Text Analysis with R: Steps.

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In this document we emphasize on those lines of codes that are necessary to be used for the Text Analysis in R.

Step 0: Install and load the required packages; Setting up working directory and Read data from website or file (e.g. a .txt file)

```
install.packages("tm")
install.packages("SnowballC")
install.packages("wordcloud")

library(tm)
library(SnowballC)
library(wordcloud)
```

If you want to read data from website:

```
dataFromWeb <- readLines("http://cob.ohio.edu/anahitas/MIS4580/dataAnalysis.txt", warn= FALSE)
```

If you want to read data from a .txt file saved in your working directory.

```
dataFromFile <- readLines("HarryPotter.txt", warn= FALSE)
```

Step 1: Do some text pre-processing and data cleaning:

- Remove HTML codes
- Remove all punctuation marks
- Remove all extra white space characters
- Convert all data to lowercase, so that words like “read” and “Read” are considered the same word for analysis

```
#=========================================================================
# Step 1: Do some text pre-processing and data cleaning:
#=========================================================================

myCleanedData <- dataFromFile

#Remove HTML codes
myCleanedData <- gsub("<.*?>", "", myCleanedData)

#Remove all punctuation marks
myCleanedData <- gsub("[[:punct:]]","", myCleanedData)

#Remove all extra white space characters
myCleanedData <- gsub("\\s+", " ", myCleanedData)
# NOTe: or use myCleanedData <- gsub("[[:space:]]"," ", myCleanedData)

#Convert all data to lowercase
myCleanedData <- tolower(myCleanedData)
```

Step 2: Create a Corpus and Use VectorSource Function:

- To prepare your data to be converted into a corpus.
- Then use the VCorpus function to take that data and turn it into a required corpus data structure to create a TermDocumentMatrix.

```
#=============================================================================================
# Step 2: Use a VectorSource function to prepare your data to be converted into a corpus:
#=============================================================================================
#install.packages("tm") #may needed in VDI each time
#library(tm)

### Load the data as a corpus
myCorpusData <- VCorpus(VectorSource((myCleanedData)))
myCorpusData[[1]]$content
```

Step 3: Use tm_map() function to clean and prepare the text:

- **Remove stop words:** stop words are common words, that does not add much value to the text, and are preferred to be filtered out in a text so statistics concerning them will not be calculated. This allows for a better inspection of the more of the interesting words. (Examples, I, we, what, on, in, …)
- **Stem the data:** Technique to reduce the inflected words to their basic forms. So, the word like 'play', 'plays', 'playing', 'played' will all become 'play' after the 'stemming.
    - **Note:** I may ask you not to stem the document. So be careful!

```
#=============================================================================================
#Step 3: Use tm_map function to clean and prepare the text:
#=============================================================================================

## Remove stop words:
myMainCleanData <- myCorpusData
myMainCleanData <- tm_map(myMainCleanData,removeWords, stopwords("english"))

### stemming
##install.packages("SnowballC") #may needed
##library(SnowballC)
#stem the data then check it out
myMainCleanData <- tm_map(myMainCleanData,stemDocument)
```

Step 4: Create "term document matrix":

- Use TermDocumentMatrix, as a function that will take the Corpus and create your matrix as a list object where the document names are the column names, and the terms are the row names.

```
#=============================================================================================
#Step 4: Create "term document matrix", use TermDocumentMatrix:
#=============================================================================================
myTDMData <- TermDocumentMatrix(myMainCleanData)
```

Step 5: Do Analysis

Example:

- Find Terms that occurs at least "???" times
- Find words associated with "???" based on a given correlation of ??%

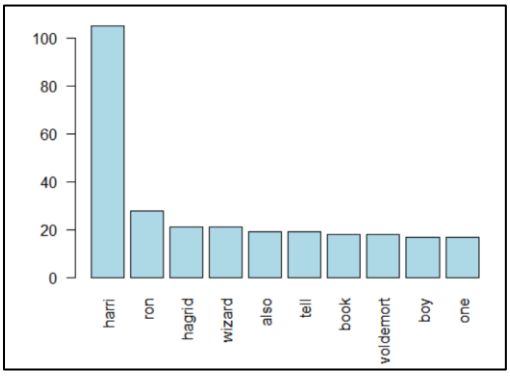
- Calculate the frequency of words and create word cloud based on those frequencies.

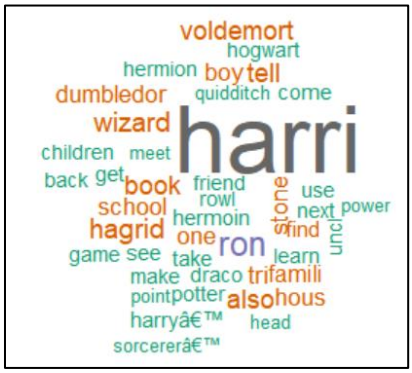
Sample analysis

```
#================================================================================
#Step 5: Do Actual Text Analysis:
#================================================================================

## To find terms that occur at least 4 times ( the lower frequency bound),
# then we can use the findFreqTerms().
findFreqTerms(myTDMData,lowfreq = 4, highfreq = Inf)
findFreqTerms(myTDMData, 4, Inf) #same as above

## we can use the FindAssocs function to find words which associate together
findAssocs(x=myTDMData, term = "wizard",corlimit = 0.5)
```

Visualization

```
#===Visualization================================================================
#my need to install.packages("wordcloud")
library(wordcloud)

# calculate the frequency of words
freqOfTerms <- sort(rowSums(as.matrix(myTDMData)),decreasing = TRUE)

#basic barplot example
barplot(freqOfTerms[1:10],col ="lightblue",las = 2)

# get list of words from heading
namesFromData <- names(freqOfTerms)

#Wordcloud: show the importance of words based on frequency with a word cloud
wordcloud(namesFromData, freqOfTerms, min.freq = 10,
          max.words = 200,colors=brewer.pal(8, "Dark2")) #by A.Sanandaji
```





How to create a colorful word cloud?

You can use this line of code to produce a colorful wordcloud if you wish:

wordcloud(namesFromData, freqOfTerms, min.freq = ??, max.words = ??, ***colors = brewer.pal(8, "Dark2"))***

See next page ➔

Side note (Using tm_map() to combine steps 1,2,3)— This is Optional:

You can use tm_map() to do some data cleaning (Remove all punctuation marks, Remove all extra white space characters, Convert all data to lowercase) that you did in step 1 (instead of using gsub() or tolower()) and combine it directly with step 2 and step 3. If you use this approach you do not need to conduct the previous steps 1-3.

Here is the alternative code that combines steps 1,2, and 3:

```
#================================================================================
#Step 1 and 2 and 3 combined (Alternate way to clean data using tm_map()
#================================================================================
library(tm)
library(SnowballC)

myCleanedData=dataFromFile

#Remove HTML codes
myCleanedData = gsub("<.*?>", "", myCleanedData)

#Load the data as a corpus
myCorpusData=VCorpus(VectorSource((myCleanedData)))
myMainCleanData=myCorpusData

#Convert all data to lowercase
myMainCleanData=tm_map(myMainCleanData,content_transformer(tolower))

#Remove all punctuation marks
myMainCleanData=tm_map(myMainCleanData,removePunctuation)

#Remove all extra white space characters
myMainCleanData=tm_map(myMainCleanData,stripWhitespace)

# remove stopwords
myMainCleanData=tm_map(myMainCleanData,removeWords, stopwords("English"))

#stem data
myMainCleanData=tm_map(myMainCleanData,stemDocument)

## end of *** Step 1,2 and 3 Combined
#================================================================================
```