

# Exercise RMarkdown and reproducibility course

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## 1 Introduction

This exercise is the best way to practice **RMarkdown** (Salinas 2020) now that you have had an overview of how it works. The principle is that you want to produce a copy of this **pdf** file. We provide most of the **R code**, because the scope is to work on the **RMarkdown** (Xie, Allaire, and Golemund 2018) integration, not on the **R code**.

## 2 Starters

You want to create a new **Rmarkdown** file and save it in the **Exercise** folder.

## 3 Load packages

What packages will I need? Well I can fill that in later anyway.

BTW: To add a new code chunk the keyboard shortcut is **Ctrl + Alt + i**. Or use the insert button on the top left side of this window.

## 4 Research compendium

Let's organize our project. We create a folder called `data` and list the files in the current working folder.

```
system("mkdir -p data")
list.files(path = ".")

## [1] "bibliography.bib" "data"          "Exercise_files"  "Exercise.log"
## [5] "Exercise.md"      "Exercise.pdf"    "Exercise.Rmd"

list.dirs(path = ".", full.names = TRUE, recursive = TRUE)

## [1] "."                  "/data"
## [3] "./Exercise_files"   "./Exercise_files/figure-latex"
```

We can now copy the `datasets.xlsx` file (from `data/` in the main folder to the `Exercise/data/` folder).

```
file.copy("../data/datasets.xlsx", "data")
```

If you're running an **Unix system**, you can also use a bash command (`mv ../data/datasets.xlsx data/`). This is the occasion to try to include a code chunk with another language (i.e. bash)!

## 5 Load the project data

We'll use the `mtcars` dataset that we'll load from the `datasets.xlsx` file. Here we do not provide the code because it is part of the exercise.

## 6 Analyze the data

### 6.1 Get a look at the data

```
my_mtcars2 <- within(my_mtcars, {
  vs <- factor(vs, labels = c("V", "S"))
  am <- factor(am, labels = c("automatic", "manual"))
  cyl <- ordered(cyl)
  gear <- ordered(gear)
  carb <- ordered(carb)
})
summary(my_mtcars2)
```

##	mpg	cyl	disp	hp	drat
##	Min. :10.40	4:11	Min. : 71.1	Min. : 52.0	Min. :2.760
##	1st Qu.:15.43	6: 7	1st Qu.:120.8	1st Qu.: 96.5	1st Qu.:3.080
##	Median :19.20	8:14	Median :196.3	Median :123.0	Median :3.695
##	Mean :20.09		Mean :230.7	Mean :146.7	Mean :3.597
##	3rd Qu.:22.80		3rd Qu.:326.0	3rd Qu.:180.0	3rd Qu.:3.920
##	Max. :33.90		Max. :472.0	Max. :335.0	Max. :4.930
##	wt	qsec	vs	am	gear carb
##	Min. :1.513	Min. :14.50	V:18	automatic:19	3:15 1: 7
##	1st Qu.:2.581	1st Qu.:16.89	S:14	manual :13	4:12 2:10
##	Median :3.325	Median :17.71			5: 5 3: 3
##	Mean :3.217	Mean :17.85			4:10
##	3rd Qu.:3.610	3rd Qu.:18.90			6: 1

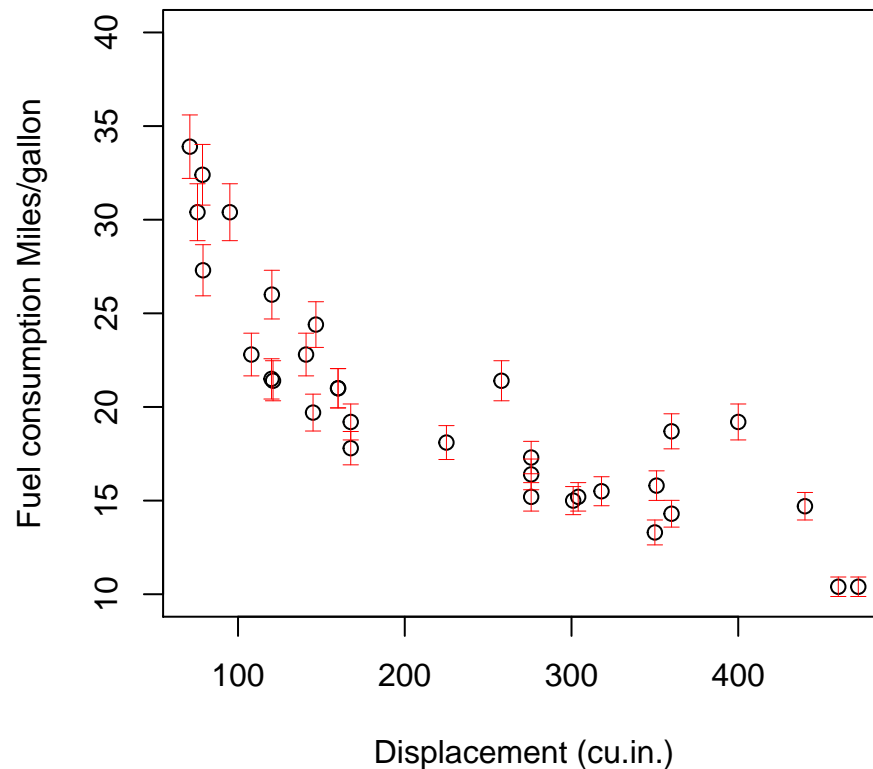
```
## Max. :5.424 Max. :22.90
```

```
8: 1
```

## 6.2 First analysis, fuel consumption

I want to assess the motors consumption as a function of the displacement. Engine displacement is the measure of the cylinder volume swept by all of the pistons of a piston engine, excluding the combustion chambers.

```
plot(mpg ~ disp,
     data = my_mtcars,
     xlab="Displacement (cu.in.)",
     ylab="Fuel consumption Miles/gallon",
     ylim=c(10,40))
arrows(x0 = my_mtcars$disp,
       y0 = my_mtcars$mpg * 0.95,
       x1 = my_mtcars$disp,
       y1 = my_mtcars$mpg * 1.05,
       angle = 90,
       code = 3,
       length = 0.04,
       lwd = 0.4,
       col="red")
```



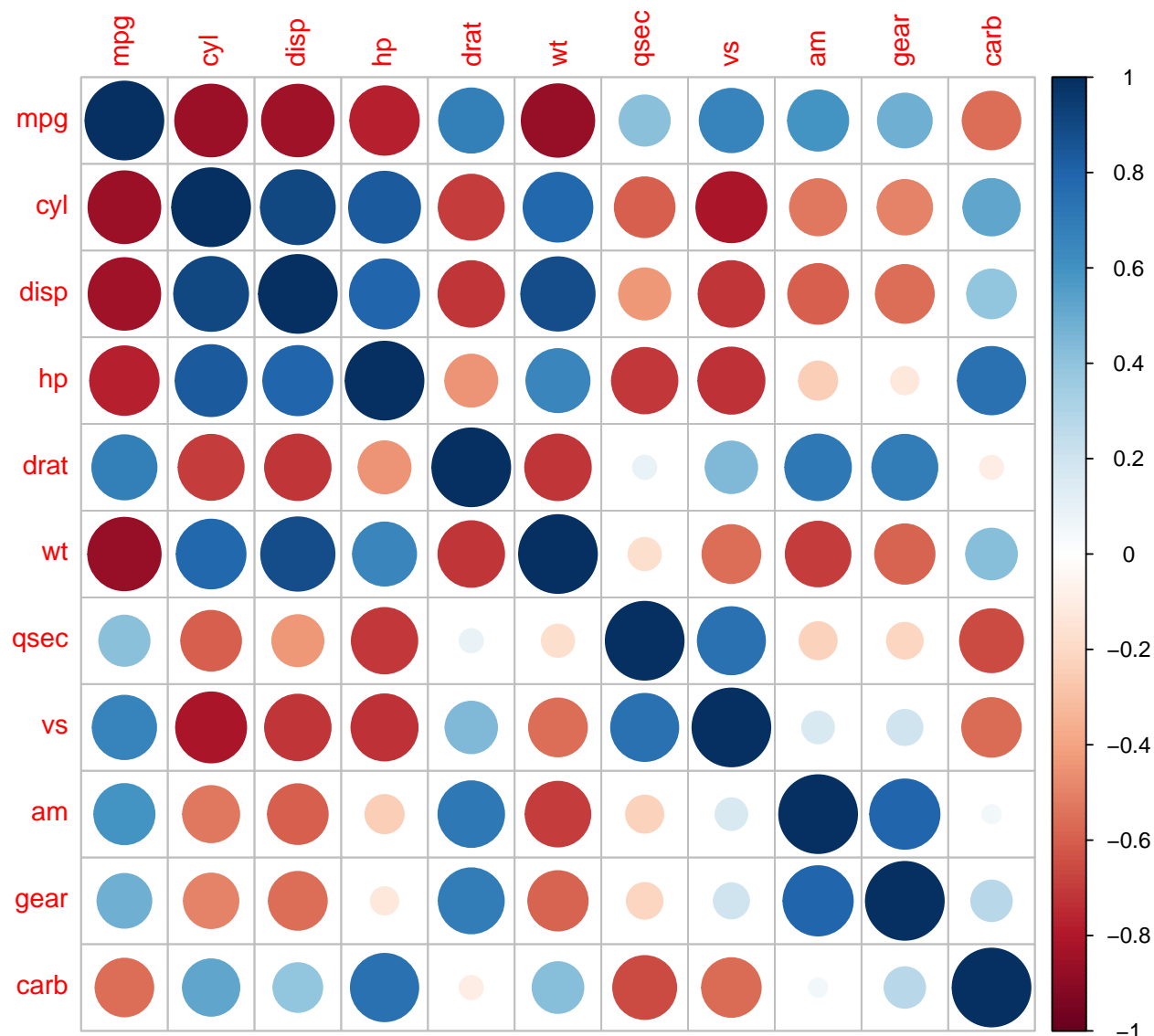
Whoo, that was **interesting**. Can we conclude that bigger motors consume more fuel?

Let's move on to the next analysis.

### 6.3 Second analysis, is that all?

To assess whether other variables could also explain the consumption I will plot the correlation among each pair of variables in my data.

```
mcor <- cor(my_mtcars)
corrplot(mcor)
```



Whoohooohooo, that plot looks great!

It looks like the **number of cylinders** (cyl), **Gross horsepower** (hp) and the **Weight** (wt. 1000 lbs), could play a role too.

If you are looking for the the variables meaning, you can find it [here](#).

### 6.4 Third analysis, we like camembert, they like pie!

Let's produce a pie chart showing the proportion of cars that have different carb values.

```
#concat the names for the legend
names = as.factor(paste(unique(my_mtcars$carb),"carbs"))
#get the percentages
percent=100*table(my_mtcars$carb)/length(my_mtcars$carb)
pie(x=percent, label=paste(percent, "%"), col=rainbow(length(names)),
    main="Percentage of cars per number of carburators" )
#add legend
legend("right",legend = names, fill = rainbow(length(names)), cex=0.8)
```

## Percentage of cars per number of carburators

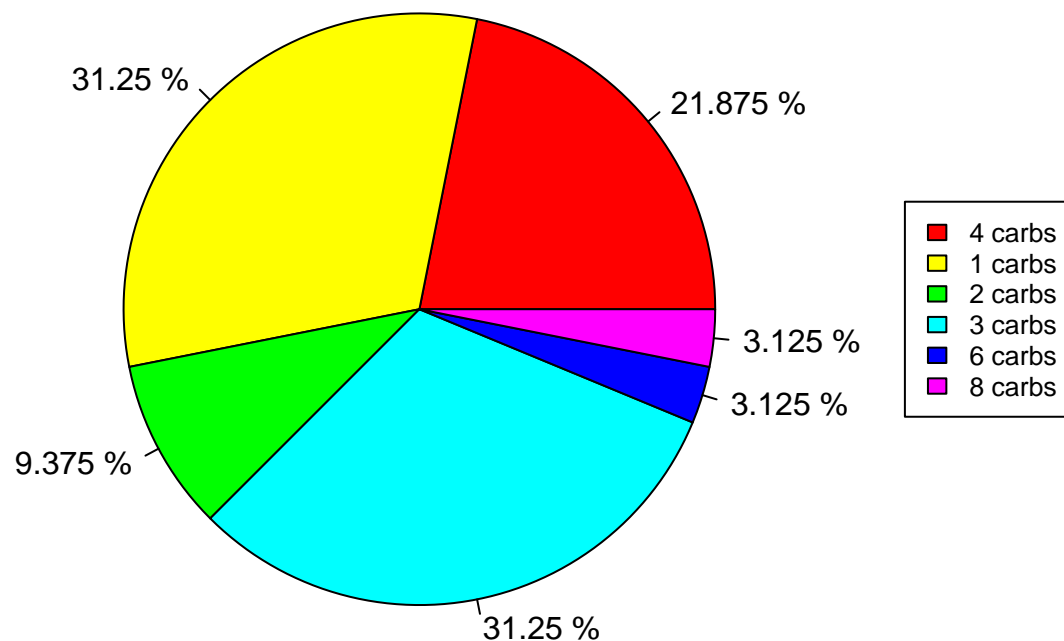


Figure 1: have you ever tried the camembert pie?

## 7 Let's make sure that my figures have been saved!

```
list.dirs(path = ".", full.names = TRUE, recursive = TRUE)

## [1] "."                      "./data"
## [3] "./Exercise_files"       "./Exercise_files/figure-latex"

list.files(path = "./Exercise_files/figure-html/")

## character(0)
```

Table 1: a wonderful table

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

## 8 Print a nice table of the mtcars dataset

Try to reproduce this table with `kable()` and the `kableExtra` functions.

## 9 Insert an image

Insert the image of a cute kitten here :) Limit the width to 200px and center the picture!

```
knitr::include_graphics("data/kitten-wallpaper-android.jpeg")
```



Figure 2: A cute kitten

```
# this is another way to include external images with knitr - it allows you to use
# the code chunk parameters to place/resize/etc the image
```

## Bibliography

Salinas, Isaac Quintanilla. 2020. “R Markdown Guide.”

Xie, Yihui, Joseph J Allaire, and Garrett Golemund. 2018. *R Markdown: The Definitive Guide*. Chapman; Hall/CRC.