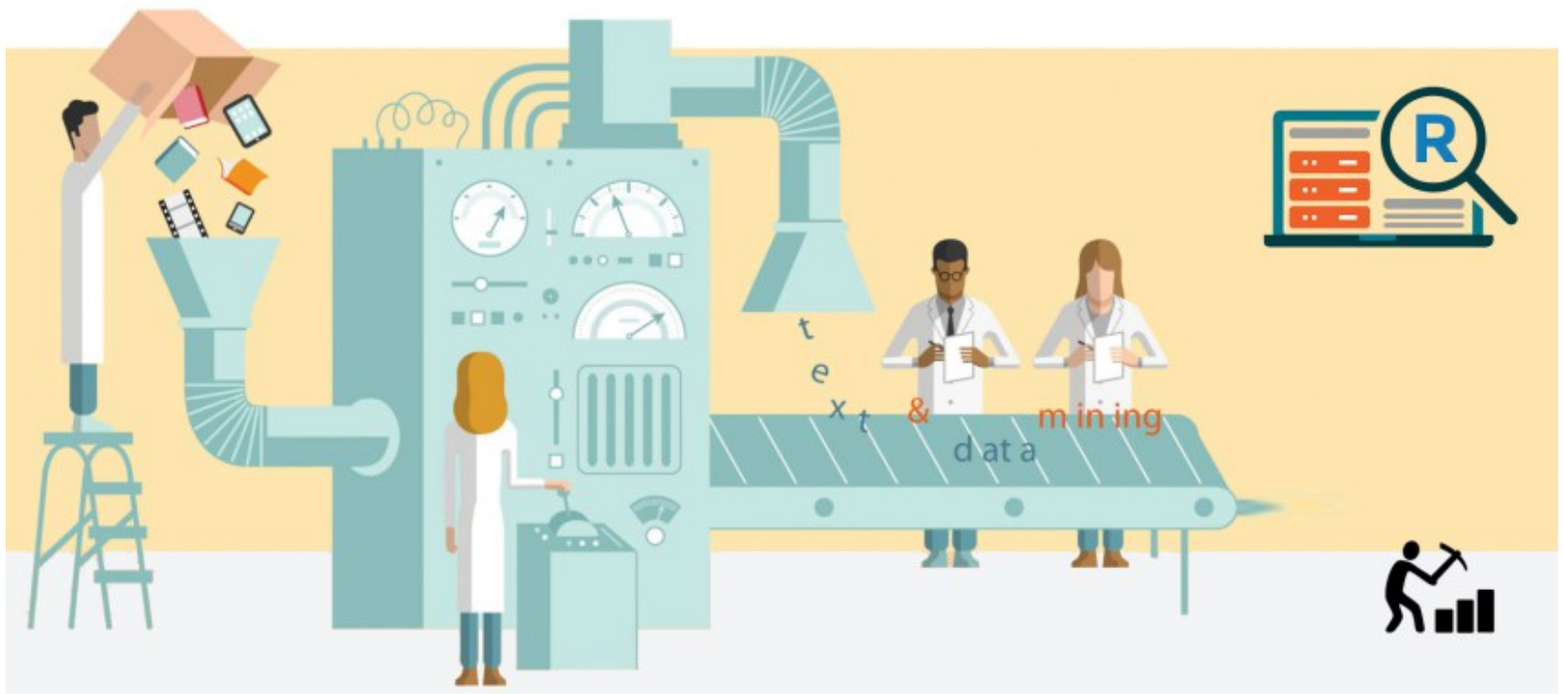
How to use text mining with R - Open Source For You.pdf
Saved to Dropbox • 11 Oct 2017, 21:18

OPEN GURUS

How to use text mining with R

BARKHA PATEL AND SAPAN MANKAD FEBRUARY 20, 2017 9.67K 1 COMMENT



The vast quantity of data, textual or otherwise, that is generated every day has no value unless processed. Text mining, which involves algorithms of data mining, machine learning, statistics and natural language processing, attempts to extract some high quality, useful information from the text.

Text mining, in general, means finding some useful, high quality information from reams of text. More specifically, text mining is machine-supported analysis of text, which uses the algorithms of data mining, machine learning and statistics, along with natural language processing, to extract useful information. It covers a wide range of applications in areas such as social media monitoring, recommender systems, sentiment analysis, spam email classification, opinion mining, etc.

Whatever be the application, there are a few basic steps that are to be carried out in any text mining task. These steps include preprocessing of text, calculating the frequency of words appearing in the documents to discover the correlation between these words, and so on. R is an open source language and environment for statistical computing and graphics. It includes packages like tm, SnowballC, ggplot2 and wordcloud, which are used to carry out the earlier-mentioned steps in text processing.

Getting started

The first prerequisite is that R and R Studio need to be installed on your machine. R Studio is an integrated development environment (IDE) for R. The free open source versions of R Studio and R can be downloaded from their respective websites.

FREE NEWSLETTER

Want daily updates in your inbox?

Subscribe To Email

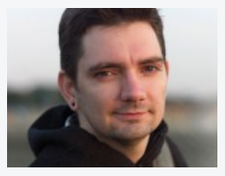
THOUGHT LEADERS

‘CentOS Linux is built on a lot of past experience’

OCTOBER 3, 2017

‘At the heart of the Open Invention Network is its powerful cross-licence’

JULY 4, 2017



‘Open source development at Google is both very diverse and distributed’

JULY 1, 2017

‘I built C++ primarily for myself and my colleagues’

Once you have both R and R Studio on your machine, start R Studio and install the packages tm, SnowballC, ggplot2 and wordcloud, which are usually not installed by default. These packages can be installed by going to *Tools -> install packages* in R Studio.

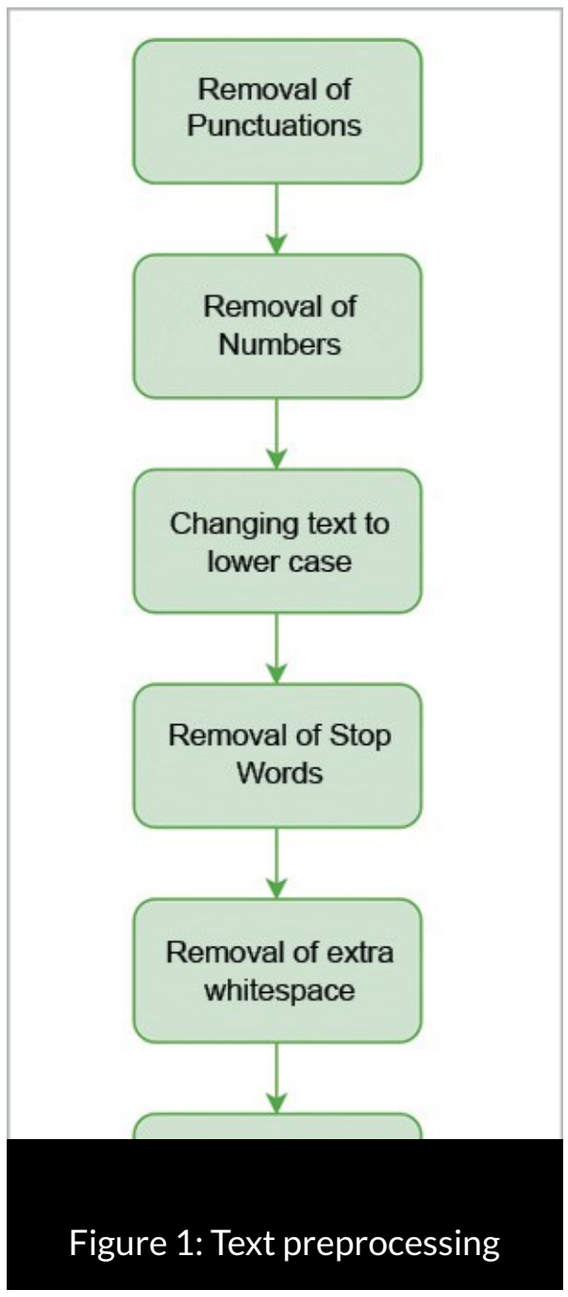


Figure 1: Text preprocessing

Figure 1: Text preprocessing

Loading data

First, let us start by loading the data, which can be any text (or collection of texts, commonly referred to as a corpus) from which we want to extract useful information. To illustrate the process in this tutorial, we have used five text documents related to our favourite superhero, Batman!

For this step, first load the library tm and then use the function *Corpus()* to create a collection of documents. This loads our text documents residing in a particular folder into a corpus object.

```
library(tm)
docs <- Corpus(DirSource("path to your folder"))
docs
<<VCorpus>>
Metadata: corpus specific: 0, document level (indexed): 0
Content: documents: 5
```

The above method is to be used when you want to perform text processing on data present on your local machine in a folder, but if you want to load a dataset from an online repository, R allows you to directly load the dataset into your project as mentioned below.

To understand how to load data in R directly from the Internet, we use the famous Iris dataset (stored in CSV format) available from the UCI Machine Learning Repository (*http://archive.ics.uci.edu/ml/*), which provides free access to several datasets that can be used to test many machine learning algorithms.

Download and load the library RCurl which allows fetching of URIs, HTTP requests, get and post forms, and then process the results returned from the Web server, as follows:

```
library(RCurl)
url <-'https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data'
docs <- getURL(url, ssl.verifypeer=FALSE)
connection <- textConnection(docs)
dataset <- read.csv(connection, header=FALSE)
head(dataset)
V1 V2 V3 V4 V5
1 5.1 3.5 1.4 0.2 Iris-setosa
2 4.9 3.0 1.4 0.2 Iris-setosa
3 4.7 3.2 1.3 0.2 Iris-setosa
4 4.6 3.1 1.5 0.2 Iris-setosa
5 5.0 3.6 1.4 0.2 Iris-setosa
6 5.4 3.9 1.7 0.4 Iris-setosa
```

Preprocessing

Preprocessing the text means removing punctuations, numbers, common words, etc. This step is performed to clean the data to increase the efficiency and robustness of our results by removing words that don't necessarily contribute to our analysis.

Removal of punctuation: To remove all punctuation, use the following command:

JUNE 2, 2017

'The community drives OpenStack's innovation curve'

MAY 2, 2017

SUCCESS STORIES

Andhra Pradesh rolls out an electronic public distribution system using open source

JULY 11, 2017

Future of Indian e-governance begins with OpenForge

JULY 1, 2017

Vodafone deploys open source to reduce vendor lock-in

JUNE 9, 2017

MakeMyTrip travels forward in time using the power of open source

MAY 16, 2017

Open source offers more flexibility, agility and security to Bharti Airtel

JANUARY 10, 2017

CONNECT WITH US

```
docs <- tm_map(docs, removePunctuation)
```

Removal of numbers: The following command will remove the numbers in the text:

```
docs <- tm_map(docs, removeNumbers)
```

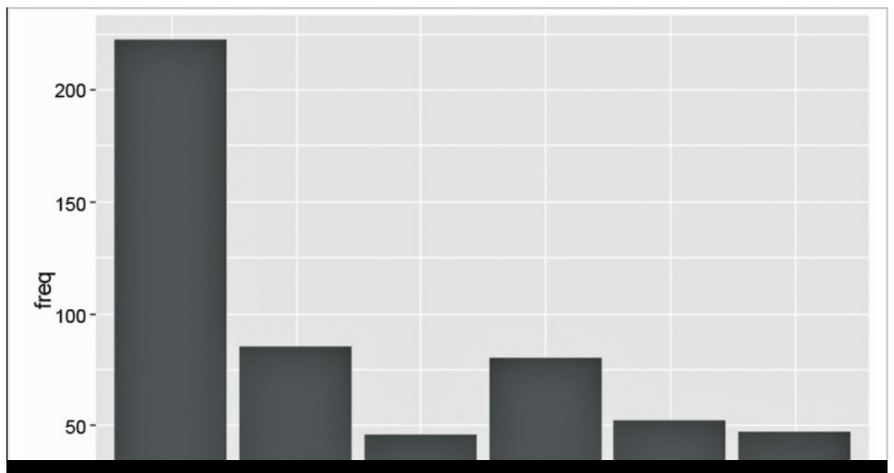


Figure 2: Depicts the plot of words with a frequency greater than 30

Changing the text to lower case: The command shown below will change the text being mined into lower case:

```
docs <- tm_map(docs, tolower)
```

Removal of stop words: Common words like 'but', 'and', etc, are called stop words. The following command will remove them:

```
docs <- tm_map(docs, removeWords, stopwords("english"))
```

Removal of extra whitespaces: The following command will remove the extra whitespaces:

```
docs <- tm_map(docs, stripWhitespace)
```

Stemming: Stemming is the procedure of converting words to their base or root form. For example, *playing, played, plays,* etc, will be converted to *play*.
To perform stemming, use the command shown below:

```
library(SnowballC)
docs <- tm_map(docs, stemDocument)
```

Document term matrix

A document term matrix (DTM) depicts the frequency of a word in its respective document. In this matrix, the rows are represented by documents and the columns are represented by words. How often a word occurs in a document, is what determines the value ascribed to it—if it appears only once, its value is 1; if it appears twice, its value is 2; and if it does not appear at all, then the value is 0.
To create a DTM for our corpus, type:

```
dtm<- DocumentTermMatrix(docs)
dtm
<<DocumentTermMatrix (documents: 5, terms: 2566)>>
Non-/sparse entries: 3449/9381
Sparsity : 73%
Maximal term length: 23
Weighting : term frequency (tf)
```

The summary of our DTM states that there are five documents and 2566 unique words. Hence, let's give a matrix with the dimensions of 5×2566, in which 73 per cent of the rows have value 0.
To get the total frequency of words in the whole corpus, we can sum the values in a row, as follows:

```
freq <- colSums(as.matrix(dtm))
```

For that, we have to first transform the DTM into a matrix, and then sum up the rows to give a single value for each column.
Next, we sort this in descending order to get to know the terms with the highest frequency, as follows:

```
ord <- order(freq,decreasing=TRUE)
freqn[head(ord)]
batman bruce comic gotham wayne character
222 85 80 52 47 46
```

Finding associations

After the previous step, we get a rough idea that the terms 'batman', 'bruce', 'comic', 'wayne' and 'character' are central to our corpus. Thus, if we want to find terms that highly correlate with them we can use the *findAssocs()* function, which takes as its parameter the DTM, the word and the correlation limit (which ranges from 0 to 1). A correlation of 1 means 'always together', while a correlation of 0.5 means 'together for 50 per cent of the time'.

644000 Likes
23949 Followers
11757 Subscribers

4413 Comments

HOW-TOS

Developing a virtual machine for Erlang/OTP using Ansible
OCTOBER 3, 2017

Ansible deployment of Jenkins
AUGUST 31, 2017

Analyse your web browsing history using Python
AUGUST 21, 2017

How to run OpenStack on AWS
JULY 31, 2017

Deploying Graphite using Ansible
JULY 31, 2017

```
findAssocs(dtm, "bruce", corlimit=0.90)
$bruce
able pain times order will time
0.99 0.98 0.98 0.97 0.96 0.95
access day defeat earth eyes idea
0.94 0.94 0.94 0.94 0.94 0.94
individual minds nightwing sometimes unlike character
0.94 0.94 0.94 0.94 0.94 0.93
associated life part personality alfred man
0.92 0.92 0.92 0.92 0.91 0.91
parents
0.91
```

Plotting the term frequencies

To graphically represent our term frequencies as a plot, the ggplot2 library is used as follows:

```
library(ggplot2)
wf <- data.frame(word=names(freq), freq=freq)
p <- ggplot(subset(wf, freq>30), aes(word, freq))
p <- p + geom_bar(stat="identity")
p <- p + theme(axis.text.x=element_text(angle=45, hjust=1))
p
```

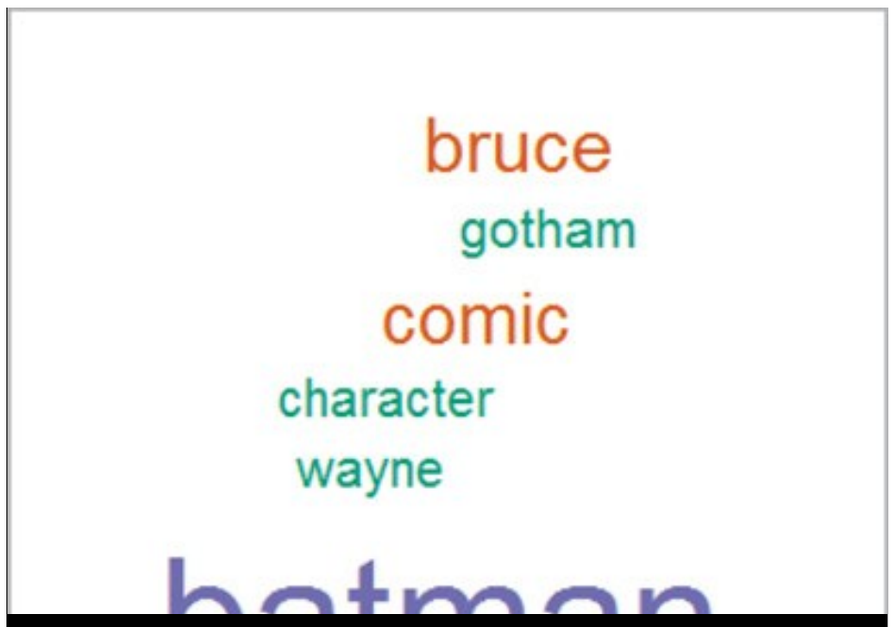


Figure 3: Word Cloud of words with a frequency greater than 30

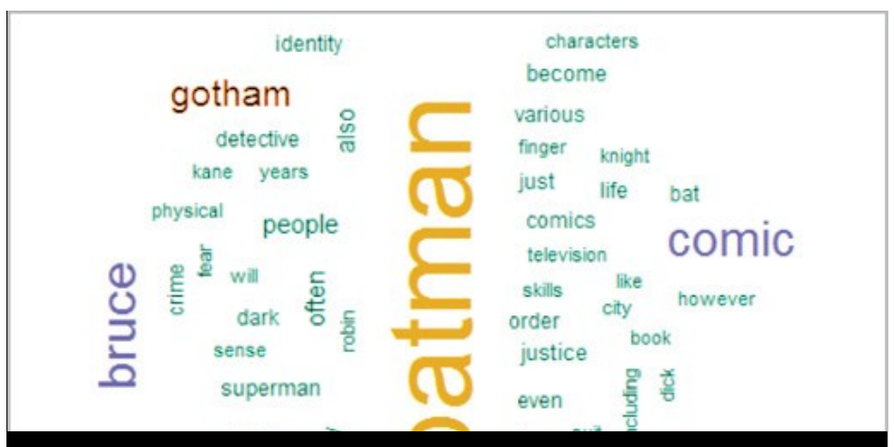


Figure 4: Word Cloud of the 50 words that occur most often in the document

Word Cloud

Word Cloud is another way of representing the frequency of terms in a document. Here, the size of a word indicates its frequency in the document corpus.

Load the *wordcloud* package, as follows:

```
library(wordcloud)
```

For Word Cloud comprising terms with a frequency greater than 30, use the following command:

```
wordcloud(names(freq), freq, min.freq=30,colors=brewer.pal(3,"Dark2"))
```

For a Word Cloud for the 50 words that occur most often, use the command given below:

```
wordcloud(names(freq), freq, max.words=50,colors=brewer.pal(6,"Dark2"))
```

Text processing is about extracting useful information from text, which includes basic steps of pre-processing data, stemming the data, representing the corpus using the document term matrix and obtaining the associations between terms. R provides several libraries and functions to efficiently carry out these tasks.

Share this:

Google Facebook 8 Twitter More

TAGS : DATA MINING, OPEN SOURCE, R, TEXT MINING, TEXT MINING USING R

PREVIOUS ARTICLE

Talk to your Bluetooth device using Node.js

NEXT ARTICLE

Asttecs to demonstrate IoT, surveillance integration with IP PBX at IEW 2017

Barkha Patel

The author is a Text Mining enthusiast. Her agenda is to solve real life problems through technology products that are user friendly and user-centric. She can be contacted at barkha95@yahoo.com.

RELATED ARTICLES

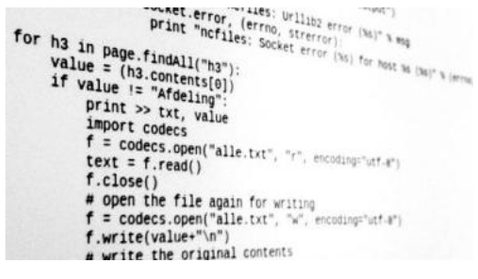
S. PARDHU PAVAN, JUNE 23, 2017

Beaglebone Black: Flashing eMMC using an SD card

MITESH_SONI, NOVEMBER 27, 2014

OpenMEAP Create Mobile Apps with Ease!

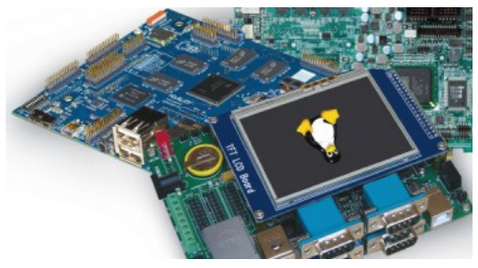
KENNETH GONSALVES, APRIL 30, 2012



```
for h3 in page.findAll("h3"):
    value = (h3.contents[0])
    if value != "Afdeling":
        print >> txt, value
        import codecs
        f = codecs.open("alle.txt", "r", encoding="utf-8")
        text = f.read()
        f.close()
        # open the file again for writing
        f = codecs.open("alle.txt", "w", encoding="utf-8")
        f.write(value+"\n")
```

FOSS is __FUN__: The Fifth Freedom, Part 2

PRAVIN SELVA, JANUARY 18, 2015



Develop a GNU/Linux-like OS for a Single Board Computer

RUCHIRA PRASAD, MARCH 8, 2016

7 Open Source Tools from NGA

DR ANIL SETH, MARCH 1, 2009

Secure Communication

Sponsored

Sponsored

TODAY WEEK MONTH

Azure Functions gets Java support

OSFY BUREAU , OCTOBER 11, 2017

Partner site: eleB2B.com - India's Electronics Industry Distributors, Manufacturers, Service Providers

TAGS

Android Apache Artificial Intelligence C Canonical cloud database Developers Docker Facebook Fedora firewall GNOME Google html India Insight Intel IoT Java JavaScript lets try Linus Torvalds Linux Linux Foundation Microsoft MySQL network open source open source software operating systems Oracle PHP programming python raspberry pi Red Hat Security Tips ubuntu unix web applications Windows WordPress WWW

Creative Commons - Attribution + Noncommercial © Copyright 2017. EFY Enterprise Pvt. Ltd.