

# Entrega do trabalho final

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## Arquivos

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## Help da função

collocations                      package:none                      R Documentation

Extract collocations for a target word from a given raw text.

### Description:

collocations receives a text and a target word and select the sentences from the text which contain the target word. From those sentences, the co-occurrences between target word and the other words which are above a certain threshold will constitute the set of collocations.

### Usage:

```
collocates(thetext, targetword, ncollmax)
```

### Arguments:

thetext                      character. Text given by the user in .txt format and UTF-8 encoding.

targetword                      character. Any word the user has chosen from the text. It will be the reference for the extraction of the collocations.

ncollmax                      numeric. Maximum number of collocates to be displayed on the graph generated by the function. In case the number of extracted collocates is less than the stipulated maximum, then ncollmax will be ignored.

### Details:

The function may not work well depending on the size of the text file given even though some optimizations were tried such as using environments hash to count faster the words'

occurrences.

Value:

Instead of returning values, `collocates` generates one text file and another file for a barplot in png format. Both are saved in the workspace being used to run the function.

Warning:

Depending on the size of the text file, the function may get too slow or not work. As a suggestion, the user can experiment the function with different text sizes. See Examples for a simple teste of the function.

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References:

[http://en.wikibooks.org/wiki/R\\_Programming/Text\\_Processing](http://en.wikibooks.org/wiki/R_Programming/Text_Processing) Last access in may 18th 2014.

About environments and hash argument:  
<http://adv-r.had.co.nz/Environments.html> (There has been created a hash function to optimize the use of hashes, but it only works for later versions of R. Read "See Also")

Download of non-annotated corpora for testing the function:  
<http://corpora.informatik.uni-leipzig.de/download.html> Last access in may 15th 2014.

To understand a little bit more about collocations in a more intuitive way: <http://esl.fis.edu/grammar/easy/colloc.htm>

See Also:

For more information on hash usage in R, see:  
<http://cran.r-project.org/web/packages/hash/index.html>,  
<http://cran.r-project.org/web/packages/hash/hash.pdf> and  
<http://opendatagroup.wordpress.com/2009/07/26/hash-package-for-r/>.

Examples:

```
# Download the file "teste-texto-bbc.txt" in  
(http://ecologia.ib.usp.br/bie5782/doku.php?id=bie5782:01\_curso\_atual:alunos:trabalho\_final:  
viviane.santos.silva:start) and save it to your R workspace to run this  
example.
```

```
collocates(thetext="test-text-bbc.txt", targetword="fiction", ncollmax=10)
# generates a barplot for the 10 first collocates which co-occur
with the target word "film" in the text given.
```

## Código da função

```
##### FUNCTION TO EXTRACT COLLOCATIONS FROM RAW TEXTS #####

collocations <- function(thetext, targetword, ncollmax) {

## Reading the text ##

text <- scan(thetext, character(0), quote = NULL, sep = "\n", allowEscapes =
FALSE, strip.white = TRUE, fileEncoding = "UTF-8") # reads text input in
.txt format
textstring <- tolower(paste(text, collapse = "")) # converts upper-case
characters to lower-case
# textstring

textclean1 <- gsub("[^[:alnum:][:space:]]'\.]", "", textstring) # removes
from the textstring all ist characters, except alphabetic, spaces,
apostrophes and period
textclean2 <- gsub("[:space:]]+", ' ', textclean1) # substitutes multiple
spaces that may accidentally appear in the text for simple space character
textclean3 <- gsub("\. ", '.', textclean2) # substitute "period+space" for
period only (to avoid future problems with the extraction of words from the
beginings of the paragraphs)

textdotsplit <- strsplit(textclean3, split='\\.') # separate the text by its
sentences using the periods to guide this process

txtw <- list() # creating an empty list
# iterating to split the text to make it possible to access its words
individually
for (i in 1:length(textdotsplit[[1]])){
  txtw[i] <- strsplit(textdotsplit[[1]][i], split=' ') # txtw is now a list
of lists, each inner list corresponding to a sentence with indexes to access
its words
}

## Creating a dictionary to save word occurrences ##

wordcounter <- function(sentencelist){ # function to transform a list of
list such as txtw into a dictionary containing words counts
  wordcount <- new.env(hash=TRUE, parent = emptyenv()) # initializing the
dictionary
  for (i in seq(1:length(sentencelist))){
    sentence <- sentencelist[[i]] # this was made to make the code easier to
```

```
read, avoiding excessive '[' notation
  for (j in seq(1:length(sentence))){
    eachword <- sentence[j] # 'eachword' is accessing each of the words
from the text given
    if (is.null(wordcount[[eachword]])) { # dictionary's new entry
      wordcount[[eachword]] <- list(value=1)
    } else{wordcount[[eachword]]$value <- wordcount[[eachword]]$value + 1
# updates existing entry
    }
  }
}
return(wordcount)
}
```

## Creating a named list from a dictionary ##

```
ordnamedlist <- function(dict){ # tranform dictionary into list and sort it
by its values
  occlist <- list() # creates an empty list
  i <- 1
  for (w in ls(dict)) { # transform dictionary into a list
    occlist[[i]] <- list(name=w, value=dict[[w]]$value) # extracts words and
their corresponding number of occurrences from the environment hash
    i <- i+1
  }
  occlist[order(as.numeric(sapply(occlist, "[", "value")), decreasing=T)] #
applies the '[' function through the sapply to the named list created
# and extract its values, which will be used by the as.numeric to generate a
simple numeric vector which, in turn, will be sorted by the
# order function to ordenate the values returning their positions that will
be "given" back to occlist and will automatically order it
}
```

```
wcount <- wordcounter(txtw) # calling the function that turns a list of
lists into a dictionary
wcountsort <- ordnamedlist(wcount) # transforming the wcount (dictionary)
into an ordered list
```

## Creating a file containing the words and their counts ##

```
namefile <- "wordscounts.txt" # just to make it easier to change the file
name if one prefer
```

```
write("words\tcounts", file=namefile) # generates a file containing 2
column-headers: words and counts. avoids problems if the user call this
function more than once (function countsfile right below calls a write
function which is using append=T)
```

```
print("A file named 'wordscounts.txt', containing your text words and their counts has been generated. Feel free to explore it (:") # so the user will know a file has been generated
```

```
countsfile <- function(l){ # function to be used by the lapply to print properly in the file words and their counts
  write(paste(c(l$name, l$value), collapse="\t"), file=namefile, append=T)
}
```

```
trash <- lapply(wcountsort, countsfile) # calling the function to generate a file. the variable 'trash' is being attributed the lapply output for this was generating NULL values and, apparently, R has nothing like a procedure function (a function that returns nothing).
```

```
## Finding the co-occurrences ##
```

```
hastarget <- function(wlist, target){ # checks if the lists (sentences) in wlist has the target word
  target %in% wlist # the test is made using the logical function %in%
}
```

```
sbin <- which(sapply(txtw, hastarget, targetword)) # function 'which' returns the positions of the lists from txtw tested by the hastarget function and that were marked "TRUE"
tsentences <- txtw[sbin] # tsentences receives only those sentences containing the target word
```

```
cooccurrences <- wordcounter(tsentences) # creates a dictionary with the counts of the words from the sentences which contains the target word
occlistsort <- ordnamedlist(cooccurrences) # sorts the created dictionary of co-occurrences
```

```
## Calculating cooccurrences words frequencies ##
```

```
wtotal <- sum(sapply(txtw, length)) # total number of words in the text
stotal <- sum(sapply(tsentences, length)) # total number of words in the subtext (sentences which contained the target word)
```

```
## Creating a dictionary for the frequencies of the co-occurrences ##
```

```
wfreqs <- function(countlist, total){ # countlist is a named list containing names and associated values and total is the amount of words in the portion of text from which this countlist was generated
  freqs <- new.env(hash=TRUE, parent = emptyenv())
  for (i in seq(1:length(countlist))){
    eachword <- countlist[[i]]$name
    freqs[[eachword]]$value <- (countlist[[i]]$value/total) # calculating the frequencies of the words
  }
}
```

```
}  
  return(freqs)  
}  
  
tfreqs <- wfreqs(wcountsort, wtotal) # calling the functions that creates  
the frequency dictionary for the whole text  
cfreqs <- wfreqs(occlistsort, stotal) # calling the functions that creates  
the frequency dictionary for the sentences of the text that contains the  
target  
  
## Creating a dictionary for the frequencies of the relevant words ##  
  
testocc <- function(ftotal, fsent){  
  
  ratio <- new.env(hash=TRUE, parent = emptyenv())  
  for (w in ls(fsent)){  
    if(tfreqs[[w]] > 0.0001 & wcount[[w]]$value > 5){ # discarding words  
with frequencies in the text below 0.01% or, for a text with less than 5000  
words, discarding those words with freqs less than 2  
      ratio[[w]]$value <- fsent[[w]]$value/ftotal[[w]]$value # this  
important parameter will be used to judge whether or not a word w is forming  
a collocation with the target. if this value is 0.5, it means there is no  
difference between the distribution of the word w considered alone and its  
distribution given the target (and that's the null model). the max of this  
ratio will be 'wtotal/stotal'. the minimum will be 1 (when every occurrence  
of w meets every occurrence of the target)  
    }  
  }  
  return(ratio)  
}  
  
relvfreqs <- testocc(tfreqs, cfreqs) # dictionary containing words and  
their ratios  
relvfreqslist <- ordnamedlist(relvfreqs) # ordered list of the dictionary  
created  
  
## Extracting collocates ##  
  
threshold <- 2 # only words which appear twice as often will be considered  
collocates candidates  
  
selectcoll <- function(l){ # will be used to select the collocations  
comparing the candidate words' ratios and the chosen threshold  
  l$value > threshold  
}  
  
collindex <- which(sapply(relvfreqslist, selectcoll)) # selecting the  
collocates' indexes
```

```
collocates <- relevfreqslist[collindex] # using the extracted indexes,
collocates access the correct collocates from the relevfreqslist (list of
relevant words and their frequencies)

n <- as.numeric(ncollmax)
if(length(collocates) > n){ # test to check if there are more collocates
than the number the user wants to display on the graph
  collocates <- collocates[1:n]
}

if(length(collocates) == 0) {
  print(paste("Couldn't find any collocate for the '", targetword, "' chosen.
Maybe you can try a more frequent word."))
  return(invisible())
}

## Plotting a barplot displaying the n most probable collocates ##

collnames <- sapply(collocates, function(l) l$name) # generating a vector
containing the words which were selected as being collocates
collratios <- sapply(collocates, function(l) as.numeric(l$value)) #
collocates ratio (or the degree of the collocations extracted)

png("barplot-collocates.png")
barplot(collratios, names.arg = collnames, las=2, main=paste("Collocates
of", targetword), ylab="Collocations ratios", ylim=c(0,
max(collratios)+0.5)) # graph displaying the results of the function
dev.off()

}
```

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