

Rmarkdown introduction

Epihubben Journal Club

Antoine K.D. Abalo

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Markdown

- ▶ Lightweight markup language for creating formatted text using a plain-text editor
- ▶ Created by **John Gruber** and **Aaron Swartz** in **2004**
- ▶ **Aim:** Ease plain text conversion into rich text format, without any heavy codes

R Markdown

- ▶ Package developed by **Yihui Xie** to integrated Markdown language into R (around **2012** - 2014)
- ▶ **Aim:** Facilitate reproducible research, allowing codes sharing with textual documentation on different form (*LaTeX*, *HTML*, *Markdown*, etc.) and for dynamic report generation with R.
- ▶ Yihui Xie: Author of **Knitr**, **blogdown**, **bookdown** etc.

R markdown - Functionalities

- ▶ R Markdown family of packages enables creating beautiful data science products like:
 - ▶ books, blogs, websites, and presentations etc.
- ▶ Aim: help you publish polished websites for sharing your work.
E.g.:
 - ▶ Present analyses or visualizations with R code (Ex. My tutorial),
 - ▶ Slides (like this one you are seeing),
 - ▶ R package (My package),
 - ▶ Personal-professional websites, etc.

Overview: Start using Rmarkdown

SOURCE EDITOR

The screenshot shows the RStudio Source Editor interface with the following numbered callouts:

- 1. New File**: Points to the 'New File' icon in the top-left toolbar.
- 2. Embed Code**: Points to the 'Run' button (a green play icon) in the top toolbar.
- 3. Write Text**: Points to the text area where the user is editing the R Markdown document.
- 4. Set Output Format(s) and Options**: Points to the 'Knit' button (a blue square with a white 'K') in the top toolbar.
- 5. Save and Render**: Points to the 'Save' icon (a floppy disk) in the top toolbar.
- 6. Share**: Points to the 'Share' icon (a person) in the top toolbar.

Additional annotations in the Source Editor include:

- set preview location**: Points to the 'Preview' button (a magnifying glass) in the top toolbar.
- insert code chunk**: Points to the 'Insert Code Chunk' button (a green plus icon) in the top toolbar.
- go to code chunk**: Points to the 'Go to Code Chunk' button (a magnifying glass) in the top toolbar.
- run code chunk(s)**: Points to the 'Run Code Chunk(s)' button (a green play icon) in the top toolbar.
- run all previous chunks**: Points to the 'Run All Previous Chunks' button (a green play icon) in the top toolbar.
- run current chunk**: Points to the 'Run Current Chunk' button (a green play icon) in the top toolbar.
- R Markdown Including Plots**: Points to the 'R Markdown Including Plots' button (a green play icon) in the top toolbar.
- show outline**: Points to the 'Show Outline' button (a magnifying glass) in the top toolbar.

The code in the editor includes a title, author, output format, and an R code chunk:

```
1 ---
2 title: "Document Title"
3 author: "Author Name"
4 output:
5   html_document:
6     toc: TRUE
7 ---
8
9 {r setup, include=FALSE}
10 knitr::opts_chunk$set(echo = TRUE)
11
12
13 ## R Markdown
14
15 This is an R Markdown document.
16 Markdown is a simple formatting
17 syntax for authoring HTML, PDF,
18 and MS Word documents.
19
20 {r cars}
21 summary(cars)
22
23
```

VISUAL EDITOR

The screenshot shows the RStudio Visual Editor interface, displaying the rendered HTML output of the R Markdown document. The callouts include:

- insert citations**: Points to the 'Insert Citations' button (a magnifying glass) in the top toolbar.
- style options**: Points to the 'Style Options' button (a magnifying glass) in the top toolbar.

The rendered output shows the title, author, and the R code chunk output:

```
1 ---
2 title: "Document Title"
3 author: "Author Name"
4 output:
5   html_document:
6     toc: TRUE
7 ---
8
9 {r setup, include=FALSE}
10 knitr::opts_chunk$set(echo = TRUE)
11
12
13 ## R Markdown
14
15 This is an R Markdown document.
16 Markdown is a simple formatting
17 syntax for authoring HTML, PDF,
18 and MS Word documents.
19
20 {r cars}
21 summary(cars)
22
23
```

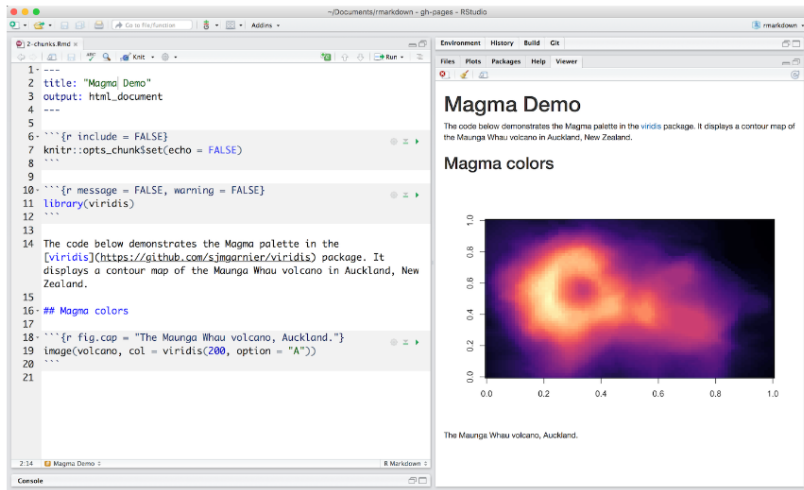
The magic behind



When you run render, R Markdown feeds the .Rmd file to knitr, which executes all of the code chunks and creates a new markdown (.md) document which includes the code and its output.

The markdown file generated by knitr is then processed by pandoc which is responsible for creating the finished format.

Codes chunks



The screenshot shows the RStudio interface with a file named "2-chunks.Rmd" open. The editor displays an R code chunk with the following content:

```
1 ----
2 title: "Magma Demo"
3 output: html_document
4 ----
5
6 ```{r include = FALSE}
7 knitr::opts_chunk$set(echo = FALSE)
8 ```
9
10 ```{r message = FALSE, warning = FALSE}
11 library(viridis)
12 ```
13
14 The code below demonstrates the Magma palette in the
15 [viridis](https://github.com/sjmgarnier/viridis) package. It
16 displays a contour map of the Maunga Whau volcano in Auckland, New
17 Zealand.
18
19 ## Magma colors
20
21 ```{r fig.cap = "The Maunga Whau volcano, Auckland."}
22 image(volcano, col = viridis(200, option = "A"))
23 ```
```

The rendered output on the right shows the title "Magma Demo" and a paragraph explaining the code. Below this is a section titled "Magma colors" which contains a contour map of the Maunga Whau volcano. The map uses the viridis color palette, showing a gradient from dark purple to bright yellow. The axes of the plot range from 0.0 to 1.0. Below the plot is the caption "The Maunga Whau volcano, Auckland."

Inline coding

- ▶ You can insert chunks:
 - ▶ keyboard shortcut **Ctrl + Alt + I** (OS X: **Cmd + Option + I**)
 - ▶ Command in the editor toolbar
 - ▶ Typing the chunk delimiters `{r}` and.
- ▶ R Markdown run each code chunk and embed the results beneath the code chunk in your final report.

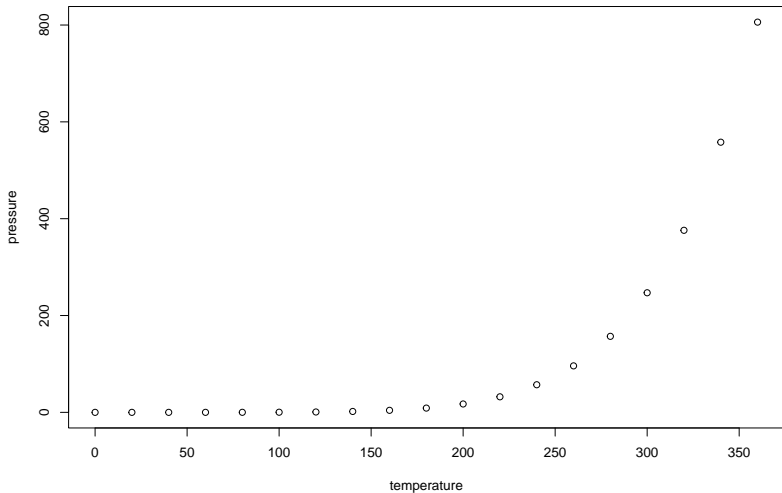
NB: Chunk options for personalised code output

```
# This is an example  
a <- c(1,2,3,4)  
cat("The output of a =", a)
```

```
## The output of a = 1 2 3 4
```


Tables - Figures

```
plot(pressure)
```



Tables - Figures

Table 1: Example of embended table

| age_group | Number_events | Pers_years |
|-----------|---------------|------------|
| 35-39 | 0 | 480 |
| 40-44 | 1 | 587 |
| 45-49 | 3 | 680 |
| 50-54 | 5 | 541 |
| 55-59 | 8 | 479 |
| 60-64 | 8 | 356 |
| 65-69 | 4 | 157 |
| 70-74 | 1 | 36 |

Interactive Documents

R Markdown documents are a perfect platform for interactive content. To make your documents interactive, add:

- ▶ Interactive JavaScript visualizations based on htmlwidgets, or
- ▶ Reactive components made with Shiny (**upcoming coding clubs**)

Interactive table

Scientific articles

Additional resources

The reference guide

The Rmarkdown cheatsheet

Let's put this into practice

- ▶ If you don't have R and Rstudio installed, you can create a free account on R Studio Cloud and start using R.