INTRODUCTION TO MARKDOWN

Ineke van Gremberghe

MIROR TRAINING EVENT

UGent

October 20, 2016

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

Markdown_Demo.Rmd ×

Knit Word ▾

Run ▾

'Knit' to Word, pdf or html

```
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
12  Italics:
13
14  text *This text will be in italics* text
15
16  Bold:
17
18  text **This text will be in bold** text
19
20  Unordered list:
21
22  - First
23  - Second
24  - Third
25
26  Ordered list:
27
28  1. First
29  2. Second
30  3. Third
31
32  Links: [Google](http://www.google.com)
33
34  Advanced Linking: [Google][1] and [UGent][2]
35
36  [1]: http://www.google.com
37  [2]: http://www.ugent.be
38
39  A way to include some latex code in R Markdown
40  $$
41  y_{ij} = b_{ij} + \beta_{0} + \beta_{1}
42  $$
```

1:1   R markdown ÷   R Markdown ÷

Environment   History

Import Dataset ▾

List ▾

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:

MARKDOWN=> MS WORD

```
---
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
$$
y_{ij} = b_{ij} + \beta_{0} + \beta_{1}
$$
```

=>

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

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 `r 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)

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)
```
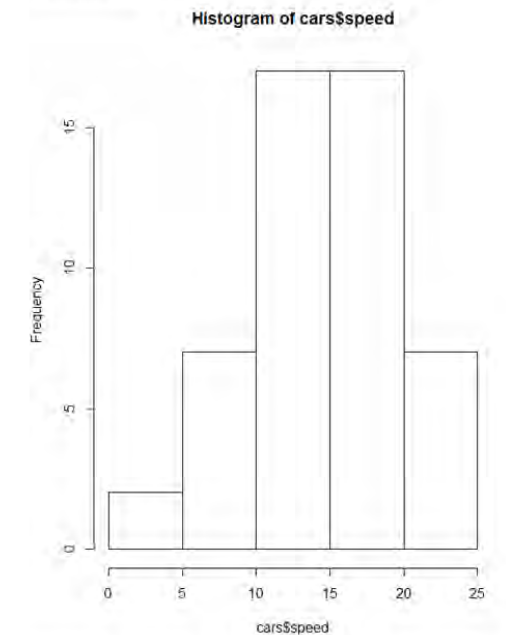
You can also embed plots, for example:
```{r chunk3, echo=FALSE, eval = TRUE, fig.width=6}
hist(cars$speed)
```
Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing the R code generating the plot.
Also, if we write `eval = FALSE` parameter in the code chunk, the R code will not be executed.
```

Use 'kable' for tables

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'

Markdown_Demo.Rmd × | KnitR_Demos.Rmd × | RMDKnitr_Demo.Rmd ×

Knit Word ▾ | Run ▾

```
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$set(fig.width=8, fig.height=8, echo=FALSE, warning=FALSE, message=FALSE)
10 ```
11
12 This **airquality** dataset consists of `r nrow(airquality)` rows and `r ncol(airquality)` columns.
13 The data from the following covariates is obtained from May 1, 1973 (a Tuesday) to September 30, 1973:
14
15 * Ozone: Mean ozone in parts per billion from 1300 to 1500 hours at Roosevelt Island
16 * Solar.R: Solar radiation in Langleys in the frequency band 4000-7700 Angstroms from 0800 to 1200 hours at Central Park
17 * Wind: Average wind speed in miles per hour at 0700 and 1000 hours at LaGuardia Airport
18 * Temperature: Maximum daily temperature in degrees Fahrenheit at La Guardia Airport
19
20 ## Descriptives
21 ```{r first, echo = FALSE}
22 kable(summary(airquality))
23 ```
24
25 ## Plots
26 ```{r third, echo=FALSE, fig.align='left'}
27 par(mfrow=c(2, 2))
28 boxplot(Ozone~Month, data = airquality, xlab = "Ozone", ylab = "Month")
29 boxplot(Solar.R~Month, data = airquality, xlab = "Solar.R", ylab = "Month")
30 boxplot(Wind~Month, data = airquality, xlab = "Wind", ylab = "Month")
31 boxplot(Temp~Month, data = airquality, xlab = "Temperature", ylab = "Month")
32 ```
33
34 ## Model building
35 ```{r reg_airquality, echo= FALSE}
36 lr <- lm(Ozone ~ Month, data = airquality)
37
38 kable(summary(lr)$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_knutshell/>
46 * <http://rmarkdown.rstudio.com/>
47
```

20:16 Descriptives ÷   R Markdown ÷

Environment | History

Import Dataset ▾ | List ▾

Global Environment ▾

Values

lr   List of 13

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:

OUTPUT: MS WORD DOCUMENT

Airquality_Demo

Demonstration using Markdown/knitr with airquality dataset
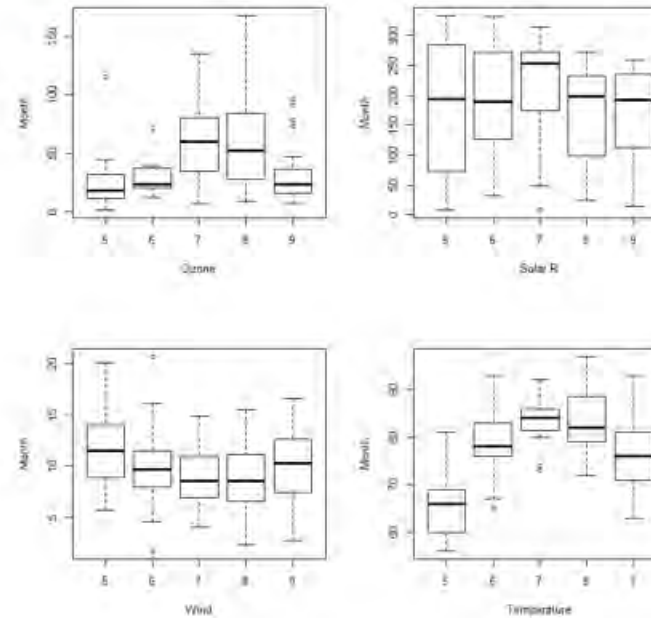
Introduction

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_knutshell/
- http://rmarkdown.rstudio.com/

MORE INFORMATION

- For more details on using R Markdown see rmarkdown.rstudio.com

- For more details on using knitr see kbroman.org/knitr_knutshell

- For more details on Markdown for GitHub see guides.github.com/features/mastering-markdown/

Thank you for your attention!

Methods in Research on Research

A presentation delivered at the

first MiRoR training event
October 19-21, 2016
Ghent, Belgium

www.miror-ejd.eu   @MirorProject