Customer dropout membership*

Pedro Sobreiro, Javier Berrocal, Domingos Martinho, José Garcia Alonso

Extremadura University

15 July, 2021

Abstract

Abstract of the article.

Introduction

Research idea:

-

Context: An organization membership located in Portugal. The organization offers an annual membership for the members, the service subscription has several payment options:

- Men with a annual fee of 10€
- Women annual fee of 6€
- Correspondent fee 6€
- Retired fee 5€

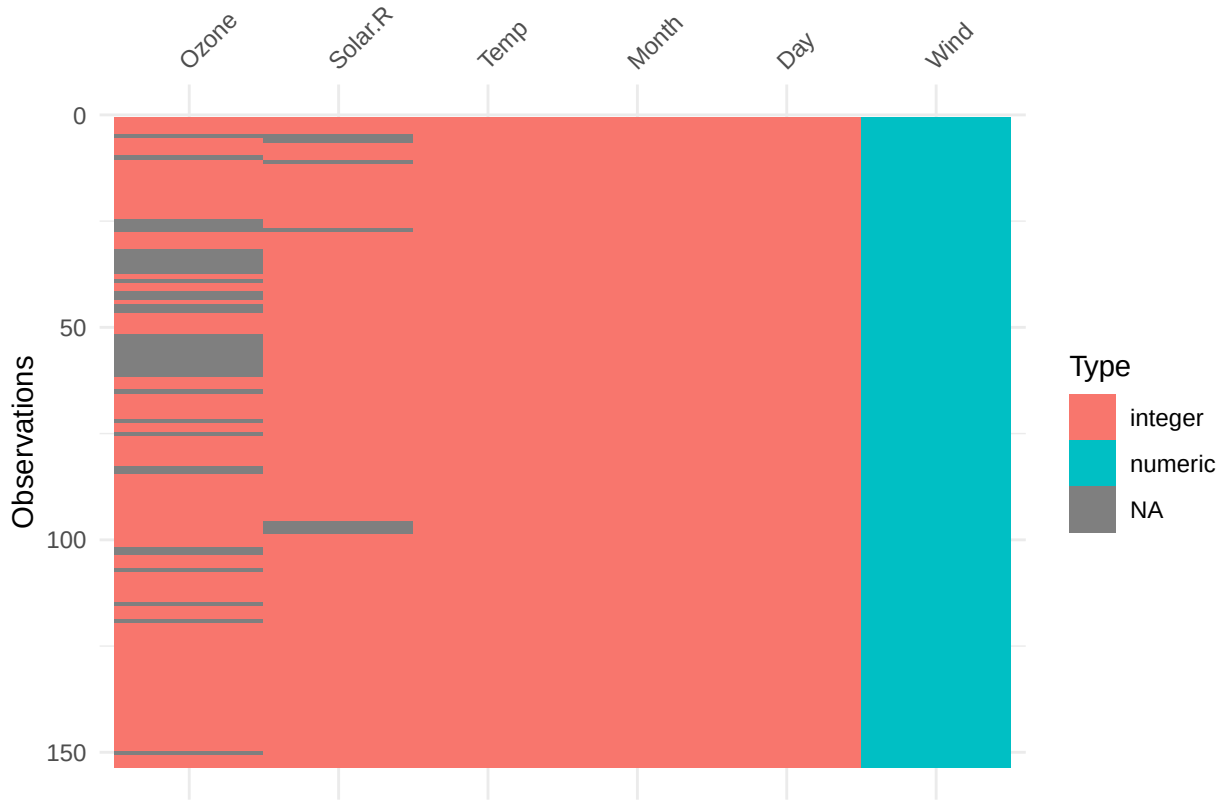
*Corresponding address: sobreiro@esdrm.ipsantarem.pt. The current template adapts part of the Rmd code by Paul C. Bauer, Mannheim Centre for European Social Research.

- Student fee 2.5€
- under-14 fee 1€

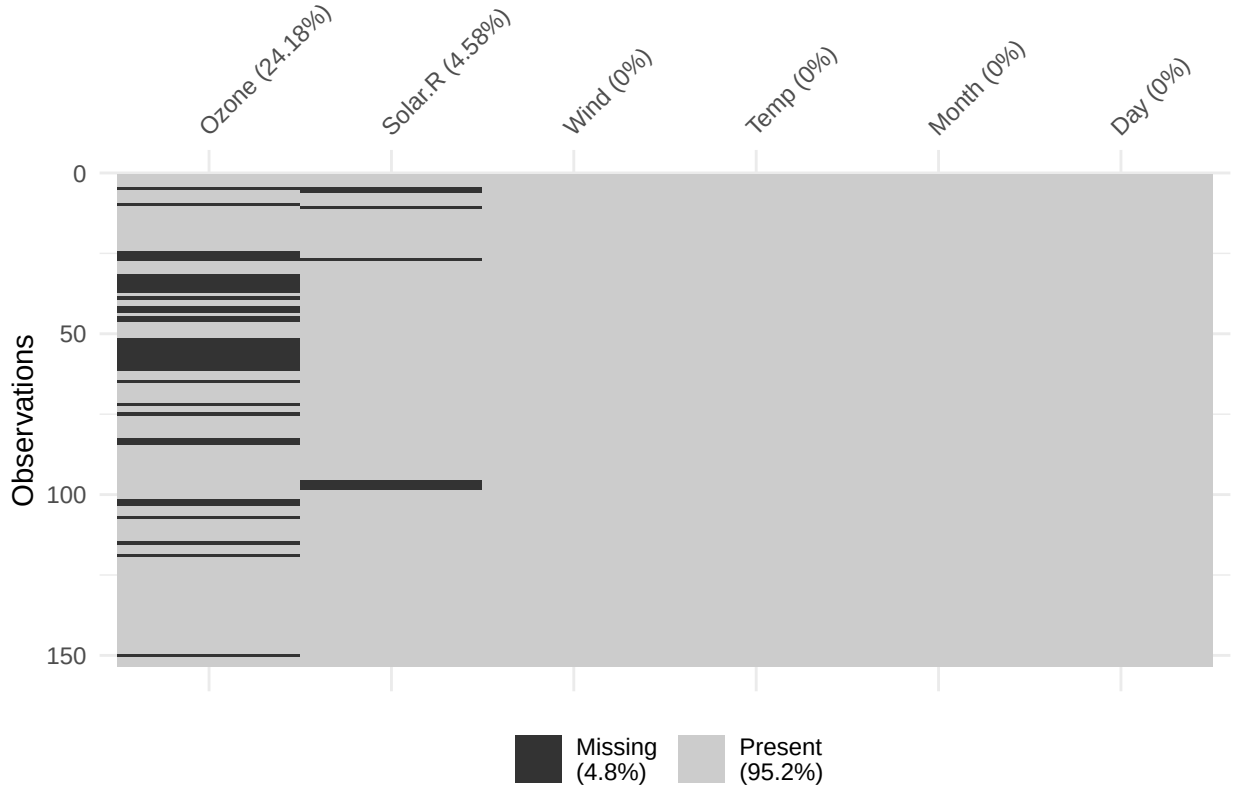
```
library(dplyr)
library(dlookr)
library(ggplot2)

#eda_report(nlswork,output_dir  =
#   "C:/Users/mangelo.EEG/Documents/GitHub/prjs/reports/",
#   output_file = "eda_report.pdf")

## The data

names(airquality)
```

```
## [1] "Ozone"   "Solar.R" "Wind"    "Temp"    "Month"   "Day"
```

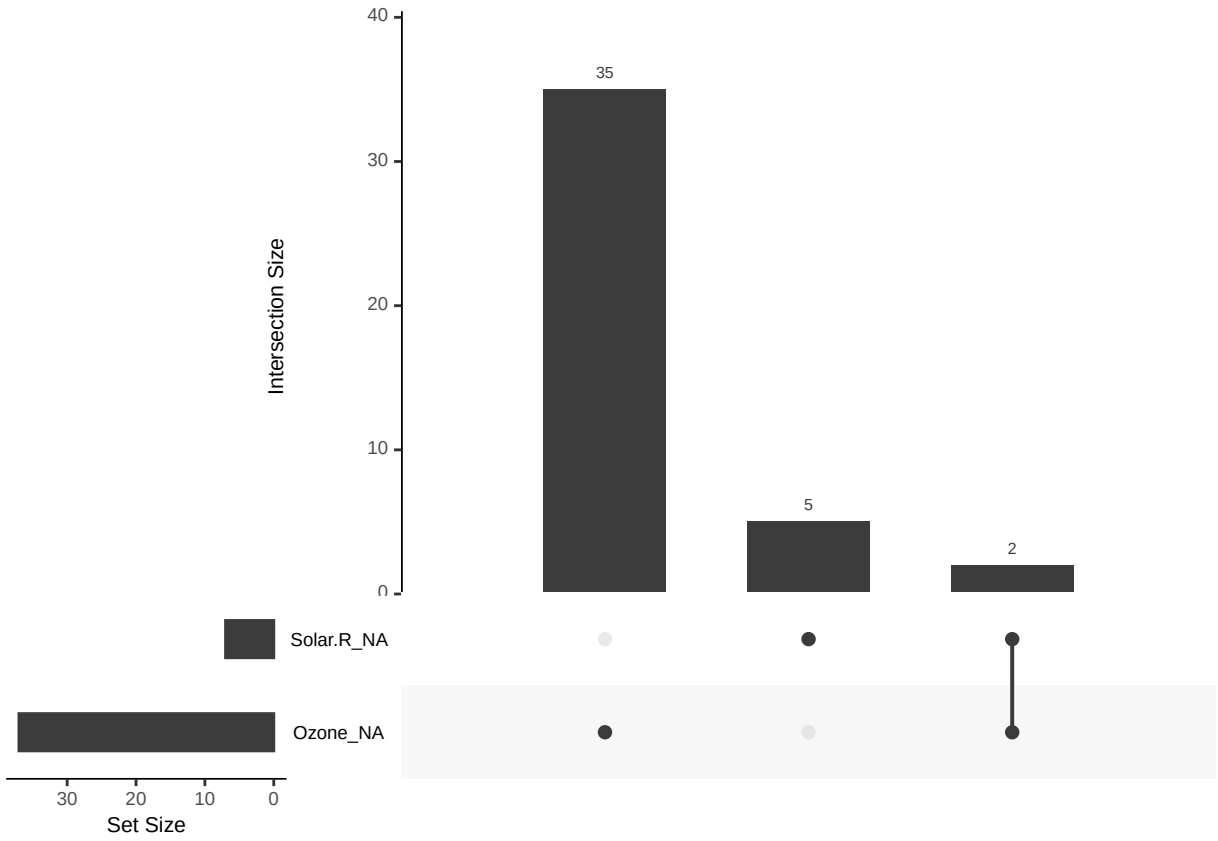
```
#summary(nlswork)

## Missing values
library(visdat)
vis_dat(airquality)
```



```
library(naniar)
vis_miss(airquality)
```



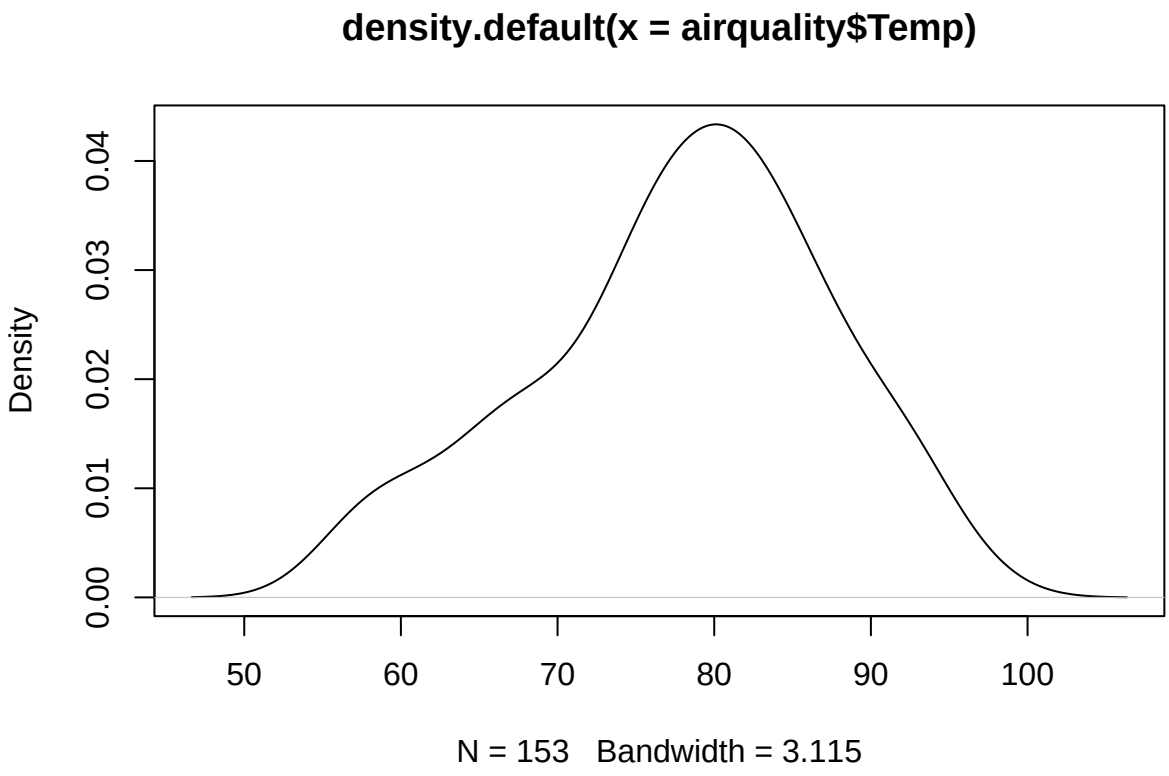

```
gg_miss_upset(airquality)
```



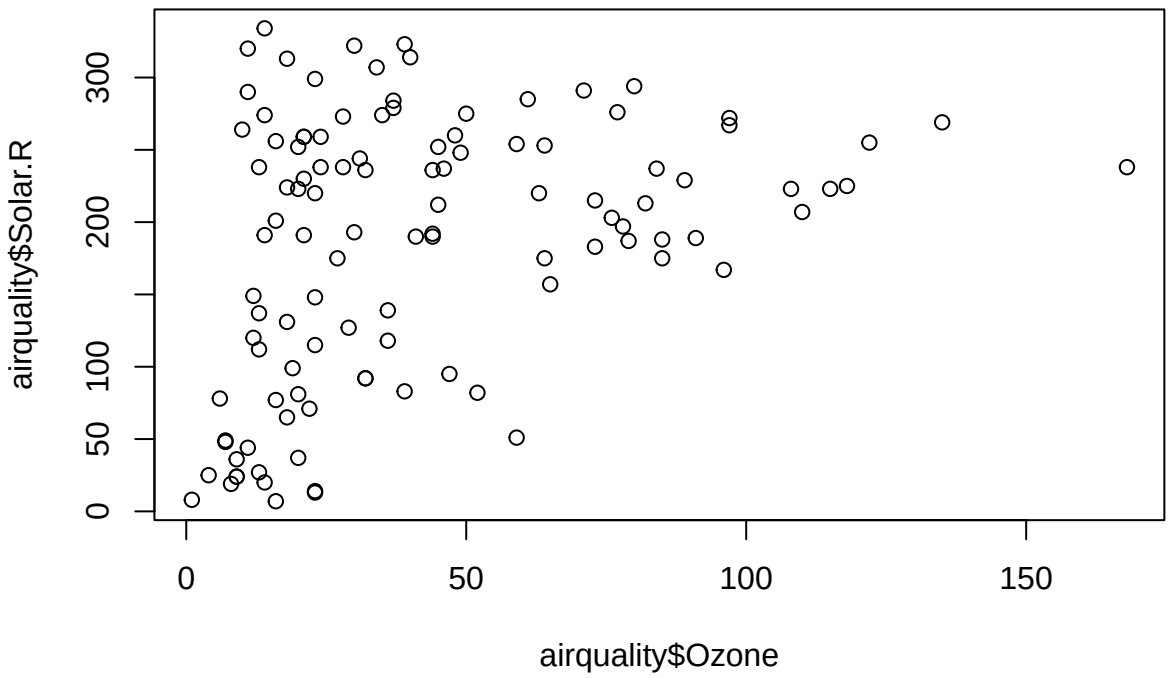

```
## GRAPHS
dplyr::glimpse(cars$Ozone)
```

```
##  NULL
```

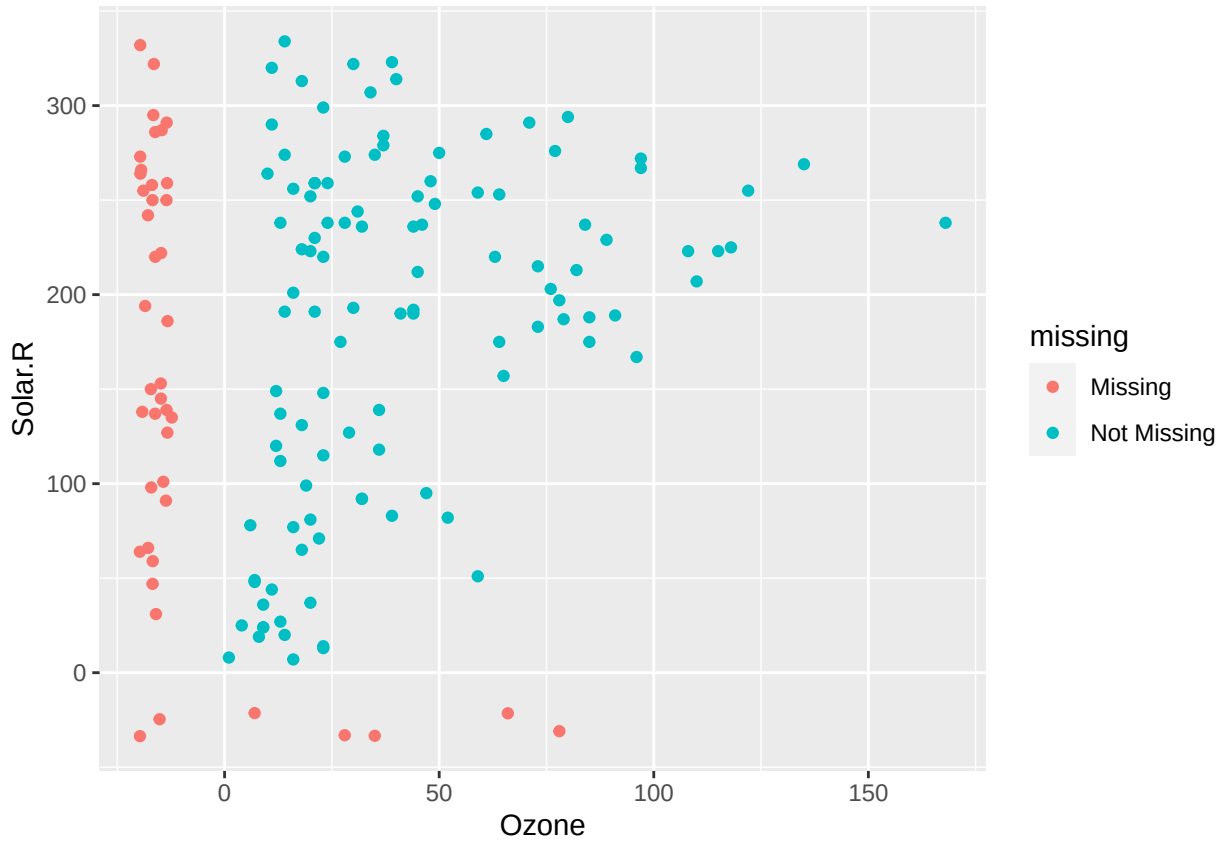
```
d <- density(airquality$Temp)
plot(d)
```



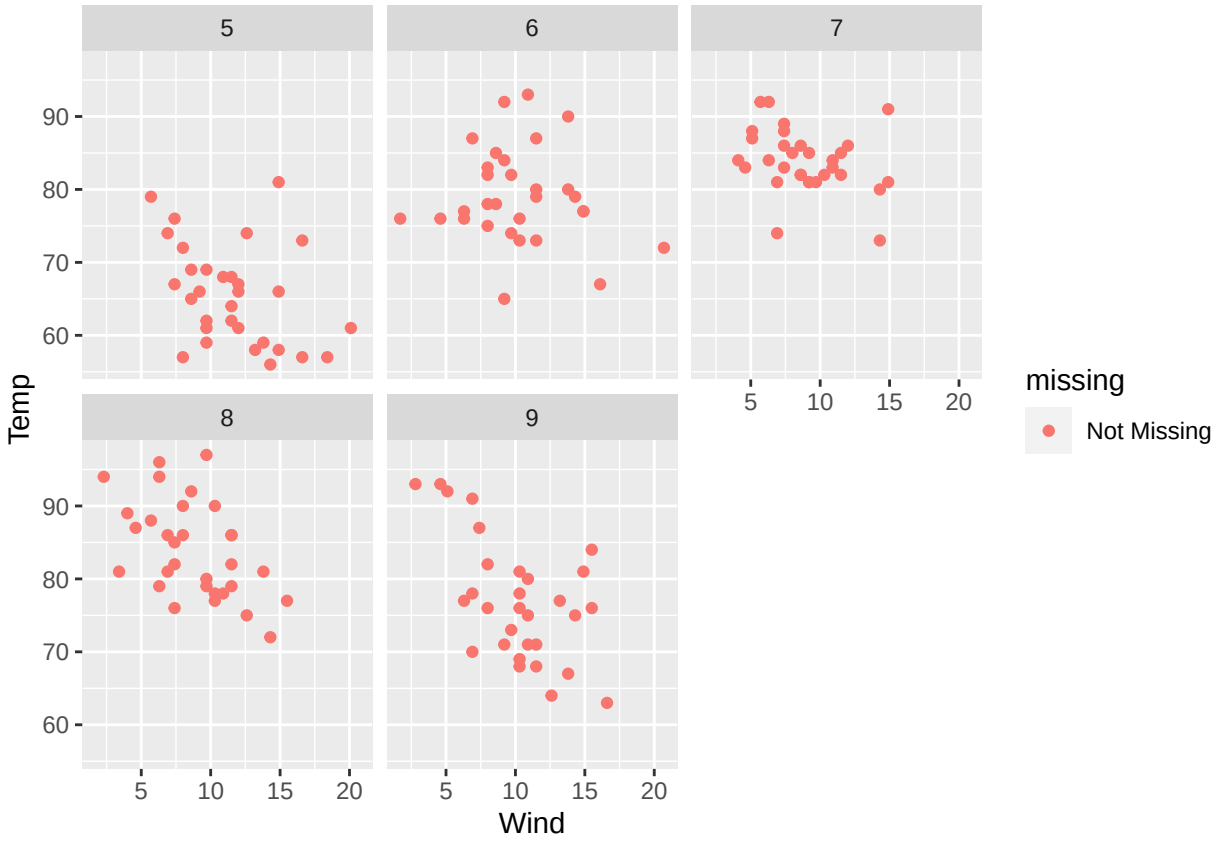

```
plot(airquality$Ozone, airquality$Solar.R)
```




```
ggplot(airquality, aes(x = Ozone, y = Solar.R)) +
geom_miss_point()
```




```
ggplot(airquality, aes(x = Wind, y = Temp)) +
geom_miss_point() +
facet_wrap(vars(Month))
```




```
stats <- summary(airquality$Temp)
stats
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   56.00   72.00   79.00   77.88   85.00   97.00
```

```
describe(airquality)
```

```
## # A tibble: 6 x 26
##   variable     n    na   mean    sd se_mean   IQR skewness kurtosis   p00
##   <chr>    <int> <int>  <dbl> <dbl>   <dbl> <dbl>    <dbl>    <dbl> <dbl>
## 1 Ozone      116    37  42.1  33.0    3.06   45.2  1.24       1.29    1
## 2 Solar.R    146     7 186.   90.1    7.45  143   -0.428     -0.968   7
## 3 Wind       153     0   9.96  3.52   0.285   4.1  0.348      0.111   1.7
## 4 Temp       153     0  77.9   9.47   0.765  13   -0.378     -0.404  56
## 5 Month      153     0   6.99  1.42   0.115   2   -0.00239   -1.30    5
## 6 Day        153     0  15.8   8.86   0.717  15    0.00265   -1.20    1
## # ... with 16 more variables: p01 <dbl>, p05 <dbl>, p10 <dbl>, p20 <dbl>,
## #   p25 <dbl>, p30 <dbl>, p40 <dbl>, p50 <dbl>, p60 <dbl>, p70 <dbl>,
## #   p75 <dbl>, p80 <dbl>, p90 <dbl>, p95 <dbl>, p99 <dbl>, p100 <dbl>
```

The average age in our data is 77.9.

Tables

R Markdown PDF is now able to produce good tables with our output. For `stargazer` the label is contained in the function, while for `kable` it's contained in the chunk name.

stargazer(): Summary and regression tables

Table @ref(tab1) shows data's summary statistics.[1] `stargazer()` is and excellent solution to export outputs.

```
library(stargazer)
stargazer(cars,
          title = "Summary table with stargazer",
          label = "tab1cars",
          table.placement = "h",
          header = FALSE)
```

Table 1: Summary table with stargazer

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
speed	50	15.400	5.288	4	12	19	25
dist	50	42.980	25.769	2	26	56	120

Table @ref(tab2) reports regression outputs. Name the models as you can refer to their names in the text (M1, M2, M3).

```
library(stargazer)
model1 <- lm(speed ~ dist, data = cars)
model2 <- lm(speed ~ dist, data = cars)
model3 <- lm(dist ~ speed, data = cars)
stargazer(model1, model2, model3,
          title = "Regression table with stargazer",
          label = "tab2",
          table.placement = "h",
          column.labels = c("M1", "M2", "M3"),
          model.numbers = FALSE,
          header = FALSE)
```

[1] You can reference the table as @ref(tab1cars).

Table 2: Regression table with stargazer

	Dependent variable:		
	speed		dist
	M1	M2	M3
dist	0.166***	0.166***	
	(0.017)	(0.017)	
speed			3.932***
			(0.416)
Constant	8.284***	8.284***	−17.579**
	(0.874)	(0.874)	(6.758)
Observations	50	50	50
R^2	0.651	0.651	0.651
Adjusted R^2	0.644	0.644	0.644
Residual Std. Error (df = 48)	3.156	3.156	15.380
F Statistic (df = 1; 48)	89.567***	89.567***	89.567***
Note:			*p<0.1; **p<0.05; ***p<0.01

Figures

Graphs with R

You can insert figures like this. One would like to produce and insert them on the fly in the `.rmd` file. Figure @ref(fig:fig-1) is such an example.

```
plot(cars$speed, cars$dist)
```

However, in some cases it does not work.

Example: ggplot2 graphs

See the `ggplot2` output reported in Figure @ref(fig:fig-2).

```
mtcars$cyl <- as.factor(mtcars$cyl) # Convert cyl to factor
library(ggplot2)
ggplot(mtcars, aes(x = wt, y = mpg, shape = cyl)) + geom_point() +
  labs(x = "Weight (lb/1000)", y = "Miles/(US) gallon",
       shape = "Number of \n Cylinders") + theme_classic()
```

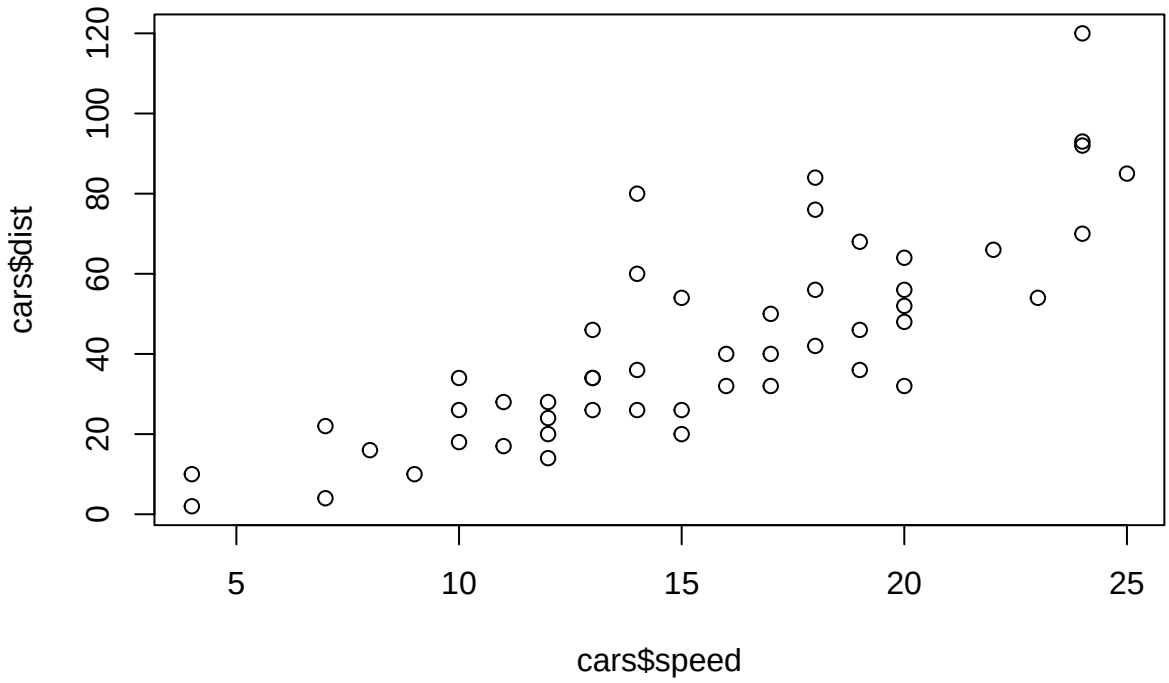


Figure 1: Scatterplot of Speed and Distance

Another example using Plotly

With `Plotly` we can produce interactive graphs which play well, for example, once can embedded in html webpages (drop by here for an example). One can insert this type of graphs in R Markdown PDF using `Orca` (it generates static images from Plotly graphs). Go here to check how to install it. See Figure @ref(fig:fig-3) for an example.

```
library(plotly)
p <- plot_ly(cars, type = "scatter", mode = "markers",
        x = ~speed,
        y = ~dist)
#Sys.setenv('MAPBOX_TOKEN' = '12123123') # set arbitrary token
# Lets create a value for example


media <- mean(cars$speed)
```

The criminal rate is 15.4%o.

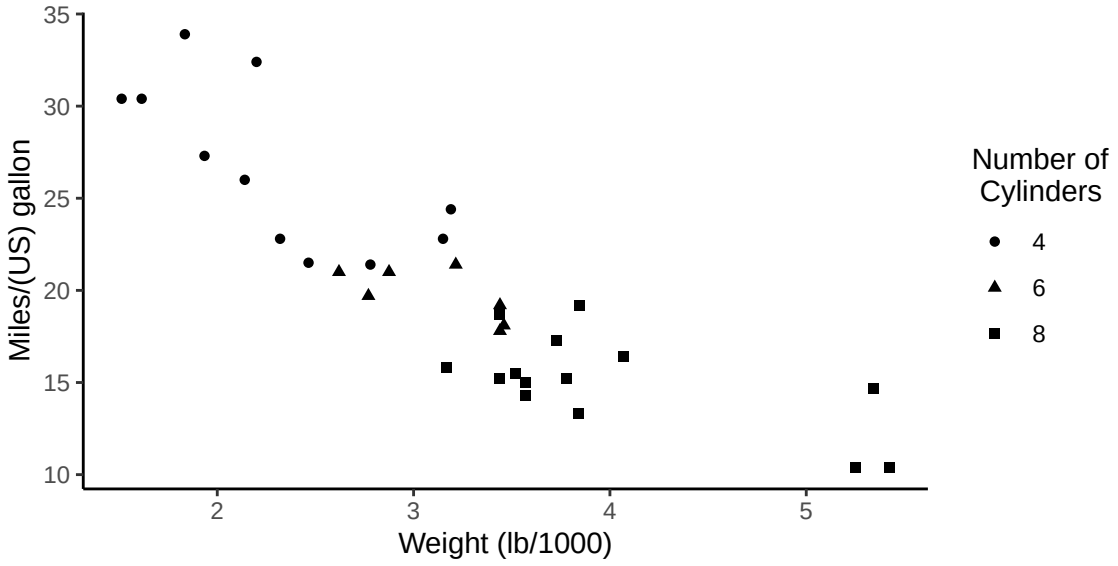


Figure 2: Miles per gallon according to the weight

Miguel's tests

R

Example of an equation

$$\int_0^{2\pi} \sin x \, dx$$

Example of a matrix

$$\mathbf{X} = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

or

$$f(k) = \binom{n}{k} p^k (1-p)^{n-k} \tag{1}$$

See Equation @ref(eq:binom).

$$y_{ijt} = \beta x_{ijt} + \eta_i + \gamma_j + \lambda_t + \varepsilon_{ijt} \tag{2}$$

```
library(stargazer)
stargazer(cars,
          title = "Summary 24",
          label = "tab24",
          table.placement = "ht",
          header = FALSE)
```

Table 3: Summary 24

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
speed	50	15.400	5.288	4	12	19	25
dist	50	42.980	25.769	2	26	56	120

Final remarks

Check the replication package for Bonhomme, Lamadon and Manresa (2019): https://github.com/tlamadon/blm-replicate

References

Appendix: Chunk options

Software versioning

R

```
cat(paste("#", capture.output(sessionInfo()), "\n", collapse  = ""))
```

```
## # R version 4.1.0 (2021-05-18)
## # Platform: x86_64-pc-linux-gnu (64-bit)
## # Running under: Ubuntu 20.04.2 LTS
## #
## # Matrix products: default
## # BLAS:   /usr/lib/x86_64-linux-gnu/openblas-pthread/libblas.so.3
## # LAPACK: /usr/lib/x86_64-linux-gnu/openblas-pthread/liblapack.so.3
## #
## # locale:
## #  [1] LC_CTYPE=en_US.UTF8       LC_NUMERIC=C
## #  [3] LC_TIME=en_US.UTF8        LC_COLLATE=en_US.UTF8
## #  [5] LC_MONETARY=en_US.UTF8    LC_MESSAGES=en_US.UTF8
## #  [7] LC_PAPER=en_US.UTF8       LC_NAME=C
## #  [9] LC_ADDRESS=C              LC_TELEPHONE=C
## # [11] LC_MEASUREMENT=en_US.UTF8 LC_IDENTIFICATION=C
## #
## # attached base packages:
## # [1] stats     graphics  grDevices utils     datasets  methods   base
## #
## # other attached packages:
## # [1] plotly_4.9.4.1  stargazer_5.2.2 naniar_0.6.1    visdat_0.5.3
## # [5] ggplot2_3.3.5   dlookr_0.4.5    dplyr_1.0.7     rmarkdown_2.9
## # [9] nvimcom_0.9-115
## #
## # loaded via a namespace (and not attached):
## #   [1] webshot_0.5.2       RColorBrewer_1.1-2  httr_1.4.2
## #   [4] UpSetR_1.4.0        tools_4.1.0         backports_1.2.1
## #   [7] utf8_1.2.1          R6_2.5.0            rpart_4.1-15
## #  [10] lazyeval_0.2.2      Hmisc_4.5-0         nortest_1.0-4
## #  [13] DBI_1.1.1           colorspace_2.0-2    nnet_7.3-16
## #  [16] withr_2.4.2         tidyselect_1.1.1    gridExtra_2.3
```

```
## #  [19] curl_4.3.2          compiler_4.1.0      extrafontdb_1.0
## #  [22] cli_3.0.0           rvest_1.0.0         htmlTable_2.2.1
## #  [25] xml2_1.3.2          sandwich_3.0-1      labeling_0.4.2
## #  [28] scales_1.1.1        checkmate_2.0.0     mvtnorm_1.1-2
## #  [31] proxy_0.4-26        RcmdrMisc_2.7-1     systemfonts_1.0.2
## #  [34] stringr_1.4.0       digest_0.6.27       foreign_0.8-81
## #  [37] svglite_2.0.0       rio_0.5.27          base64enc_0.1-3
## #  [40] jpeg_0.1-8.1        pkgconfig_2.0.3     htmltools_0.5.1.1
## #  [43] extrafont_0.17      highr_0.9           htmlwidgets_1.5.3
## #  [46] rlang_0.4.11        readxl_1.3.1        rstudioapi_0.13
## #  [49] prettydoc_0.4.1     farver_2.1.0        generics_0.1.0
## #  [52] jsonlite_1.7.2      zoo_1.8-9           crosstalk_1.1.1
## #  [55] zip_2.2.0           car_3.0-11          magrittr_2.0.1
## #  [58] kableExtra_1.3.4    Formula_1.2-4       Matrix_1.3-4
## #  [61] Rcpp_1.0.7          munsell_0.5.0       fansi_0.5.0
## #  [64] abind_1.4-5         gdtools_0.2.3       partykit_1.2-13
## #  [67] lifecycle_1.0.0     stringi_1.6.2       yaml_2.2.1
## #  [70] inum_1.0-4          carData_3.0-4       MASS_7.3-54
## #  [73] plyr_1.8.6          grid_4.1.0          hrbrthemes_0.8.0
## #  [76] forcats_0.5.1       crayon_1.4.1        lattice_0.20-44
## #  [79] haven_2.4.1         splines_4.1.0       hms_1.1.0
## #  [82] knitr_1.33          pillar_1.6.1        glue_1.4.2
## #  [85] evaluate_0.14       latticeExtra_0.6-29 data.table_1.14.0
## #  [88] png_0.1-7           vctrs_0.3.8         Rttf2pt1_1.3.8
## #  [91] cellranger_1.1.0    tidyr_1.1.3         gtable_0.3.0
## #  [94] purrr_0.3.4         assertthat_0.2.1    xfun_0.24
## #  [97] openxlsx_4.2.4      libcoin_1.0-8       e1071_1.7-7
## # [100] class_7.3-19        survival_3.2-11     viridisLite_0.4.0
## # [103] tibble_3.1.2        cluster_2.1.2       corrplot_0.90
## # [106] ellipsis_0.3.2
```

```
  # or use message() instead of cat()
```

Figure 3: Example: export a Plotly figure using ‘orca‘