A Brief R Markdown Tutorial

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1 R Markdown

R Markdown provides an authoring framework for data science. You can use a single R Markdown file to both

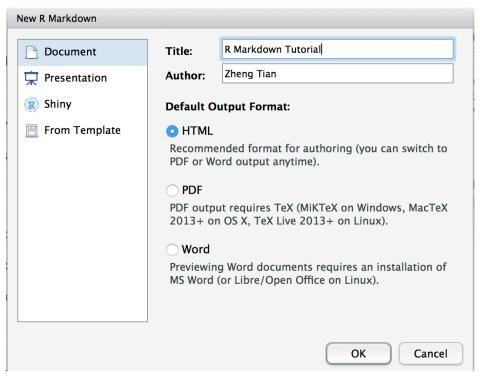
- save and execute code
- generate high quality reports that can be shared with an audience

This document gives you a very brief tutorial for R Markdown. You can also read tutorial documents in the this link, http://rmarkdown.rstudio.com/lesson-1.html.

1.1 Create a R Markdown file

An R Markdown file is a plain text file that has the extension .Rmd. In RStudio, you can easily create a new R Markdown file through the following steps:

- 1. Click File -> New File -> R Markdown.
- 2. At the left panel in the window jumping up, choose Document, and at the right panel, enter the title and author name of the document. Then, choose HTML as the default output format and click OK.



3. A short R Markdown document is generated with some elements in it as a template.

1.2 How R Markdown works

The underlying mechanism of R Markdown is shown as follows



Figure 1: R Markdown Workflow

- To generate an HTML document from a R Markdown file, click Knit button in RStudio.
- A built-in HTML browser will be invoked to have a preview of the document.
- You can also create a PDF file by click the little arrow beside Knit button, and choose Knit to PDF.

2 The Elements in a R Markdown File

2.1 The Paragraph

A new paragraph is created by following one or more blank lines.

2.2 Headers and sections

The # sign defines a top-level header and a section, ## defines a level-two header and a subsection.

```
# Section
## A subsection
### A subsubsection
```

2.3 Emphasis

Markdown uses **bold** to use the bold font and *italic* to use the *italic* font.

2.4 List

We can create a list as follows,

```
* Item 1
```

- * Item 2
 - + Item 2a
 - + Item 2bn
 - Item 1
 - Item 2
 - Item 2a
 - Item 2b

The list can also be numbered as follows,

- 1. Item 1
- 2. Item 2
- 3. Item 3
 - + Item 3a
 - + Item 3b

2.5 Equations

R Markdown uses the LaTeX command to create mathematical expressions.

For example, the linear regression equation in display mode is

$$[Y_i = \beta_0 + \beta_1 X_i + u_i, \text{ for } i = 1, \dots, n]$$
 which generates

$$Y_i = \beta_0 + \beta_1 X_i + u_i$$
, for $i = 1, ..., n$

And the in-line mathematical expression is $\beta_1 = \frac{\Delta Y}{\Delta X}$, generating $\beta_1 = \frac{\Delta Y}{\Delta X}$.

3 R Code Chunk

Most importantly, we can include R code along with the output in a R Markdown file. You can quickly insert chunks like these into your file with

- the keyboard shortcut Ctrl + Alt + I (OS X: Cmd + Option + I)
- the Insert button in the editor toolbar

• or by typing the chunk delimiters "'{r} and "'.

The behaviors of the R code chunk can be controlled by adding options.

summary(mtcars[, 1:3])

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

The options that are often used include echo, results, include, and eval, etc.

```
library(knitr)
kable(mtcars[1:5, 1:3])
```

	mpg	cyl	disp
Mazda RX4	21.0	6	160
Mazda RX4 Wag	21.0	6	160
Datsun 710	22.8	4	108
Hornet 4 Drive	21.4	6	258
Hornet Sportabout	18.7	8	360

We can also embed plots, for example:

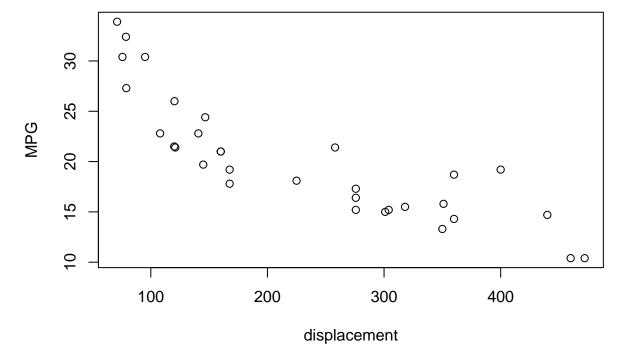


Figure 2: A Scatterplot

Finally, we use the following reference card to quickly find the relevant command in R Markdown, rmarkdown_cheatsheet.pdf.