

Introduction to RMarkdown

true

2023-02-16

Abstract

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1 Additional Resources

- R Markdown for RStudio
- R Markdown Cheatsheet
- R Markdown Reference Guide
- R Markdown Definitive Guide
- R Markdown Cookbook

2 About R Markdown

R Markdown allows you to blend formatted prose with code to create reproducible scientific documents that can be outputted in a HTML, PDF, and MS Word document.

Clicking on the **Knit** button in the editor toolbar will generate a document that includes both the content as well as the output of any embedded R code chunks within the document.

- Global Options
- Markdown Quick Reference (Help)

2.0.1 Why Bother?

1. Encourages you to document your analysis
 2. Provides a non-proprietary format that you can easily store, preserve, document with metadata, and retrieve at later dates.
 3. Reproducibility means that you can share the document with colleagues and peers to check errors or to collaborate easily. R Markdown even allows for multiple coding languages to be used in a single document.
 4. Create reports/documents that are dynamically generated from you data and can be easily revised. R Markdown documents are dynamic and an errors or issues with the coding can be made with little work on the user's end.
- No longer do you need to re-code and re-paste
-

3 YAML Header

- YAML AIN'T MARKUP LANGUAGE

This is the metadata area for your document and it also determines how the document is rendered when you knit it. It's default fields are **title**, **author**, **date**, and **output**. But you can add more fields.

About YAML:

- White spaces matter: indents indicate the contents are *child* of the level above
 - Spaces not tabs
 - Boolean operators: true/false is lowercase
 - true/false ~ yes/no
 - Entries can include executable code
 - “2023-02-16”
 - Most common outputs are *html_document*, *pdf_document*, and *word_document*
 - Full listing of available formats
-

4 Formatting Options

The following will provide ways for you to format your text/prose within the document that you are editing

5 Header 1

5.1 Header 2

5.1.1 Header 3

5.1.1.1 Header 4

5.1.1.1.1 Header 5 Header 6

Italics - *I am italic - mama mia*

Bold - **I am bold**

Hyperlink - You can learn more about RMarkdown [here](#)



**Properly
learning
Markdown**



**Checking the
syntax on google
whenever you want
to use it**

Image -

Footnote^[1]: Footnote^[This is a footnote]

Block quote

“You miss 100% of the shots you do not take. - Wayne Gretsky” - Michael Scott

Unordered lists:

- apple
- pear
- orange
- bear
 - orange bear
 - apple pear

Ordered lists:

1. Apple
2. Pear
3. Orange Bear

6 Document Editors

You can change the way that you edit the document by using the **Source** or **Visual** tab on the editor toolbar.

6.0.1 Source

- Allows you view the document in code view

6.0.2 Visual

- Allows you to view the document with markups
 - Allows basic WYSIWIG
-

7 Code Chunks

Code chunks allow you to include code from multiple languages into your narration.

You can insert a chunk code by:

- CTRL + ALT + I (PC)
- COMMAND + OPTIONS + I (MAC)
- Use **Add Chunk** command in editor toolbar

Let's add a code chunk that allows us to see the data set mtcars

```
mtcars
```

```
##           mpg  cyl  disp  hp drat   wt  qsec vs am gear carb
## Mazda RX4      21.0   6 160.0 110 3.90 2.620 16.46 0  1   4    4
## Mazda RX4 Wag  21.0   6 160.0 110 3.90 2.875 17.02 0  1   4    4
## Datsun 710      22.8   4 108.0  93 3.85 2.320 18.61 1  1   4    1
## Hornet 4 Drive  21.4   6 258.0 110 3.08 3.215 19.44 1  0   3    1
## Hornet Sportabout 18.7   8 360.0 175 3.15 3.440 17.02 0  0   3    2
## Valiant         18.1   6 225.0 105 2.76 3.460 20.22 1  0   3    1
## Duster 360      14.3   8 360.0 245 3.21 3.570 15.84 0  0   3    4
## Merc 240D       24.4   4 146.7  62 3.69 3.190 20.00 1  0   4    2
## Merc 230        22.8   4 140.8  95 3.92 3.150 22.90 1  0   4    2
## Merc 280        19.2   6 167.6 123 3.92 3.440 18.30 1  0   4    4
## Merc 280C       17.8   6 167.6 123 3.92 3.440 18.90 1  0   4    4
## Merc 450SE      16.4   8 275.8 180 3.07 4.070 17.40 0  0   3    3
## Merc 450SL      17.3   8 275.8 180 3.07 3.730 17.60 0  0   3    3
## Merc 450SLC     15.2   8 275.8 180 3.07 3.780 18.00 0  0   3    3
## Cadillac Fleetwood 10.4   8 472.0 205 2.93 5.250 17.98 0  0   3    4
## Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82 0  0   3    4
## Chrysler Imperial 14.7   8 440.0 230 3.23 5.345 17.42 0  0   3    4
## Fiat 128        32.4   4  78.7  66 4.08 2.200 19.47 1  1   4    1
```

| | | | | | | | | | | | |
|---------------------|------|---|-------|-----|------|-------|-------|---|---|---|---|
| ## Honda Civic | 30.4 | 4 | 75.7 | 52 | 4.93 | 1.615 | 18.52 | 1 | 1 | 4 | 2 |
| ## Toyota Corolla | 33.9 | 4 | 71.1 | 65 | 4.22 | 1.835 | 19.90 | 1 | 1 | 4 | 1 |
| ## Toyota Corona | 21.5 | 4 | 120.1 | 97 | 3.70 | 2.465 | 20.01 | 1 | 0 | 3 | 1 |
| ## Dodge Challenger | 15.5 | 8 | 318.0 | 150 | 2.76 | 3.520 | 16.87 | 0 | 0 | 3 | 2 |
| ## AMC Javelin | 15.2 | 8 | 304.0 | 150 | 3.15 | 3.435 | 17.30 | 0 | 0 | 3 | 2 |
| ## Camaro Z28 | 13.3 | 8 | 350.0 | 245 | 3.73 | 3.840 | 15.41 | 0 | 0 | 3 | 4 |
| ## Pontiac Firebird | 19.2 | 8 | 400.0 | 175 | 3.08 | 3.845 | 17.05 | 0 | 0 | 3 | 2 |
| ## Fiat X1-9 | 27.3 | 4 | 79.0 | 66 | 4.08 | 1.935 | 18.90 | 1 | 1 | 4 | 1 |
| ## Porsche 914-2 | 26.0 | 4 | 120.3 | 91 | 4.43 | 2.140 | 16.70 | 0 | 1 | 5 | 2 |
| ## Lotus Europa | 30.4 | 4 | 95.1 | 113 | 3.77 | 1.513 | 16.90 | 1 | 1 | 5 | 2 |
| ## Ford Pantera L | 15.8 | 8 | 351.0 | 264 | 4.22 | 3.170 | 14.50 | 0 | 1 | 5 | 4 |
| ## Ferrari Dino | 19.7 | 6 | 145.0 | 175 | 3.62 | 2.770 | 15.50 | 0 | 1 | 5 | 6 |
| ## Maserati Bora | 15.0 | 8 | 301.0 | 335 | 3.54 | 3.570 | 14.60 | 0 | 1 | 5 | 8 |
| ## Volvo 142E | 21.4 | 4 | 121.0 | 109 | 4.11 | 2.780 | 18.60 | 1 | 1 | 4 | 2 |

7.0.0.1 Running a Code Chunk You can run a code chunk by:

- CTRL + SHIFT + ENTER (PC)
- COMMAND + SHIFT + ENTER (MAC)
- Run button in Code Chunk
- Run button in editor toolbar

7.1 Customize Chunk Code

7.1.1 Chunk Cog Wheel

- Allows you to rename the chunk so it can be easily located
- Allows you to set message and warning displays
- Allows you to adjust plot sizes

7.1.1.1 Include Include allows you to include or not include the chunk code in the final product when knitted.

include =

Let's create a chunk code that sets our current working directory but does not display the code or

7.1.1.2 Eval Eval tells RStudio to either run or not run a code chunk when the document is knitted

eval =

Let's install the CRAN package Tidyverse. But since this is a one time operation, let's preface that

7.1.1.3 Message Some commands, like loading a package, will display messages after the code is run. You can choose whether or not you want the

message =

Let's load the tidyverse package because we will need functions in it to run future code in the repository

```
library(tidyverse)
```

7.1.1.4 Echo Echo allows you to show the output of the code that has been run, but not to show the code chunk when the document is knitted

echo =

Let's get the results of a line of code without displaying the code in the report.

```
##      mpg      cyl      disp      hp
## Min.   :10.40   Min.    :4.000   Min.    : 71.1   Min.    : 52.0
## 1st Qu.:15.43   1st Qu.:4.000   1st Qu.:120.8   1st Qu.: 96.5
## Median :19.20   Median :6.000   Median :196.3   Median :123.0
## Mean   :20.09   Mean    :6.188   Mean    :230.7   Mean    :146.7
## 3rd Qu.:22.80   3rd Qu.:8.000   3rd Qu.:326.0   3rd Qu.:180.0
## Max.   :33.90   Max.    :8.000   Max.    :472.0   Max.    :335.0
##      drat      wt      qsec      vs
## Min.   :2.760   Min.    :1.513   Min.    :14.50   Min.    :0.0000
## 1st Qu.:3.080   1st Qu.:2.581   1st Qu.:16.89   1st Qu.:0.0000
## Median :3.695   Median :3.325   Median :17.71   Median :0.0000
## Mean   :3.597   Mean    :3.217   Mean    :17.85   Mean    :0.4375
## 3rd Qu.:3.920   3rd Qu.:3.610   3rd Qu.:18.90   3rd Qu.:1.0000
## Max.   :4.930   Max.    :5.424   Max.    :22.90   Max.    :1.0000
##      am      gear      carb
## Min.   :0.0000   Min.    :3.000   Min.    :1.000
## 1st Qu.:0.0000   1st Qu.:3.000   1st Qu.:2.000
## Median :0.0000   Median :4.000   Median :2.000
## Mean   :0.4062   Mean    :3.688   Mean    :2.812
## 3rd Qu.:1.0000   3rd Qu.:4.000   3rd Qu.:4.000
## Max.   :1.0000   Max.    :5.000   Max.    :8.000
```

8 Inline Code

You can include coding within the body of your work using inline code using the backtick (‘) button on your keyboard

Let's include inline code with the mean of the mpg variable in the mtcars dataset as well as the number of observations. The average miles per gallon from the cars dataset is 20.090625 based on 32 observations

9 Plots

10 Citations

R Markdown allows you to insert citations as well as work with citation managers such as Zotero and CiteDrive. Once a citation is added to the document, it will automatically populate in a bibliography at the end of the document.

Insert Citations into your document:

- Visual Mode: Insert > Citation
- Source Mode: (Auerbach, 2021) or (See (Grolemund, n.d.))
- Visual Mode: @ will show you available citations

When a Citation is generated:

- A new .bib file will be created in the current working directory and will be attached to the document in the YAML header

- The default format for the citations is **Chicago Turabian**. If you want to change the format you will need to download the proper .csl file and add it to your working directory and add a csl field to your YAML header
 - Zotero Library
 - Citation Visual Editor

10.0.0.0.1 Let's try and find and enter the citation for the following article

- 10.1016/j.jvs.2021.03.055
-

References

- Auerbach, C. (2021). *Using RMarkdown to present your findings* (C. Auerbach & W. Zeitlin, Eds.; p. 0). Oxford University Press. <https://doi.org/10.1093/oso/9780197582756.003.0009>
- Grolemund, Y. X. J. J. A. G. (n.d.). *R markdown: The definitive guide*. <https://bookdown.org/yihui/rmarkdown/>