

# A Brief R Markdown Tutorial

*Zheng Tian*

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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

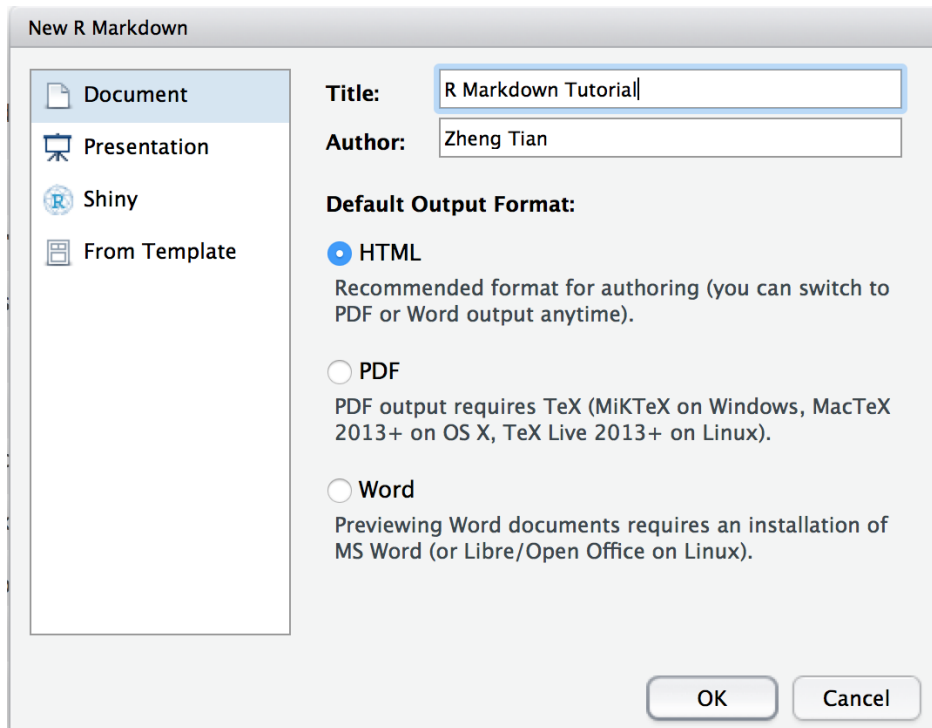
- save and execute code
- generate high quality reports that can be shared with an audience

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

```
\[Y_i = \beta_0 + \beta_1 X_i + u_i, \text{ for } i = 1, \ldots, n\]
```

which generates

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

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
##  Min.   :10.40  Min.   :4.000  Min.   : 71.1
##  1st Qu.:15.43  1st Qu.:4.000  1st Qu.:120.8
##  Median :19.20  Median :6.000  Median :196.3
##  Mean   :20.09  Mean   :6.188  Mean   :230.7
##  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:

```
plot(mtcars$disp, mtcars$mpg,
     xlab = "displacement", ylab = "MPG")
```

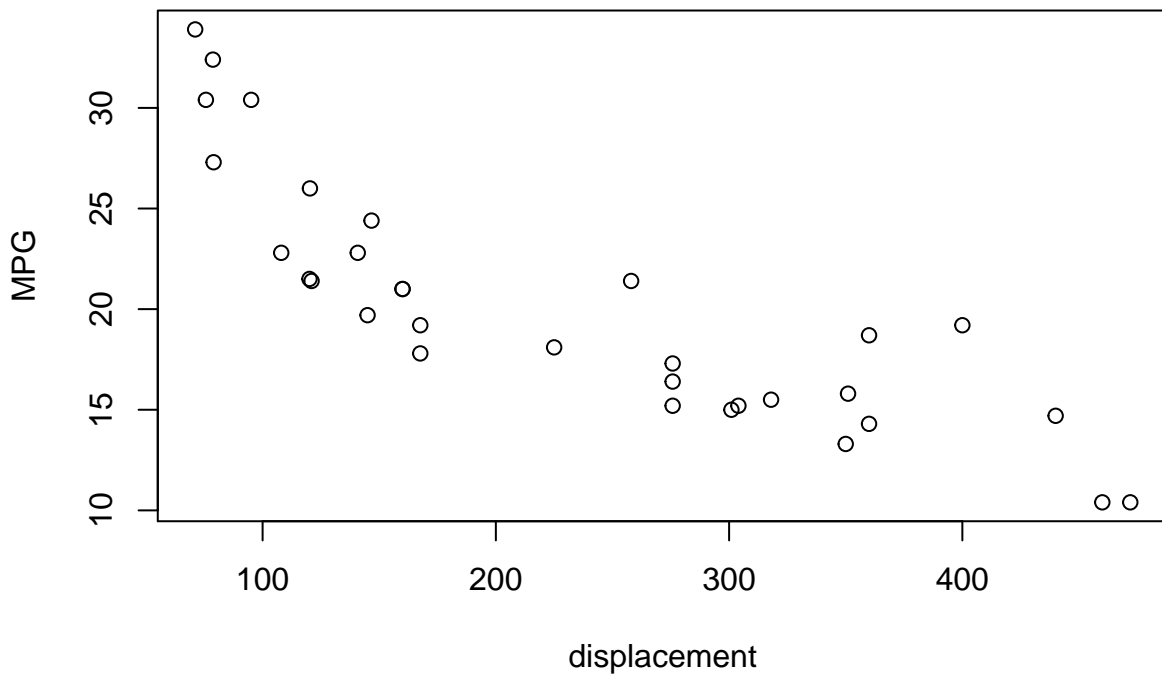


Figure 2: A Scatterplot

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