

INTRODUCTION TO MARKDOWN

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WHAT IS MARKDOWN?

- Tool to convert plain text into formatted text
- Main goal is to focus on the content rather than the formatting
- Easier to learn than LaTeX (although LaTeX is preferred for complex documents)
- Markdown is also a syntax for styling text on the [GitHub platform](#)

- [R Markdown](#): R code embedded in a Markdown document
- use .Rmd extension in R studio
- R Markdown converted to standard Markdown using '[knitr](#)' package
- Workflow: R Markdown => Markdown => html/pdf/word

MARKDOWN SYNTAX

This is an H1 header format

This is an H2 header format

This text will be in italics

****This text will be in bold****

Unordered list:

- First
- Second
- Third

Ordered list:

1. First item
- 2 Second item
3. Third item

Links:

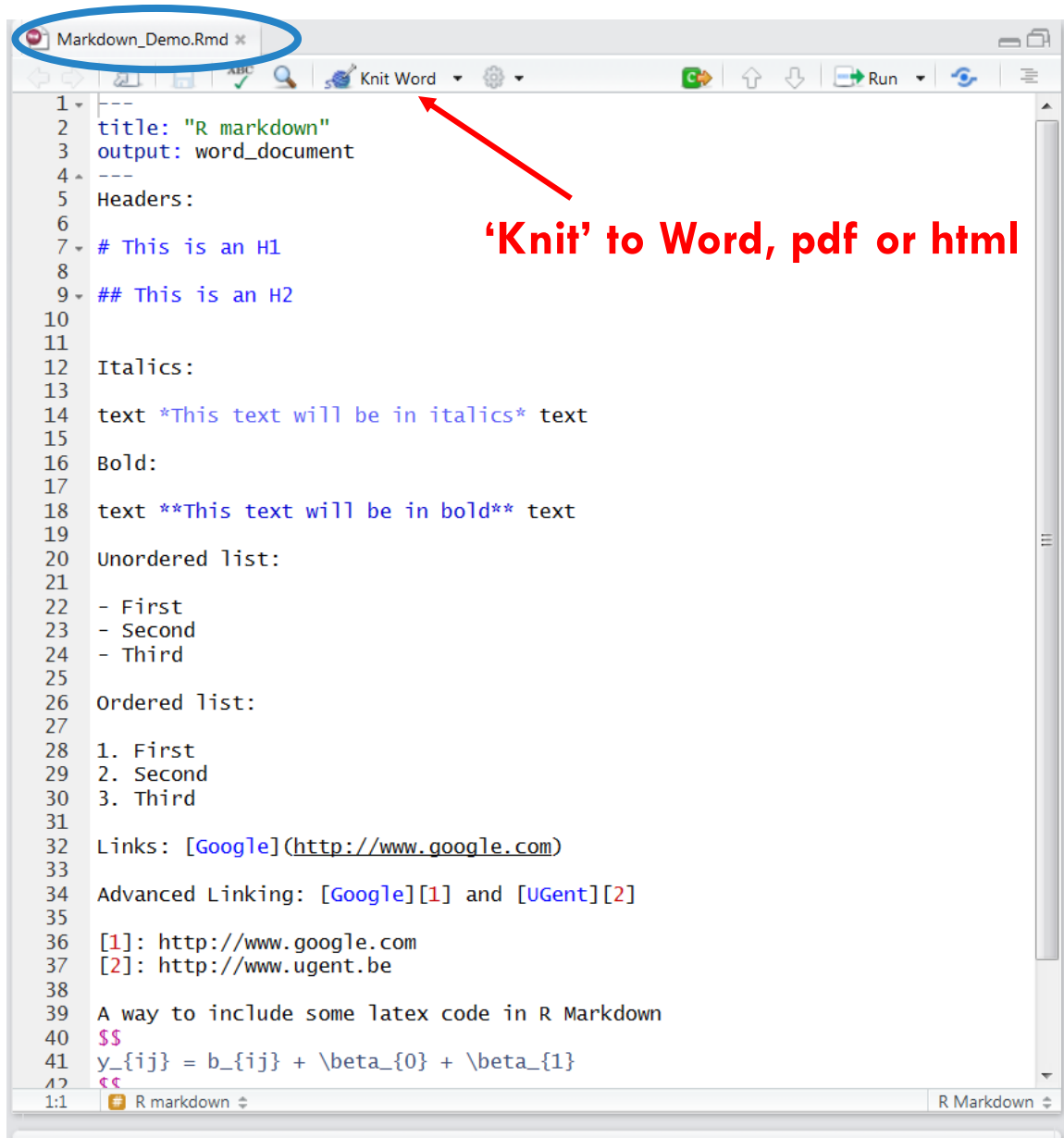
[Google](<http://www.google.com>)

Advanced links:

Advanced Linking: [Google][1] and [UGent][2]

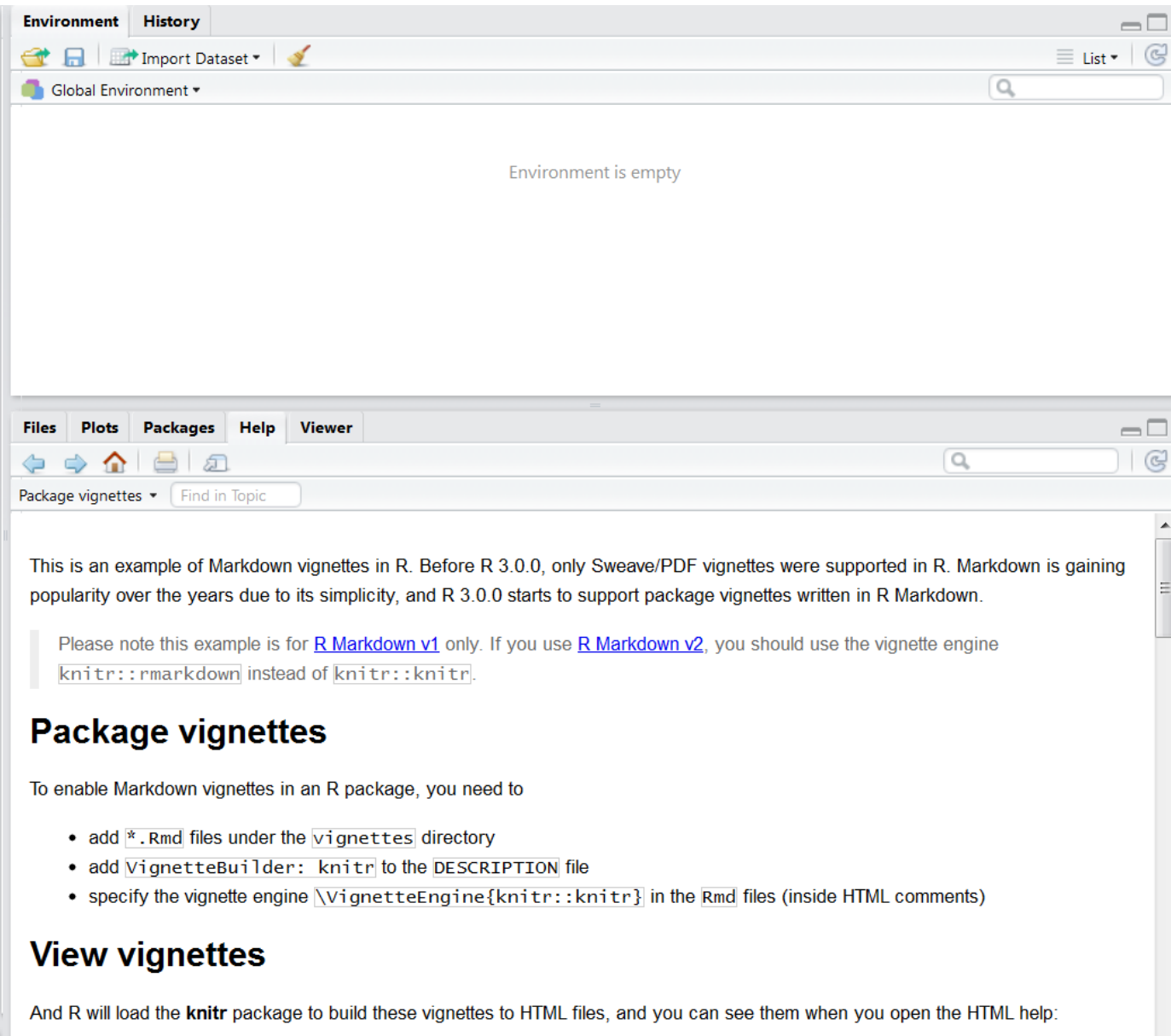
[1]: <http://www.google.com> [2]: <http://www.ugent.be>

Using Markdown in R studio



```
1 ---
2 title: "R markdown"
3 output: word_document
4 ---
5 Headers:
6
7 # This is an H1
8
9 ## This is an H2
10
11 Italics:
12 text This text will be in italics text
13
14 Bold:
15 text This text will be in bold text
16
17 Unordered list:
18
19 - First
20 - Second
21 - Third
22
23 Ordered list:
24
25 1. First
26 2. Second
27 3. Third
28
29 Links: [Google] (http://www.google.com)
30
31 Advanced Linking: [Google][1] and [UGent][2]
32
33 [1]: http://www.google.com
34 [2]: http://www.ugent.be
35
36 A way to include some latex code in R Markdown
37
38 
$$y_{ij} = b_{ij} + \beta_0 + \beta_1$$

39
40
```



Environment History

Global Environment

Environment is empty

Files Plots Packages Help Viewer

Package vignettes Find in Topic

This is an example of Markdown vignettes in R. Before R 3.0.0, only Sweave/PDF vignettes were supported in R. Markdown is gaining popularity over the years due to its simplicity, and R 3.0.0 starts to support package vignettes written in R Markdown.

Please note this example is for [R Markdown v1](#) only. If you use [R Markdown v2](#), you should use the vignette engine `knitr::rmarkdown` instead of `knitr::knitr`.

Package vignettes

To enable Markdown vignettes in an R package, you need to

- add `*.Rmd` files under the `vignettes` directory
- add `VignetteBuilder: knitr` to the `DESCRIPTION` file
- specify the vignette engine `\VignetteEngine{knitr::knitr}` in the `Rmd` files (inside HTML comments)

View vignettes

And R will load the **knitr** package to build these vignettes to HTML files, and you can see them when you open the HTML help:

```
---  
title: "R markdown"  
output: word_document  
---
```

Headers:

This is an H1

This is an H2

Italics:

text *This text will be in italics* text

Bold:

text **This text will be in bold** text

Unordered list:

- First
- Second
- Third

Ordered list:

1. First
2. Second
3. Third

Links: [Google](http://www.google.com)

Advanced Linking: [Google][1] and [UGent][2]

[1]: http://www.google.com

[2]: http://www.ugent.be

A way to include some latex code in R Markdown

```
$$  
y_{ij} = b_{ij} + \beta_0 + \beta_1  
$$
```

MARKDOWN=> MS WORD



R markdown

Headers:

This is an H1

This is an H2

Italics:

text *This text will be in italics* text

Bold:

text **This text will be in bold** text

Unordered list:

- First
- Second
- Third

Ordered list:

1. First
2. Second
3. Third

Links: [Google](#)

Advanced Linking: [Google](#) and [UGent](#)

A way to include some latex code in R Markdown

$$y_{ij} = b_{ij} + \beta_0 + \beta_1$$

WHAT IS KNITR?

- R package designed for dynamic report generation in R
- Script contains a mixture of text and R code, which is when processed replaced by text and output, including figures and tables
- Uses R as programming language and a documentation language (LateX, Markdown)
- Inline R code within the text and separate code chunks

Advantage: you do not need to copy and paste your R output anymore!

USING PACKAGE 'KNITR' IN R STUDIO

Knit Word

'Knit' to Word, pdf or html

```
1 ---
2 title: "Knitr_Demo"
3 output: word_document
4 ---
5
6 ```{r global_options, include=FALSE}
7 library(knitr)
8 knitr::opts_chunk$set(fig.width=12, fig.height=8,
9   echo=FALSE, warning=FALSE, message=FALSE)
10 ```
11
12 Cars is a built-in dataset in R. This dataset has nrow(cars) rows.
13 We can also see our dataset using the head command as follows:
14 ```{r chunk1}
15 head(cars)
16 ```
17
18 Tables using kable:
19 ```{r chunk_table}
20 x <- rnorm(100)
21 y <- 2*x + rnorm(100)
22 lr <- lm(y~x)
23
24 kable(summary(lr)$coeff, digits = 2, row.names = FALSE,
25   col.names = c("Estimate","Standard Error","t-value","p-value"),
26   caption = "Linear Regression",
27   format.args = list(decimal.mark = ","))
28 ```
29
30 We can see the summary statistics using by embedding an R code chunk like this:
31 ```{r chunk2}
32 summary(cars)
33 ```
34
35 You can also embed plots, for example:
36 ```{r chunk3, echo=FALSE, eval = TRUE, fig.width=6}
37 hist(cars$speed)
38 ```
39 Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing the R code generating the plot.
40 Also, if we write `eval = FALSE` parameter in the code chunk, the R code will not be executed.
41
42
43 28:4 (Top Level) R Markdown
```

Code chunk

Inline R code

Code chunk

Code chunk

Code chunk

Code chunk

Environment History

Import Dataset

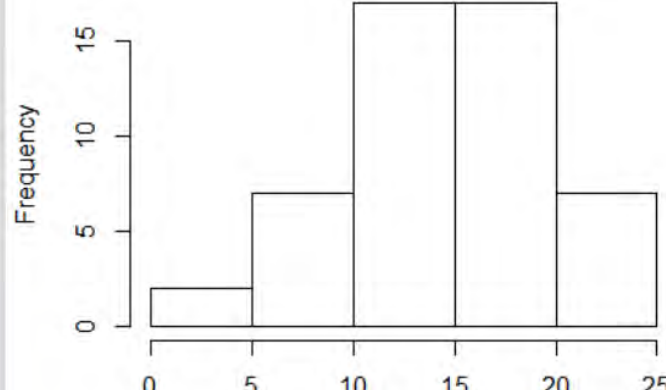
Global Environment

Environment is empty

Files Plots Packages Help Viewer

Zoom Export

Histogram of cars\$speed



Frequency

cars\$speed

cars\$speed	Frequency
0-5	2
5-10	7
10-15	16
15-20	16
20-25	7

CODE CHUNKS

- **echo=FALSE**: to hide the R code in the final report
- **results="hide"**: to hide the results/output (figures are shown!)
- **include=FALSE**: to have the chunk evaluated, but neither the code nor its output is displayed
- **warning=FALSE** and **message=FALSE**: to suppress any R warnings or messages from being included in the final report

R CODE + TEXT => REPORT

```
---  
title: "Knitr_Demo"  
output: word_document  
---
```

```
```{r global_options, include=FALSE}  
library(knitr)
knitr::opts_chunk$set(fig.width=12, fig.height=8,
 echo=FALSE, warning=FALSE, message=FALSE)
```
```

Cars is a built-in dataset in R. This dataset has `nrow(cars)` rows.
We can also see our dataset using the head command as follows:

```
```{r chunk1}  
head(cars)
```
```

Tables using kable:

```
```{r chunk_table}  
x <- rnorm(100)
y <- 2*x + rnorm(100)
lr <- lm(y~x)
```
```

Use 'kable' for tables

```
kable(summary(lr)$coeff, digits = 2, row.names = FALSE,  
  col.names = c("Estimate", "Standard Error", "t-value", "p-value"),  
  caption = "Linear Regression",  
  format.args = list(decimal.mark = ","))  
```
```

We can see the summary statistics using by embedding an R code chunk like this:

```
```{r chunk2}  
summary(cars)  
```
```

You can also embed plots, for example:

```
```{r chunk3, echo=FALSE, eval = TRUE, fig.width=6}  
hist(cars$speed)  
```
```

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing the R code generating the plot. Also, if we write `eval = FALSE` parameter in the code chunk, the R code will not be executed.

Plot

=>

## Knitr\_Demo

Cars is a built-in dataset in R. This dataset has 50 rows. We can also see our dataset using the head command as follows:

```
speed dist
1 4 2
2 4 10
3 7 4
4 7 22
5 8 16
6 9 10
```

Tables using kable:

Linear Regression

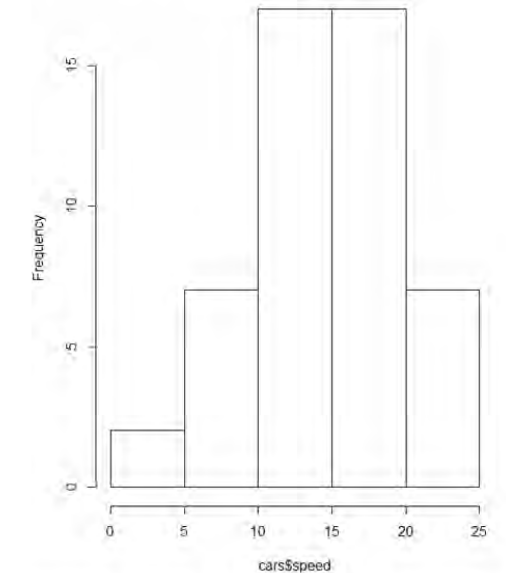
| Estimate | Standard Error | t-value | p-value |
|----------|----------------|---------|---------|
| -0.07    | 0.1            | -0.71   | 0.48    |
| 1.88     | 0.1            | 18.62   | 0.00    |

We can see the summary statistics using by embedding an R code chunk like this:

```
speed dist
Min. : 4.0 Min. : 2.00
1st Qu.:12.0 1st Qu.: 26.00
Median :15.0 Median : 36.00
Mean :15.4 Mean : 42.98
3rd Qu.:19.0 3rd Qu.: 56.00
Max. :25.0 Max. :120.00
```

You can also embed plots, for example:

## Histogram of cars\$speed



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing the R code generating the plot. Also, if we write `eval = FALSE` parameter in the code chunk, the R code will not be executed.

For more complex tables consider 'pander' or 'stargazer'

# EXAMPLE OF A SMALL REPORT

The screenshot displays the RStudio interface with an R Markdown document titled 'Markdown\_Demo.Rmd'. The document content is as follows:

```
1 ---
2 title: "Airquality_Demo"
3 output: word_document
4 ---
5 # Demonstration using Markdown/knitr with airquality dataset
6 ## Introduction
7 ```{r global_options, include=FALSE}
8 library(knitr)
9 knitr::opts_chunk$set(fig.width=8, fig.height=8, echo=FALSE, warning=FALSE, message=FALSE)
10 ```
11
12 This airquality dataset consists of nrow(airquality) rows and ncol(airquality) columns.
13 The data from the following covariates is obtained from May 1, 1973 (a Tuesday) to September 30, 1973:
14
15 * Ozone: Mean ozone in parts per billion from 1300 to 1500 hours at Roosevelt Island
16 * Solar.R: Solar radiation in Langley's in the frequency band 4000-7700 Angstroms from 0800 to 1200 hours at Central Park
17 * Wind: Average wind speed in miles per hour at 0700 and 1000 hours at LaGuardia Airport
18 * Temperature: Maximum daily temperature in degrees Fahrenheit at La Guardia Airport
19
20 ## Descriptives
21 ```{r first, echo = FALSE}
22 kable(summary(airquality))
23 ```
24
25 ## Plots
26 ```{r third, echo=FALSE, fig.align='left'}
27 par(mfrow=c(2, 2))
28 boxplot(Ozone~Month, data = airquality, xlab = "Ozone", ylab = "Month")
29 boxplot(Solar.R~Month, data = airquality, xlab = "Solar.R", ylab = "Month")
30 boxplot(Wind~Month, data = airquality, xlab = "Wind", ylab = "Month")
31 boxplot(Temp~Month, data = airquality, xlab = "Temperature", ylab = "Month")
32 ```
33
34 ## Model building
35 ```{r reg_airquality, echo= FALSE}
36 lr <- lm(Ozone ~ Month, data = airquality)
37
38 kable(summary(lr)$coeff, digits = 2, row.names = FALSE,
39 col.names = c("Estimate", "Standard Error", "t-value", "p-value"),
40 caption = "Linear Regression",
41 format.args = list(decimal.mark = ","))
42 ```
43
44 ## Links
45 * <http://kbroman.org/knitr_knuthshell/>
46 * <http://rmarkdown.rstudio.com/>
47
```

The right-hand pane shows the rendered HTML output. It includes a search bar, a 'Values' section showing a list of 13 items, and a 'Package vignettes' section. The vignette text reads:

This is an example of Markdown vignettes in R. Before R 3.0.0, only Sweave/PDF vignettes were supported in R. Markdown is gaining popularity over the years due to its simplicity, and R 3.0.0 starts to support package vignettes written in R Markdown.

Please note this example is for [R Markdown v1](#) only. If you use [R Markdown v2](#), you should use the vignette engine `knitr::rmarkdown` instead of `knitr::knitr`.

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- add `*.Rmd` files under the `vignettes` directory
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## View vignettes

And R will load the **knitr** package to build these vignettes to HTML files, and you can see them when you open the HTML help:

# OUTPUT: MS WORD DOCUMENT

## Airquality\_Demo

### Demonstration using Markdown/knitr with airquality dataset

#### Introduction

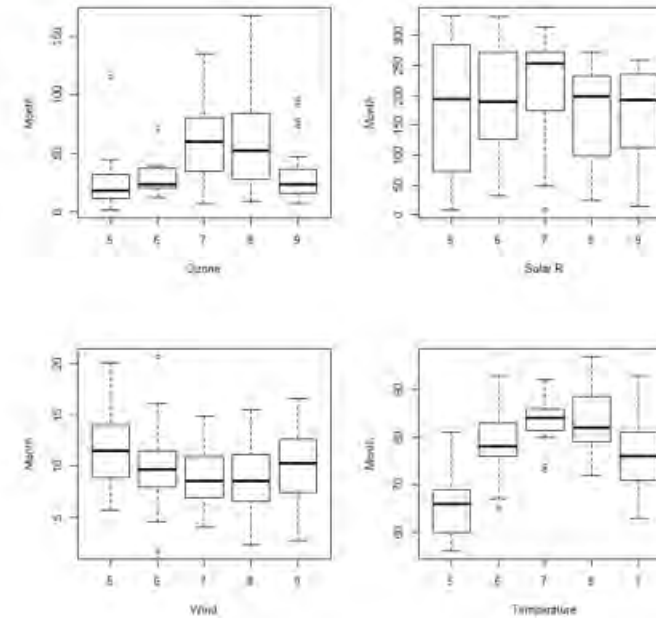
This **airquality** dataset consists of 153 rows and 6 columns. The data from the following covariates is obtained from May 1, 1973 (a Tuesday) to September 30, 1973:

- Ozone: Mean ozone in parts per billion from 1300 to 1500 hours at Roosevelt Island
- Solar.R: Solar radiation in Langleys in the frequency band 4000-7700 Angstroms from 0800 to 1200 hours at Central Park
- Wind: Average wind speed in miles per hour at 0700 and 1000 hours at LaGuardia Airport
- Temperature: Maximum daily temperature in degrees Fahrenheit at La Guardia Airport

#### Descriptives

| Ozone          | Solar.R        | Wind            | Temp           | Month          | Day           |
|----------------|----------------|-----------------|----------------|----------------|---------------|
| Min.: 1.00     | Min.: 7.0      | Min.: 1.700     | Min.: 56.00    | Min.: 5.000    | Min.: 1.0     |
| 1st Qu.: 18.00 | 1st Qu.: 115.8 | 1st Qu.: 7.400  | 1st Qu.: 72.00 | 1st Qu.: 6.000 | 1st Qu.: 8.0  |
| Median: 31.50  | Median: 205.0  | Median: 9.700   | Median: 79.00  | Median: 7.000  | Median: 16.0  |
| Mean: 42.13    | Mean: 185.9    | Mean: 9.958     | Mean: 77.88    | Mean: 6.993    | Mean: 15.8    |
| 3rd Qu.: 63.25 | 3rd Qu.: 258.8 | 3rd Qu.: 11.500 | 3rd Qu.: 85.00 | 3rd Qu.: 8.000 | 3rd Qu.: 23.0 |
| Max.: 168.00   | Max.: 334.0    | Max.: 20.700    | Max.: 97.00    | Max.: 9.000    | Max.: 31.0    |
| NA's: 37       | NA's: 7        | NA              | NA             | NA             | NA            |

#### Plots



#### Model building

##### Linear Regression

| Estimate | Standard Error | t-value | p-value |
|----------|----------------|---------|---------|
| 15.66    | 15.17          | 1.03    | 0.30    |
| 3.68     | 2.07           | 1.78    | 0.08    |

#### Links

- <http://kbroman.org/knitr-knitshell/>
- <http://rmarkdown.rstudio.com/>

# MORE INFORMATION

- For more details on using R Markdown see [rmarkdown.rstudio.com](https://rmarkdown.rstudio.com)
- For more details on using knitr see [kbroman.org/knitr\\_knutshell](https://kbroman.org/knitr_knutshell)
- For more details on Markdown for GitHub see [guides.github.com/features/mastering-markdown/](https://guides.github.com/features/mastering-markdown/)

Thank you for your attention!