



UNIVERSIDAD AUTÓNOMA DEL ESTADO DE MÉXICO
Bioinformática
Jesus Alberto Elias Terron



< HeatMap >

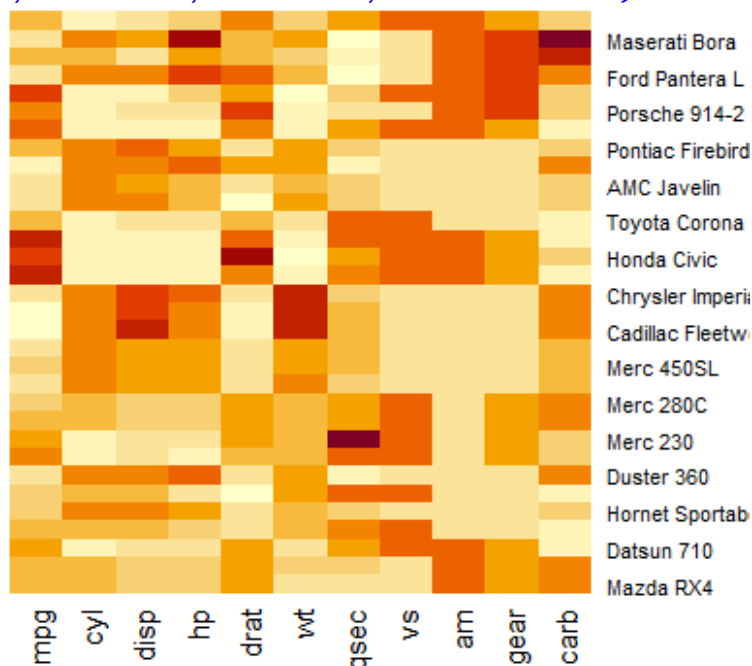
> mtcars

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 wag	21.0	6	160.0	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225.0	105	2.76	3.460	20.22	1	0	3	1
Duster 360	14.3	8	360.0	245	3.21	3.570	15.84	0	0	3	4
Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	1	0	4	2
Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	1	0	4	2
Merc 280	19.2	6	167.6	123	3.92	3.440	18.30	1	0	4	4
Merc 280C	17.8	6	167.6	123	3.92	3.440	18.90	1	0	4	4
Merc 450SE	16.4	8	275.8	180	3.07	4.070	17.40	0	0	3	3
Merc 450SL	17.3	8	275.8	180	3.07	3.730	17.60	0	0	3	3
Merc 450SLC	15.2	8	275.8	180	3.07	3.780	18.00	0	0	3	3
Cadillac Fleetwood	10.4	8	472.0	205	2.93	5.250	17.98	0	0	3	4
Lincoln Continental	10.4	8	460.0	215	3.00	5.424	17.82	0	0	3	4
Chrysler Imperial	14.7	8	440.0	230	3.23	5.345	17.42	0	0	3	4
Fiat 128	32.4	4	78.7	66	4.08	2.200	19.47	1	1	4	1
Honda Civic	30.4	4	75.7	52	4.93	1.615	18.52	1	1	4	2
Toyota Corolla	33.9	4	71.1	65	4.22	1.835	19.90	1	1	4	1
Toyota Corona	21.5	4	120.1	97	3.70	2.465	20.01	1	0	3	1
Dodge Challenger	15.5	8	318.0	150	2.76	3.520	16.87	0	0	3	2
AMC Javelin	15.2	8	304.0	150	3.15	3.435	17.30	0	0	3	2
Camaro Z28	13.3	8	350.0	245	3.73	3.840	15.41	0	0	3	4
Pontiac Firebird	19.2	8	400.0	175	3.08	3.845	17.05	0	0	3	2
Fiat X1-9	27.3	4	79.0	66	4.08	1.935	18.90	1	1	4	1
Porsche 914-2	26.0	4	120.3	91	4.43	2.140	16.70	0	1	5	2
Lotus Europa	30.4	4	95.1	113	3.77	1.513	16.90	1	1	5	2
Ford Pantera L	15.8	8	351.0	264	4.22	3.170	14.50	0	1	5	4
Ferrari Dino	19.7	6	145.0	175	3.62	2.770	15.50	0	1	5	6
Maserati Bora	15.0	8	301.0	335	3.54	3.570	14.60	0	1	5	8
Volvo 142E	21.4	4	121.0	109	4.11	2.780	18.60	1	1	4	2

> data <- as.matrix(mtcars)

> heatmap(data)

> heatmap(data, Colv = NA, Rowv = NA, scale="column")





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< corrplot >

```
> install.packages("corrplot")
```

```
> library(corrplot)
```

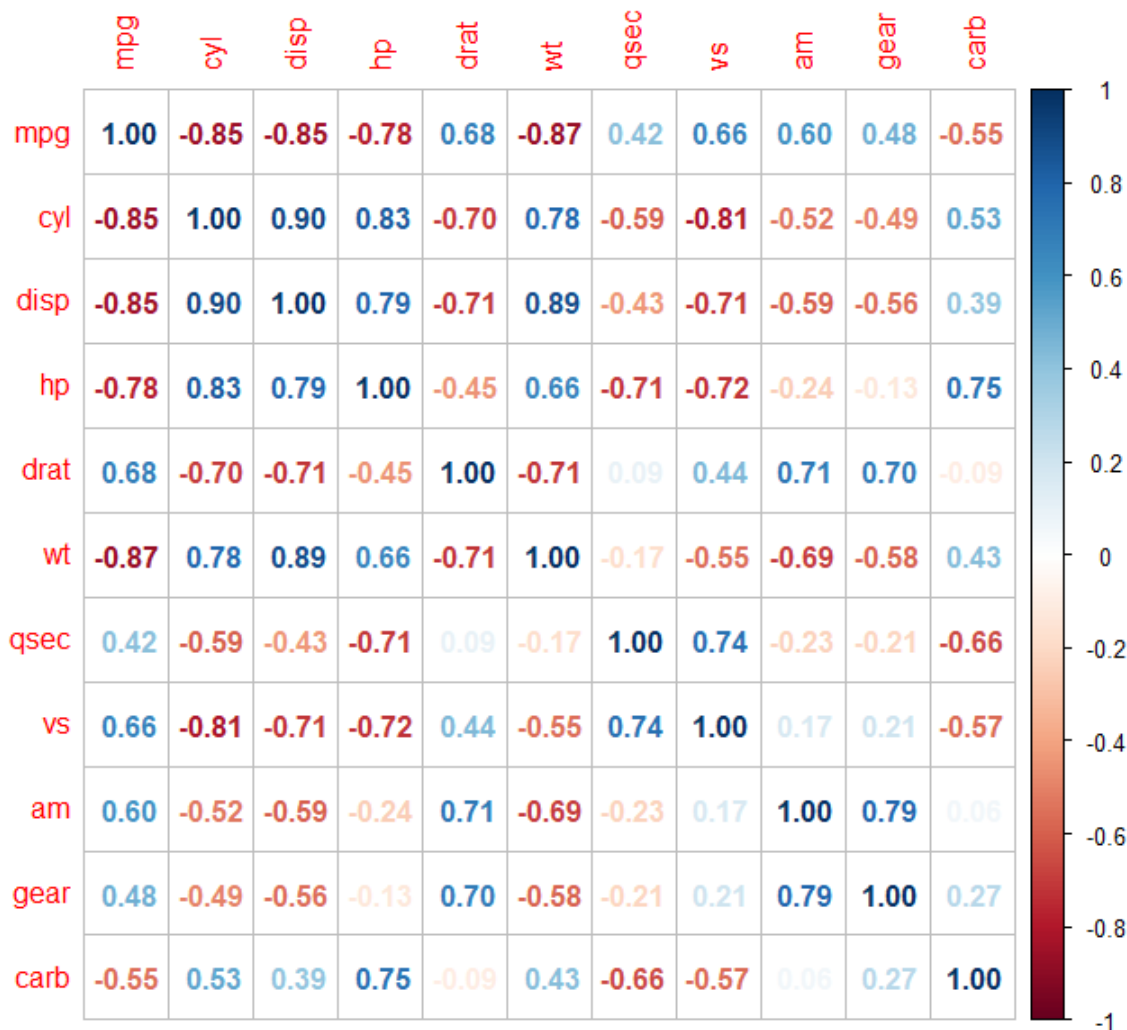
```
> data("mtcars")
```

```
> head(mtcars)
```

	mpg	cyl	dis	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3	1

```
> c<-cor(mtcars)
```

```
> corrplot(c,method="number")
```



```
< Boxplot >
```

```
> any(is.na(mtcars))
```

```
[1] FALSE
```

```
> str(mtcars)
```

```
'data.frame': 32 obs. of 11 variables:
```

```
$ mpg : num 21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
```



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```
$ cyl : num 6 6 4 6 8 6 8 4 4 6 ...
$ disp: num 160 160 108 258 360 ...
$ hp : num 110 110 93 110 175 105 245 62 95 123 ...
$ drat: num 3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
$ wt : num 2.62 2.88 2.32 3.21 3.44 ...
$ qsec: num 16.5 17 18.6 19.4 17 ...
$ vs : num 0 0 1 1 0 1 0 1 1 1 ...
$ am : num 1 1 1 0 0 0 0 0 0 0 ...
$ gear: num 4 4 4 3 3 3 3 4 4 4 ...
$ carb: num 4 4 1 1 2 1 4 2 2 4 ...
```

```
> summary(mtcars)
```

mpg	cyl	disp
Min. :10.40	Min. :4.000	Min. : 71.1
1st Qu.:15.43	1st Qu.:4.000	1st Qu.:120.8
Median :19.20	Median :6.000	Median :196.3
Mean :20.09	Mean :6.188	Mean :230.7
3rd Qu.:22.80	3rd Qu.:8.000	3rd Qu.:326.0
Max. :33.90	Max. :8.000	Max. :472.0

hp	drat	wt
Min. : 52.0	Min. :2.760	Min. :1.513
1st Qu.: 96.5	1st Qu.:3.080	1st Qu.:2.581
Median :123.0	Median :3.695	Median :3.325
Mean :146.7	Mean :3.597	Mean :3.217
3rd Qu.:180.0	3rd Qu.:3.920	3rd Qu.:3.610
Max. :335.0	Max. :4.930	Max. :5.424

qsec	vs	am
Min. :14.50	Min. :0.0000	Min. :0.0000
1st Qu.:16.89	1st Qu.:0.0000	1st Qu.:0.0000
Median :17.71	Median :0.0000	Median :0.0000
Mean :17.85	Mean :0.4375	Mean :0.4062
3rd Qu.:18.90	3rd Qu.:1.0000	3rd Qu.:1.0000
Max. :22.90	Max. :1.0000	Max. :1.0000

gear	carb
Min. :3.000	Min. :1.000
1st Qu.:3.000	1st Qu.:2.000
Median :4.000	Median :2.000
Mean :3.688	Mean :2.812
3rd Qu.:4.000	3rd Qu.:4.000
Max. :5.000	Max. :8.000

```
> anova_model<-aov(mpg~cyl, data = mtcars)
```

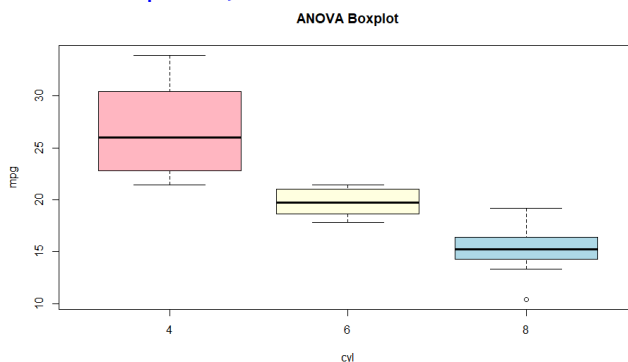
```
> summary(anova_model)
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
cyl	1	817.7	817.7	79.56	6.11e-10 ***
Residuals	30	308.3	10.3		

```
---
Signif. codes:
```

```
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
> boxplot(mpg~cyl,data=mtcars,
+         col=c("lightpink","lightyellow","lightblue"),
+         main="ANOVA Boxplot")
```





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```
(library("tidyverse"))
[1] "corrplot" "lubridate" "forcats" "stringr" "dplyr"
"purrr" "readr"
[8] "tidyr" "tibble" "ggplot2" "tidyverse" "msa"
"Biostrings" "GenomeInfoDb"
[15] "XVector" "IRanges" "S4Vectors" "stats4" "BiocGen
erics" "stats" "graphics"
[22] "grDevices" "utils" "datasets" "methods" "base"
> (library("stringr"))
[1] "corrplot" "lubridate" "forcats" "stringr" "dplyr"
"purrr" "readr"
[8] "tidyr" "tibble" "ggplot2" "tidyverse" "msa"
"Biostrings" "GenomeInfoDb"
[15] "XVector" "IRanges" "S4Vectors" "stats4" "BiocGen
erics" "stats" "graphics"
[22] "grDevices" "utils" "datasets" "methods" "base"
> output <- vector("double", ncol(mtcars))
> names(output) <- names(mtcars)
> for (i in names(mtcars)) {
+   output[i] <- mean(mtcars[[i]])
+ }
> output
      mpg      cyl    disp      hp      drat      wt      q
sec 20.090625 vs 6.187500 230.721875 146.687500 3.596563 3.217250 17.848
750 0.437500 0.406250 3.687500
carb
2.812500
> output <- vector("list", ncol(nycflights13::flights))
Error in (function (cond) :
  error in evaluating the argument 'x' in selecting a method for function
'ncol': there is no package called 'nycflights13'
> output <- vector("list", ncol(nycflights13::flights))
Error in (function (cond) :
  error in evaluating the argument 'x' in selecting a method for function
'ncol': there is no package called 'nycflights13'
> install.packages(nycflights13)
Error in install.packages : objeto 'nycflights13' no encontrado
> install.packages("nycflights13")
probando la URL 'https://cran.rstudio.com/bin/windows/contrib/4.3/nycflig
hts13_1.0.2.zip'
Content type 'application/zip' length 4510470 bytes (4.3 MB)
downloaded 4.3 MB

package 'nycflights13' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\Alumno1.PC12COMPUTOA\AppData\Local\Temp\Rtmpww5omL\downl
oaded_packages
> output <- vector("list", ncol(nycflights13::flights))
>
> names(output) <- names(nycflights13::flights)
> for (i in names(nycflights13::flights)) {
+   output[[i]] <- class(nycflights13::flights[[i]])
+ }
> output
$year
[1] "integer"

$month
[1] "integer"

$day
[1] "integer"
```



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```
$dep_time  
[1] "integer"
```

```
$sched_dep_time  
[1] "integer"
```

```
$dep_delay  
[1] "numeric"
```

```
$arr_time  
[1] "integer"
```

```
$sched_arr_time  
[1] "integer"
```

```
$arr_delay  
[1] "numeric"
```

```
$carrier  
[1] "character"
```

```
$flight  
[1] "integer"
```

```
$tailnum  
[1] "character"
```

```
$origin  
[1] "character"
```

```
$dest  
[1] "character"
```

```
$air_time  
[1] "numeric"
```

```
$distance  
[1] "numeric"
```

```
$hour  
[1] "numeric"
```

```
$minute  
[1] "numeric"
```

```
$time_hour  
[1] "POSIXct" "POSIXt"
```

```
> data("iris")  
> iris_uniq <- vector("double", ncol(iris))  
> names(iris_uniq) <- names(iris)  
> for (i in names(iris)) {  
+   iris_uniq[i] <- length(unique(iris[[i]]))  
+ }
```

```
> iris_uniq  
Sepal.Length Sepal.Width Petal.Length Petal.Width Species  
35 23 43 22 3
```

```
>  
> n <- 10  
> # values of the mean  
> mu <- c(-10, 0, 10, 100)  
> normals <- vector("list", length(mu))  
> for (i in seq_along(normals)) {
```

```
+ normals[[i]] <- rnorm(n, mean = mu[i])
+ }
> normals
[[1]]
[1] -10.826366 -10.990863 -10.278715 -9.045622 -9.914845 -9.916772 -
9.872186 -10.414968 -8.984597
[10] -9.736405

[[2]]
[1] -0.00186675 0.47935154 1.09266573 1.01678335 -0.41600937 1.52718
682 1.27835777 -1.55014491 0.92492261
[10] 0.96131191

[[3]]
[1] 8.687705 10.649232 8.700926 8.939139 9.689645 9.980005 9.44136
0 10.266999 8.986128 11.332860

[[4]]
[1] 100.58392 100.43640 99.60954 99.69960 99.27784 101.26677 99.5047
8 100.20550 100.95883 100.09959

> matrix(rnorm(n * length(mu), mean = mu), ncol = n)
      [,1] [,2] [,3] [,4] [,5] [,6]
[1,] -9.6293553 -7.431248 -9.4449863 -9.454240 -10.8202073 -10.250382
7 -10.3365837 -10.216655 -9.827654
[2,] 0.1877544 -1.280977 0.3988413 1.177973 -0.4214706 -0.774462
3 -0.9852422 -1.677233 -1.000194
[3,] 9.6600700 10.510931 11.3780735 10.559495 9.9292345 12.352192
2 12.0389672 11.104737 8.762058
[4,] 100.3837576 100.114556 100.8162985 101.032002 100.5336672 99.935601
9 99.3926393 101.123894 99.320401
      [,10]
[1,] -9.9573699
[2,] -0.7738948
[3,] 9.9432735
[4,] 99.1953215

> out <- ""
> for (x in letters) {
+   out <- str_c(out, x)
+ }
> out
[1] "abcdefghijklmnopqrstuvwxyz"
> str_c(letters, collapse = "")
[1] "abcdefghijklmnopqrstuvwxyz"
> x <- sample(100)
> sd. <- 0
> for (i in seq_along(x)) {
+   sd. <- sd. + (x[i] - mean(x))^2
+ }
> sd. <- sqrt(sd. / (length(x) - 1))
> sd.
[1] 29.01149
> sd(x)
[1] 29.01149
> sqrt(sum((x - mean(x))^2) / (length(x) - 1))
[1] 29.01149
> x <- runif(100)
> out <- vector("numeric", length(x))
> out[1] <- x[1]
> for (i in 2:length(x)) {
+   out[i] <- out[i - 1] + x[i]
+ }
> out
```



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```
[1] 0.1356253 0.9154960 1.1409454 1.1703463 1.1843833 1.9930598
2.8468568 3.0213893 4.0033992
[10] 4.5689064 5.4433400 5.8070458 6.3963409 6.8446237 7.5409310
7.8198911 8.3929249 9.0441493
[19] 9.1302147 9.4235008 9.9750655 10.4139451 10.4496657 10.9844507 1
1.8018242 12.1884683 12.4913228
[28] 12.7965141 13.5358075 13.8991291 14.7876998 14.9065307 15.6655312 1
5.7390102 16.0132199 16.1976243
[37] 16.8314524 17.5678097 18.0056007 18.3703256 19.1796062 19.9944799 2
0.5440925 21.4324213 22.2636737
[46] 22.6618106 23.4087932 23.7400649 24.6207415 25.2590804 25.9049409 2
6.1679373 26.3731250 26.5883270
[55] 27.1360010 27.9023065 28.4148523 29.3509634 30.1542130 30.5071164 3
0.7525020 31.5252732 32.2011035
[64] 33.1380861 33.2508983 33.4831419 33.8522637 34.0883366 34.5026798 3
5.3597602 35.9871311 36.0864600
[73] 36.4532054 36.7151963 37.2411797 38.1200360 38.6225073 38.6571440 3
8.7318493 38.7635342 38.8149185
[82] 39.3919740 40.0940004 40.8613529 41.1328725 41.2630887 41.9156264 4
2.5160804 42.7703521 43.1855939
[91] 43.8110042 44.2272195 44.4804996 44.7810075 44.8228298 45.3884619 4
6.0668289 46.3200726 46.5260160
[100] 47.2758001
```

```
> all.equal(cumsum(x), out)
```

```
[1] TRUE
```

```
> humps <- c("five", "four", "three", "two", "one", "no")
> for (i in humps) {
+   cat(str_c("Alice the camel has ", rep(i, 3), " humps.",
+         collapse = "\n")
+     ), "\n")
+   if (i == "no") {
+     cat("Now Alice is a horse.\n")
+   } else {
+     cat("So go, Alice, go.\n")
+   }
+   cat("\n")
+ }
```

```
Alice the camel has five humps.
Alice the camel has five humps.
Alice the camel has five humps.
So go, Alice, go.
```

```
Alice the camel has four humps.
Alice the camel has four humps.
Alice the camel has four humps.
So go, Alice, go.
```

```
Alice the camel has three humps.
Alice the camel has three humps.
Alice the camel has three humps.
So go, Alice, go.
```

```
Alice the camel has two humps.
Alice the camel has two humps.
Alice the camel has two humps.
So go, Alice, go.
```

```
Alice the camel has one humps.
Alice the camel has one humps.
Alice the camel has one humps.
So go, Alice, go.
```

```
Alice the camel has no humps.
Alice the camel has no humps.
```



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Alice the camel has no humps.
Now Alice is a horse.

```
> numbers <- c(
+   "ten", "nine", "eight", "seven", "six", "five",
+   "four", "three", "two", "one"
+ )
> for (i in numbers) {
+   cat(str_c("There were ", i, " in the bed\n"))
+   cat("and the little one said\n")
+   if (i == "one") {
+     cat("I'm lonely...")
+   } else {
+     cat("Roll over, roll over\n")
+     cat("So they all rolled over and one fell out.\n")
+   }
+   cat("\n")
+ }
```

There were ten in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were nine in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were eight in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were seven in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were six in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were five in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were four in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were three in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were two in the bed
and the little one said
Roll over, roll over
So they all rolled over and one fell out.

There were one in the bed



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```
and the little one said
I'm lonely...
> bottles <- function(n) {
+   if (n > 1) {
+     str_c(n, " bottles")
+   } else if (n == 1) {
+     "1 bottle"
+   } else {
+     "no more bottles"
+   }
+ }
>
> beer_bottles <- function(total_bottles) {
+   # print each lyric
+   for (current_bottles in seq(total_bottles, 0)) {
+     # first line
+     cat(str_to_sentence(str_c(bottles(current_bottles), " of beer o
n the wall, ", bottles(current_bottles), " of beer.\n")))
+     # second line
+     if (current_bottles > 0) {
+       cat(str_c(
+         "Take one down and pass it around, ", bottles(current_b
ottles - 1),
+         " of beer on the wall.\n"
+       ))
+     } else {
+       cat(str_c("Go to the store and buy some more, ", bottles(to
tal_bottles), " of beer on the wall.\n"))
+     }
+     cat("\n")
+   }
+ }
> beer_bottles(3)
3 bottles of beer on the wall, 3 bottles of beer.
Take one down and pass it around, 2 bottles of beer on the wall.

2 bottles of beer on the wall, 2 bottles of beer.
Take one down and pass it around, 1 bottle of beer on the wall.

1 bottle of beer on the wall, 1 bottle of beer.
Take one down and pass it around, no more bottles of beer on the wall.

No more bottles of beer on the wall, no more bottles of beer.
Go to the store and buy some more, 3 bottles of beer on the wall.

> output <- vector("integer", 0)
> for (i in seq_along(x)) {
+   output <- c(output, lengths(x[[i]]))
+ }
> output
[1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
[54] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1
> add_to_vector <- function(n) {
+   output <- vector("integer", 0)
+   for (i in seq_len(n)) {
+     output <- c(output, i)
+   }
+   output
+ }
> add_to_vector_2 <- function(n) {
+   output <- vector("integer", n)
+   for (i in seq_len(n)) {
```



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```
+      output[[i]] <- i
+    }
+  } output
+ }
> timings <- microbenchmark(add_to_vector(10000), add_to_vector_2(10000),
times = 10)
Error in microbenchmark(add_to_vector(10000), add_to_vector_2(10000), :
no se pudo encontrar la función "microbenchmark"
> (library("microbenchmark"))
Error in library("microbenchmark") :
there is no package called 'microbenchmark'
> install.packages(microbenchmark)
Error in install.packages : objeto 'microbenchmark' no encontrado
> install.packages("microbenchmark")
probando la URL 'https://cran.rstudio.com/bin/windows/contrib/4.3/microbe
nchmark_1.4.10.zip'
Content type 'application/zip' length 68300 bytes (66 KB)
downloaded 66 KB
```

package 'microbenchmark' successfully unpacked and MD5 sums checked

The downloaded binary packages are in

C:\Users\Alumno1.PC12COMPUTOA\AppData\Local\Temp\Rtmpw5omL\downl

oaded_packages

```
> (library("microbenchmark"))
[1] "microbenchmark" "corrplot"      "lubridate"      "forcats"
"stringr"         "dplyr"         "tidyr"          "tibble"
[7] "purrr"          "readr"         "tidyverse"      "xvector"
[13] "msa"            "Biostrings"    "GenomeInfoDb"   "S4Vectors"
"IRanges"         "S4Vectors"     "BiocGenerics"   "stats"
[19] "stats4"         "BiocGenerics"  "stats"          "graphics"
"grDevices"       "utils"         "base"
[25] "datasets"       "methods"       "base"
```

Warning message:

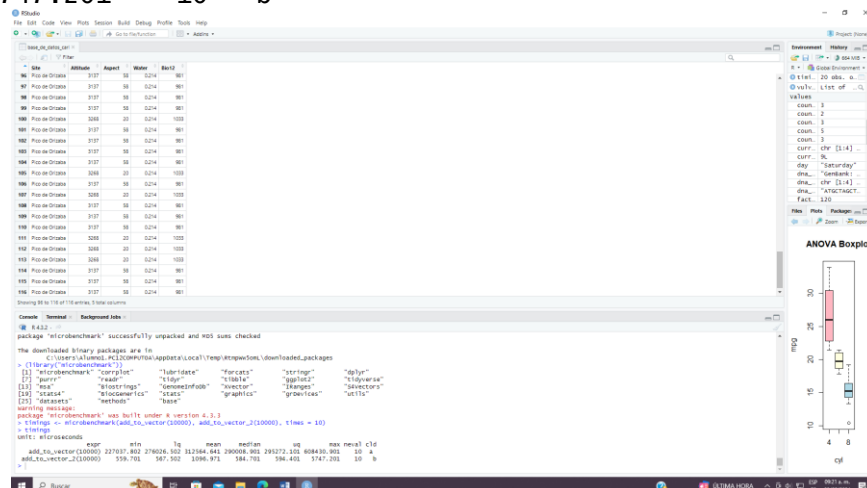
package 'microbenchmark' was built under R version 4.3.3

```
> timings <- microbenchmark(add_to_vector(10000), add_to_vector_2(10000),
times = 10)
```

```
> timings
```

Unit: microseconds

	expr	min	1q	mean	median	3q	max
uq	max neval cld						
	add_to_vector(10000)	227037.802	276026.502	312564.641	290008.901	29527	
	2.101 608430.901 10 a						
	add_to_vector_2(10000)	559.701	567.502	1096.971	584.701	59	
	4.401 5747.201 10 b						





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Bioinformática

Jesus Alberto Elias Terron



```
df <- mtcars
> head(df)

      mpg  cyl  disp  hp  drat    wt   qsec  vs  am  gear  carb
Mazda RX4    21.0   6  160  110  3.90  2.620  16.46  0   1    4    4
Mazda RX4 Wag 21.0   6  160  110  3.90  2.875  17.02  0   1    4    4
Datsun 710    22.8   4  108   93  3.85  2.320  18.61  1   1    4    1
Hornet 4 Drive 21.4   6  258  110  3.08  3.215  19.44  1   0    3    1
Hornet Sportabout 18.7   8  360  175  3.15  3.440  17.02  0   0    3    2
Valiant      18.1   6  225  105  2.76  3.460  20.22  1   0    3    1
> df <- mtcars[,c(1:7,10,11)]
> head(df)

      mpg  cyl  disp  hp  drat    wt   qsec  gear  carb
Mazda RX4    21.0   6  160  110  3.90  2.620  16.46    4    4
Mazda RX4 Wag 21.0   6  160  110  3.90  2.875  17.02    4    4
Datsun 710    22.8   4  108   93  3.85  2.320  18.61    4    1
Hornet 4 Drive 21.4   6  258  110  3.08  3.215  19.44    3    1
Hornet Sportabout 18.7   8  360  175  3.15  3.440  17.02    3    2
Valiant      18.1   6  225  105  2.76  3.460  20.22    3    1
> mtcars.pca <- prcomp(mtcars[,c(1:7,10,11)], center = TRUE, scale. = TRUE)
> summary(mtcars.pca)
Importance of components:

      PC1      PC2      PC3      PC4      PC5      PC6
PC7      PC8      PC9
Standard deviation  2.3782 1.4429 0.71008 0.51481 0.42797 0.35184 0.32
413 0.2419 0.14896
Proportion of Variance 0.6284 0.2313 0.05602 0.02945 0.02035 0.01375 0.01
167 0.0065 0.00247
Cumulative Proportion 0.6284 0.8598 0.91581 0.94525 0.96560 0.97936 0.99
103 0.9975 1.00000
> str(mtcars.pca)
List of 5
 $ sdev      : num [1:9] 2.378 1.443 0.71 0.515 0.428 ...
 $ rotation: num [1:9, 1:9] -0.393 0.403 0.397 0.367 -0.312 ...
 .. attr(*, "dimnames")=List of 2
 .. ..$ : chr [1:9] "mpg" "cyl" "disp" "hp" ...
 .. ..$ : chr [1:9] "PC1" "PC2" "PC3" "PC4" ...
 $ center   : Named num [1:9] 20.09 6.19 230.72 146.69 3.6 ...
 .. attr(*, "names")= chr [1:9] "mpg" "cyl" "disp" "hp" ...
 $ scale    : Named num [1:9] 6.027 1.786 123.939 68.563 0.535 ...
 .. attr(*, "names")= chr [1:9] "mpg" "cyl" "disp" "hp" ...
 $ x        : num [1:32, 1:9] -0.664 -0.637 -2.3 -0.215 1.587 ...
 .. attr(*, "dimnames")=List of 2
 .. ..$ : chr [1:32] "Mazda RX4" "Mazda RX4 Wag" "Datsun 710" "Hornet 4
Drive" ...
 .. ..$ : chr [1:9] "PC1" "PC2" "PC3" "PC4" ...
 - attr(*, "class")= chr "prcomp"
> library(devtools)
Loading required package: usethis
Warning message:
package 'devtools' was built under R version 4.3.3
> Sys.setenv(R_REMOTES_NO_ERRORS_FROM_WARNINGS="true")
> library(devtools)
> install_github("vqv/ggbiplot")
Downloading GitHub repo vqv/ggbiplot@HEAD
These packages have more recent versions available.
It is recommended to update all of them.
which would you like to update?

1: All
2: CRAN packages only
3: None
4: farver (2.1.1 -> 2.1.2) [CRAN]
```



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Jesús Alberto Elías Terrón



```
Enter one or more numbers, or an empty line to skip updates: 1
farver (2.1.1 -> 2.1.2) [CRAN]
Installing 1 packages: farver
probando la URL 'https://cran.rstudio.com/bin/windows/contrib/4.3/farver_
2.1.2.zip'
Content type 'application/zip' length 1509477 bytes (1.4 MB)
downloaded 1.4 MB
```

package 'farver' successfully unpacked and MD5 sums checked

The downloaded binary packages are in

```
C:\Users\Alumno1.PC12COMPUTOA\AppData\Local\Temp\Rtmpww5omL\downl
oaded_packages
— R CMD build —
```

```
✓ checking for file 'C:\Users\Alumno1.PC12COMPUTOA\AppData\Local\Temp\Rt
mpww5omL\remotes1c98f74767f\vvq-ggbiplot-f7ea76d\DESCRIPTION' (949ms)
- preparing 'ggbiplot':
✓ checking DESCRIPTION meta-information
- checking for LF line-endings in source and make files and shell script
s (571ms)
- checking for empty or unneeded directories
- looking to see if a 'data/datalist' file should be added
- building 'ggbiplot_0.55.tar.gz'
```

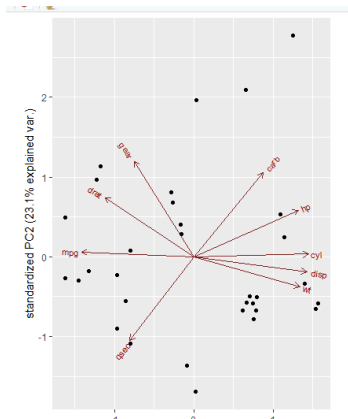
```
* installing *source* package 'ggbiplot' ...
** using staged installation
** R
** data
** byte-compile and prepare package for lazy loading
** help
*** installing help indices
** building package indices
** testing if installed package can be loaded from temporary location
** testing if installed package can be loaded from final location
** testing if installed package keeps a record of temporary installation
path
* DONE (ggbiplot)
```

```
> library(ggbiplot)
Loading required package: plyr
```

You have loaded plyr after dplyr - this is likely to cause problems.
If you need functions from both plyr and dplyr, please load plyr first, t
hen dplyr:

```
library(plyr); library(dplyr)
```

```
> ggbiplot(mtcars.pca)
```



```
> ggbiplot(mtcars.pca, labels=rownames(mtcars), obs.scale = 1, var.scale = 1)
```

