed by "not".

Network of Bigrams

```r
library(ggplot2)
library(igraph)
```

```
##
## Attaching package: 'igraph'
```

```
## The following object is masked from 'package:tidyr':
##
##     crossing
```

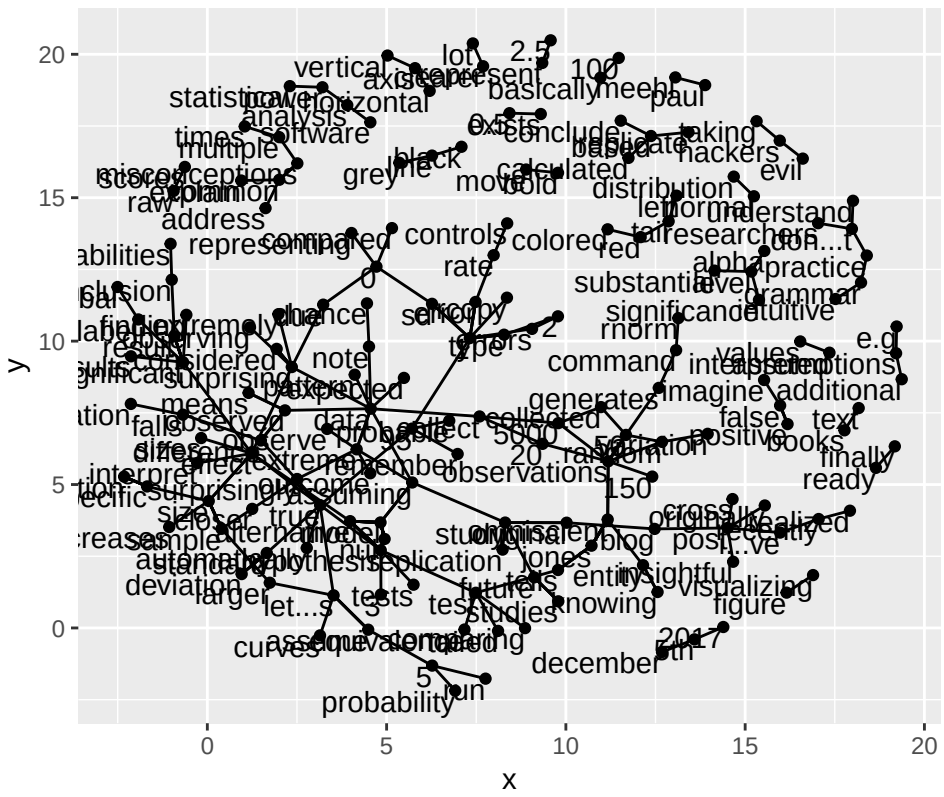
```
## The following objects are masked from 'package:dplyr':
##
##     as_data_frame, groups, union
```

```
## The following objects are masked from 'package:stats':
##
##     decompose, spectrum
```

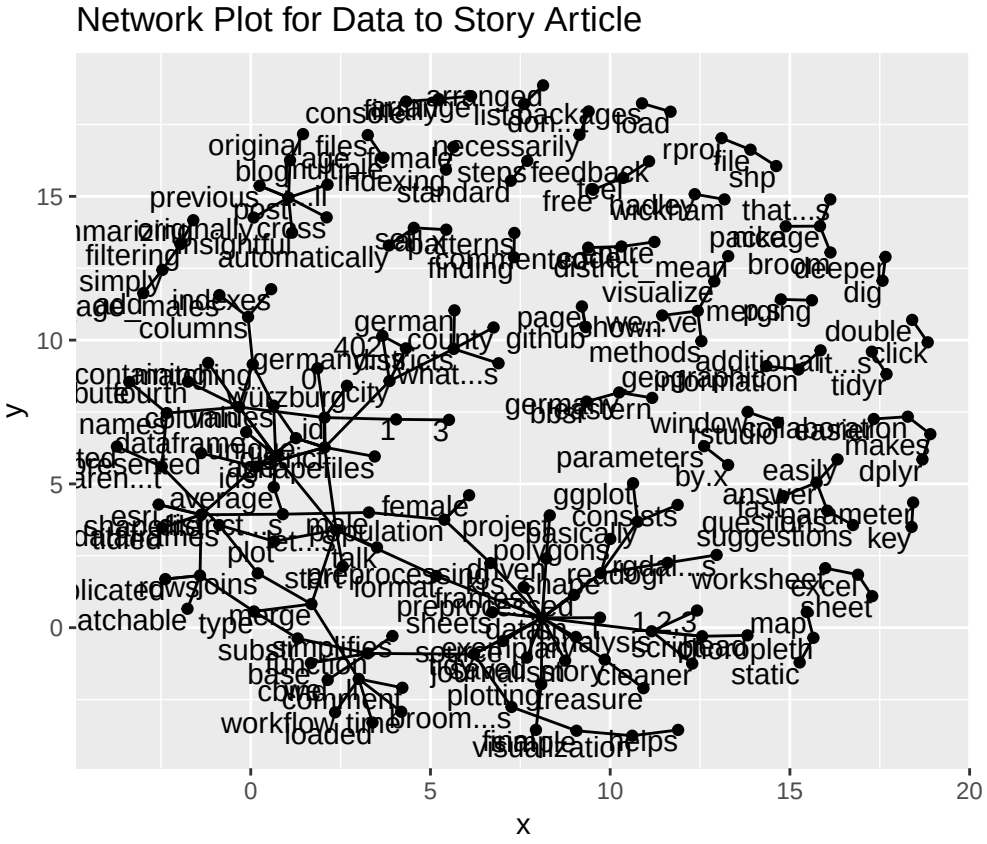
```
## The following object is masked from 'package:base':
##
##     union
```

```r
library(ggraph)

#Network for P-Value Article
bigrams_separated <-
  correlaid_bigrams %>%
  mutate(n=n()) %>%
  separate(bigram, c("word1", "word2"), sep = " ") %>%
  filter(!word1 %in% stop_words$word) %>%
  filter(!word2 %in% stop_words$word)
bigrams_separated %>% graph_from_data_frame() -> bigram_graph
set.seed(2018)
ggraph(bigram_graph, layout = "fr") +
  geom_edge_link() +
  geom_node_point() +
  geom_node_text(aes(label = name), vjust = 1, hjust = 1)+
  coord_fixed(0.8)+
  ggtitle("Network Plot for P-Value Article")
```




```
#Network for Data to Story Article
bigrams_separated2 <-
  correlaid_bigrams2 %>%
  mutate(n=n()) %>%
  separate(bigram, c("word1", "word2"), sep = " ") %>%
  filter(!word1 %in% stop_words$word) %>%
  filter(!word2 %in% stop_words$word)
bigrams_separated2 %>% graph_from_data_frame() -> bigram_graph2
set.seed(2018)
ggraph(bigram_graph2, layout = "fr") +
  geom_edge_link() +
  geom_node_point() +
  geom_node_text(aes(label = name), vjust = 1, hjust = 1)+
  coord_fixed(0.8)+
  ggtitle("Network Plot for Data to Story Article")
```




```
library(topicmodels)
library(widyr)
```

```
## Warning: package 'widyr' was built under R version 3.4.4
```

```
totalwords_sent <- total_words %>%
  inner_join(get_sentiments("bing"), by = c(word = "word"))
totalwords_sent
```

```
## # A tibble: 103 x 4
## # Groups:   word [?]
##    word              n article sentiment
##    <chr>         <int> <chr>   <chr>
##  1 critical          1 P-value negative
##  2 clearer           1 P-value positive
##  3 prefer            1 P-value positive
##  4 easy              1 P-value positive
##  5 reject            1 P-value negative
##  6 evil              1 P-value negative
##  7 misconception     1 P-value negative
##  8 sneaky            1 P-value negative
##  9 broken            1 P-value negative
## 10 correctly         1 P-value positive
## # ... with 93 more rows
```

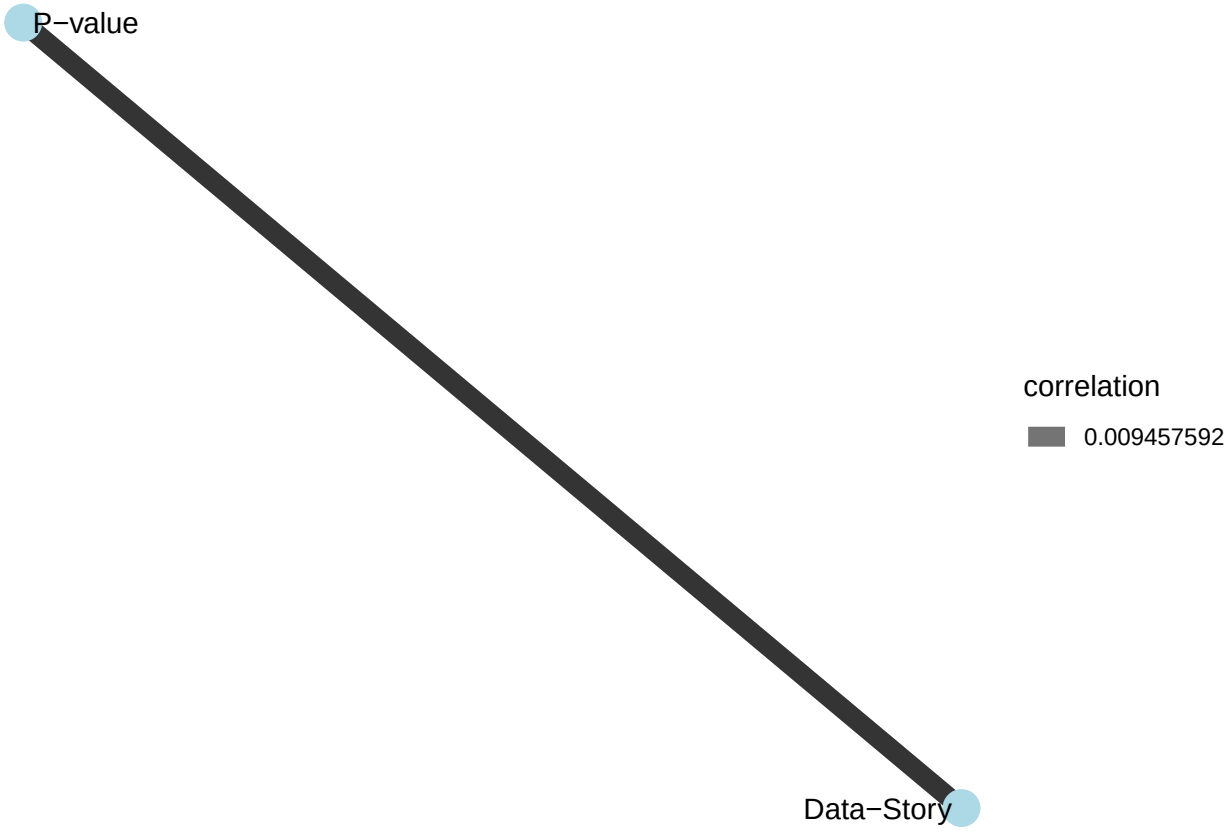
```
total_words_tf_idf <- total_words %>%
  bind_tf_idf(word, article, n) %>%
  arrange(desc(tf_idf))
total_words_tf_idf
```

```
## # A tibble: 1,433 x 6
## # Groups:   word [524]
##    word           n article          tf   idf   tf_idf
##    <chr>      <int> <chr>         <dbl> <dbl>    <dbl>
##  1 tutorial       1 Data-Story 0.000341 0.693 0.000237
##  2 steps          1 Data-Story 0.000341 0.693 0.000237
##  3 driven         1 Data-Story 0.000341 0.693 0.000237
##  4 morgenpost     1 Data-Story 0.000341 0.693 0.000237
##  5 exemplary      1 Data-Story 0.000341 0.693 0.000237
##  6 journalism     1 Data-Story 0.000341 0.693 0.000237
##  7 workflow       1 Data-Story 0.000341 0.693 0.000237
##  8 bbsr           1 Data-Story 0.000341 0.693 0.000237
##  9 commented      1 Data-Story 0.000341 0.693 0.000237
## 10 organized      1 Data-Story 0.000341 0.693 0.000237
## # ... with 1,423 more rows
```

```
article_corr <- total_words %>%
  pairwise_cor(article, word, n, sort = TRUE)
article_corr
```

```
## # A tibble: 2 x 3
##   item1      item2      correlation
##   <chr>      <chr>            <dbl>
## 1 Data-Story P-value        0.00946
## 2 P-value    Data-Story     0.00946
```

```
article_corr %>%
  graph_from_data_frame() %>%
  ggraph(layout = "fr") +
  geom_edge_link(aes(alpha = correlation, width = correlation)) +
  geom_node_point(size = 6, color = "lightblue") +
  geom_node_text(aes(label = name), repel = TRUE) +
  theme_void()
```




```
word_article <- total_words %>%
  group_by(word) %>%
  mutate(word_total = n()) %>%
  ungroup() %>%
  filter(word_total > 20)
word_article
```

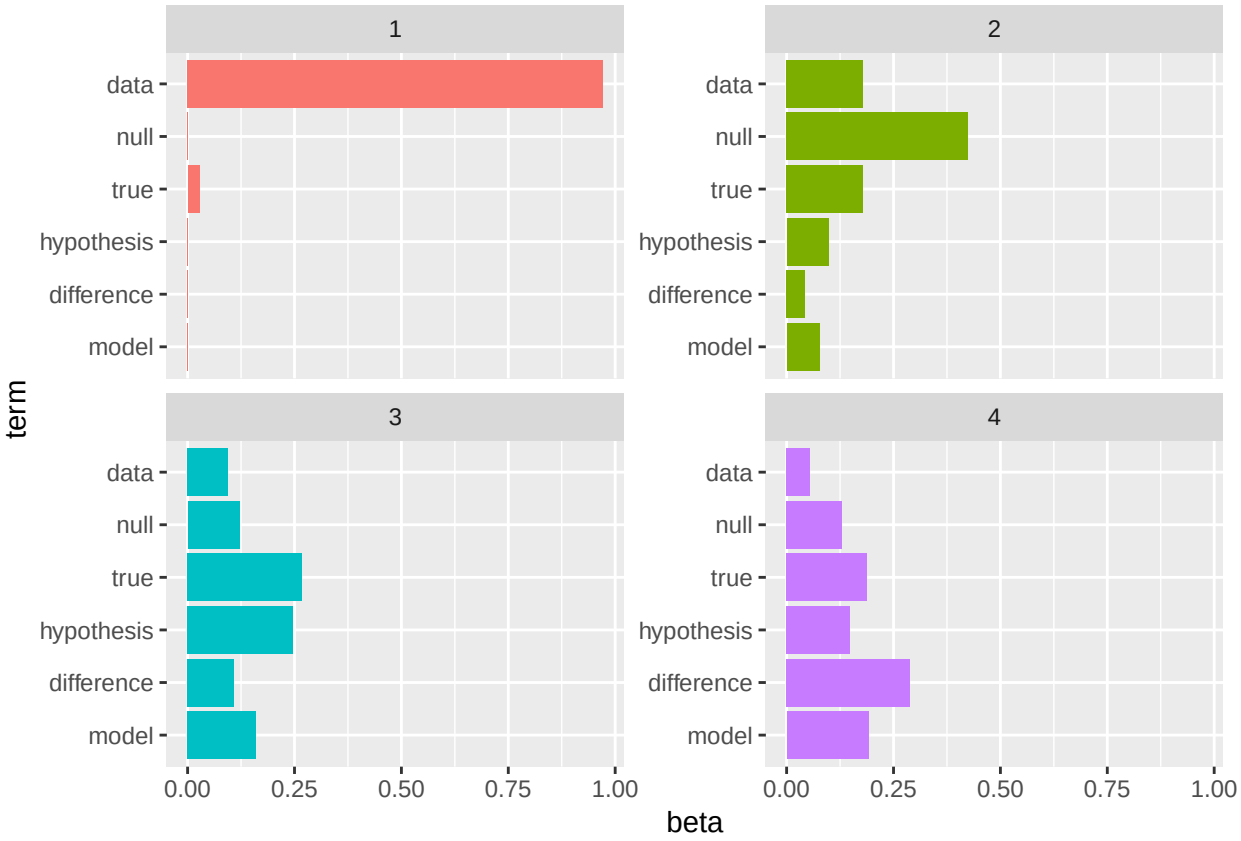
```
## # A tibble: 211 x 4
##    word      n article word_total
##    <chr> <int> <chr>        <int>
##  1 data     18 P-value         53
##  2 data     18 P-value         53
##  3 data     18 P-value         53
##  4 data     18 P-value         53
##  5 data     18 P-value         53
##  6 data     18 P-value         53
##  7 data     18 P-value         53
##  8 data     18 P-value         53
##  9 data     18 P-value         53
## 10 data     18 P-value         53
## # ... with 201 more rows
```

```
## Convert into document term matrix
word_article_dtm <- word_article %>% cast_dtm(article, word, n)

article_lda <- LDA(word_article_dtm, k = 4, control = list(seed = 123))

article_lda %>%
```

```
  tidy() %>%
  group_by(topic) %>%
  top_n(8, beta) %>%
  ungroup() %>%
  mutate(term = reorder(term, beta)) %>%
  ggplot(aes(term, beta, fill = factor(topic))) +
  geom_col(show.legend = FALSE) +
  facet_wrap(~ topic, scales = "free_y") +
  coord_flip()
```



We can see that we have the same common words amongst all of the topics in the LDA.