The 5 main steps to create word clouds in R

http://www.sthda.com/english/wiki/text-mining-and-word-cloud-fundamentals-in-r-5-simple-steps-you-should-know (http://www.sthda.com/english/wiki/text-mining-and-word-cloud-fundamentals-in-r-5-simple-steps-you-should-know)

1. Create a text file
   - Copy and paste the text in a plain text file (e.g : ml.txt)
   - Save the file
   - Note that, the text should be saved in a plain text (.txt) file format using your favorite text editor.

1. Load the data as a corpus
   - A corpus can hold several documents. In this example there is only 1.

1. Inspect the document contents

   - Check out the document before processing it.
   - Remove special characters using tm_map
   - Tidy the document by removing extra whitespace, standardizing capitalization and removing stop words.
2. Build a term-document matrix

   - A Document matrix is a table containing the frequency of the words.
   - Column names are words and row names are documents.
   - The function TermDocumentMatrix() from text mining package can be used for this.
3. Generate the word cloud.

Install and load the required packages

In [1]:

```
# Install
# install.packages("tm")  # for text mining
# install.packages("SnowballC") # for text stemming
# install.packages("wordcloud") # word-cloud generator
# install.packages("RColorBrewer") # color palettes
# Load
library("tm")
library("SnowballC")
library("wordcloud")
library("RColorBrewer")
```

```
Loading required package: NLP

Loading required package: RColorBrewer
```

Step 1

Load the text. This is done using the Corpus() function from text mining (tm) package. Corpus is a list of a documents (in our case, we only have one document).

In [2]:

```
# For simplicity, here we'll read the text file from internet

filePath <- "http://www.sthda.com/sthda/RDoc/example-files/martin-luther-king-i-have-a-dream-speech.txt"
text <- readLines(filePath)
```

Step 2

Load the data as a corpus

In [3]:

```
docs <- Corpus(VectorSource(text))
#VectorSource() function creates a corpus of character vectors
```

Step 3

Inspect the document

In [4]:

```
inspect(docs)
```

```
<<SimpleCorpus>>
Metadata:  corpus specific: 1, document level (indexed): 0
Content:  documents: 46

 [1]
 [2] And so even though we face the difficulties of today and tomorr
ow, I still have a dream. It is a dream deeply rooted in the America
n dream.
 [3]
 [4] I have a dream that one day this nation will rise up and live o
ut the true meaning of its creed:
 [5]
 [6] We hold these truths to be self-evident, that all men are creat
ed equal.
 [7]
 [8] I have a dream that one day on the red hills of Georgia, the so
ns of former slaves and the sons of former slave owners will be able
to sit down together at the table of brotherhood.
 [9]
[10] I have a dream that one day even the state of Mississippi, a st
ate sweltering with the heat of injustice, sweltering with the heat
of oppression, will be transformed into an oasis of freedom and just
ice.
[11]
[12] I have a dream that my four little children will one day live i
n a nation where they will not be judged by the color of their skin
but by the content of their character.
[13]
[14] I have a dream today!
[15]
[16] I have a dream that one day, down in Alabama, with its vicious
racists, with its governor having his lips dripping with the words o
f interposition and nullification, one day right there in Alabama li
ttle black boys and black girls will be able to join hands with litt
le white boys and white girls as sisters and brothers.
[17]
[18] I have a dream today!
[19]
[20] I have a dream that one day every valley shall be exalted, and
every hill and mountain shall be made low, the rough places will be
made plain, and the crooked places will be made straight; and the gl
ory of the Lord shall be revealed and all flesh shall see it togethe
r.
[21]
[22] This is our hope, and this is the faith that I go back to the S
outh with.
[23]
[24] With this faith, we will be able to hew out of the mountain of
despair a stone of hope. With this faith, we will be able to transfo
rm the jangling discords of our nation into a beautiful symphony of
brotherhood. With this faith, we will be able to work together, to p
ray together, to struggle together, to go to jail together, to stand
up for freedom together, knowing that we will be free one day.
[25]
[26] And this will be the day, this will be the day when all of God
s children will be able to sing with new meaning:
[27]
[28] My country  tis of thee, sweet land of liberty, of thee I sing.
[29] Land where my fathers died, land of the Pilgrim s pride,
[30] From every mountainside, let freedom ring!
[31] And if America is to be a great nation, this must become true.
```

```
[32] And so let freedom ring from the prodigious hilltops of New Ham
pshire.
[33] Let freedom ring from the mighty mountains of New York.
[34] Let freedom ring from the heightening Alleghenies of Pennsylvan
ia.
[35] Let freedom ring from the snow-capped Rockies of Colorado.
[36] Let freedom ring from the curvaceous slopes of California.
[37]
[38] But not only that:
[39] Let freedom ring from Stone Mountain of Georgia.
[40] Let freedom ring from Lookout Mountain of Tennessee.
[41] Let freedom ring from every hill and molehill of Mississippi.
[42] From every mountainside, let freedom ring.
[43] And when this happens, when we allow freedom ring, when we let
it ring from every village and every hamlet, from every state and ev
ery city, we will be able to speed up that day when all of God s chi
ldren, black men and white men, Jews and Gentiles, Protestants and C
atholics, will be able to join hands and sing in the words of the ol
d Negro spiritual:
[44] Free at last! Free at last!
[45]
[46] Thank God Almighty, we are free at last!
```

Text transformation is performed using tm_map() function to replace, for example, special characters from the text.

Replacing “/”, “@” and “|” with space:

In [5]:

```
toSpace <- content_transformer(function (x , pattern ) gsub(pattern, " ", x))
docs <- tm_map(docs, toSpace, "/")
docs <- tm_map(docs, toSpace, "@")
docs <- tm_map(docs, toSpace, "\\|")
```

```
Warning message in tm_map.SimpleCorpus(docs, toSpace, "/"):
“transformation drops documents”
Warning message in tm_map.SimpleCorpus(docs, toSpace, "@"):
“transformation drops documents”
Warning message in tm_map.SimpleCorpus(docs, toSpace, "\\|"):
“transformation drops documents”
```

Cleaning the text: the tm_map() function is used

- to remove unnecessary white space,
- to convert the text to lower case,
- to remove common stopwords like ‘the’, “we”.

The information value of ‘stopwords’ is near zero due to the fact that they are so common in a language. Removing this kind of words is useful before further analyses. For ‘stopwords’, supported languages are danish, dutch, english, finnish, french, german, hungarian, italian, norwegian, portuguese, russian, spanish and swedish. Language names are case sensitive.

You can make your own list of stopwords to remove from the text.

You could also remove numbers and punctuation with removeNumbers and removePunctuation arguments.

Another important preprocessing step is to make a text stemming which reduces words to their root form. In other words, this process removes suffixes from words to make it simple and to get the common origin. For example, a stemming process reduces the words “moving”, “moved” and “movement” to the root word, “move”.

Note that, text stemming require the package ‘SnowballC’.

In [6]:

```
# Convert the text to lower case
docs <- tm_map(docs, content_transformer(tolower))
# Remove numbers
docs <- tm_map(docs, removeNumbers)
# Remove english common stopwords
docs <- tm_map(docs, removeWords, stopwords("english"))
# Remove your own stop word
# specify your stopwords as a character vector
docs <- tm_map(docs, removeWords, c("blabla1", "blabla2"))
# Remove punctuations
docs <- tm_map(docs, removePunctuation)
# Eliminate extra white spaces
docs <- tm_map(docs, stripWhitespace)
# Text stemming
# docs <- tm_map(docs, stemDocument)
```

```
Warning message in tm_map.SimpleCorpus(docs, content_transformer(tol
ower)):
“transformation drops documents”
Warning message in tm_map.SimpleCorpus(docs, removeNumbers):
“transformation drops documents”
Warning message in tm_map.SimpleCorpus(docs, removeWords, stopwords
("english")):
“transformation drops documents”
Warning message in tm_map.SimpleCorpus(docs, removeWords, c("blabla
1", "blabla2")):
“transformation drops documents”
Warning message in tm_map.SimpleCorpus(docs, removePunctuation):
“transformation drops documents”
Warning message in tm_map.SimpleCorpus(docs, stripWhitespace):
“transformation drops documents”
```

Step 4

Build a term-document matrix. This is a table containing the frequency of the words. Column names are words and row names are documents. The function TermDocumentMatrix() from text mining package can be used.

In [7]:

```
dtm <- TermDocumentMatrix(docs)
m <- as.matrix(dtm)
v <- sort(rowSums(m),decreasing=TRUE)
d <- data.frame(word = names(v),freq=v)
head(d, 10)
```

A data.frame: 10 × 2

	word	freq
	<fct>	<dbl>
will	will	17
freedom	freedom	13
ring	ring	12
dream	dream	11
day	day	11
let	let	11
every	every	9
one	one	8
able	able	8
together	together	7

Step 5

Generate the Word cloud

In [8]:

```
set.seed(1234)# This makes the cloud reproducable.

wordcloud(words = d$word, freq = d$freq, min.freq = 1,
          max.words=200, random.order=FALSE, rot.per=0.35,
          colors=brewer.pal(8, "Dark2"))
```

The above word cloud clearly shows that “Will”, “freedom”, “dream”, “day” and “together” are the five most important words in the “I have a dream speech” from Martin Luther King.

Arguments of the word cloud generator function :

- words : the words to be plotted
- freq : their frequencies
- min.freq : words with frequency below min.freq will not be plotted
- max.words : maximum number of words to be plotted
- random.order : plot words in random order. If false, they will be plotted in decreasing frequency
- rot.per : proportion words with 90 degree rotation (vertical text)
- colors : color words from least to most frequent. Use, for example, colors =“black” for single color.

Go further

Explore frequent terms and their associations

You can have a look at the frequent terms in the term-document matrix. Let's find words that occur at least four times :

In [9]:

```
findFreqTerms(dtm, lowfreq = 4)
```

'dream' · 'day' · 'nation' · 'one' · 'will' · 'able' · 'together' · 'freedom' · 'every' · 'mountain' · 'shall' · 'faith' · 'free' · 'let' · 'ring'

You can analyze the association between frequent terms (i.e., terms which correlate) using findAssocs() function. The R code below identifies which words are associated with “freedom” in I have a dream speech :

In [10]:

```
findAssocs(dtm, terms = "freedom", corlimit = 0.3)
```

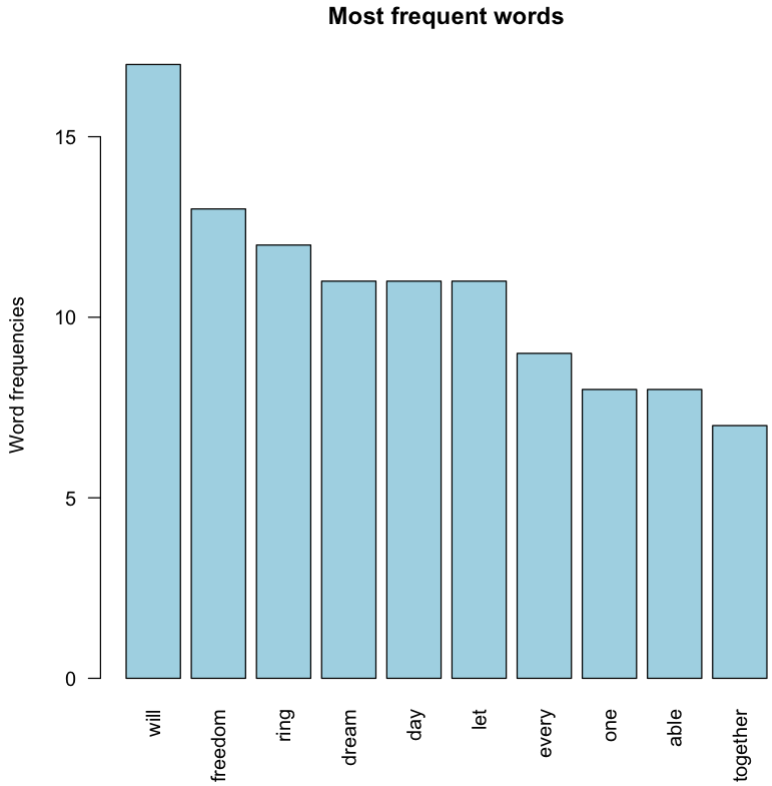
$freedom =
let: 0.89 **ring:** 0.86 **mississippi:** 0.34 **stone:** 0.34 **mountainside:** 0.34 **state:** 0.32 **every:** 0.32 **mountain:** 0.32

Plot word frequencies

The frequency of the first 10 frequent words are plotted :

In [11]:

```
barplot(d[1:10,]$freq, las = 2, names.arg = d[1:10,]$word,
        col ="lightblue", main ="Most frequent words",
        ylab = "Word frequencies")
```



In [ ]:

```

```