Tutorial: R Markdown

Your name

2024-01-12

Learning objectives

- Become familiar with the R Markdown syntax and code chunk rules

- Understand how to include figures and tables in your Markdown reports

- Create R Markdown files and export them to HTML and Microsoft Word files

Why R Markdown?

All lab assignments will be completed within an R Markdown document.

Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. It presents your code alongside its output (graphs, tables, etc.) with conventional text to explain it, a bit like a notebook. This can make it easier for the instructors to present instructions, code, and other content for each lab. For students, R Markdown can makes it easier to integrate R code with their written explanations, such as answers to questions.

This file provides an overview of R Markdown. If you're reading a knitted version of this document (e.g., under the "Jupyter Hub, R, and RStudio - Resources" module in Canvas), the `.Rmd` file that was used to create it was provided to you in Week 2 of class (`Intro_to_RMarkdown.Rmd`).

Note: Some of the below content was borrowed from a tutorial about R Markdown at Coding Club.

The YAML header

At the top of an R Markdown document, there is a YAML header section enclosed by `---`. By default, it includes a title, author, date and the file type you want to output to. For this class, you will produce HTML (`.html`) and MS Word (`.docx`) documents. The instructors may return the Word document back to you with comments. Make sure to replace "Your name" with your actual name. The "date" will be automatically generated using the `Sys.Date()` function, which returns the current date.

Knitting a document

When you click the **Knit** button (ball of blue yarn with a needle through it), a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. By default, I set up R Markdown files to knit to an HTML file; however, you can knit other formats by clicking the drop-down menu next to the knit button. **Please remember to knit your assignments to MS Word files**.
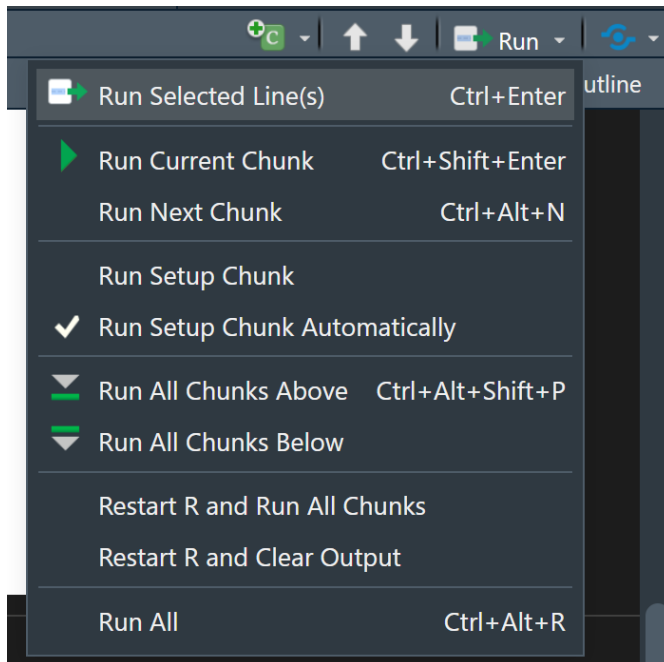
Code chunks

The first code chunk in R Markdown may contain R packages that are needed to run your code. For this file, we use the `here()` and `knitr()` packages.

You can embed an R code chunk like this:

```r
summary(cars)
```

```
##      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
```

When working through your lab assignment, you can run the code for an individual chunk by clicking the green "play button" triangle in the top-right corner of the chunk. To run multiple chunks, click on the `Run` button in the top-right corner of the "Source" pane in RStudio, and select your preference (e.g., restart R and run all chunks, or run all chunks above). You can run individual lines of code within chunks by selecting `Run selected lines` or using the keyboard shortcut (on Windows) `CTRL + SHIFT + ENTER`. See the screenshot below.

You can also embed plots, for example:
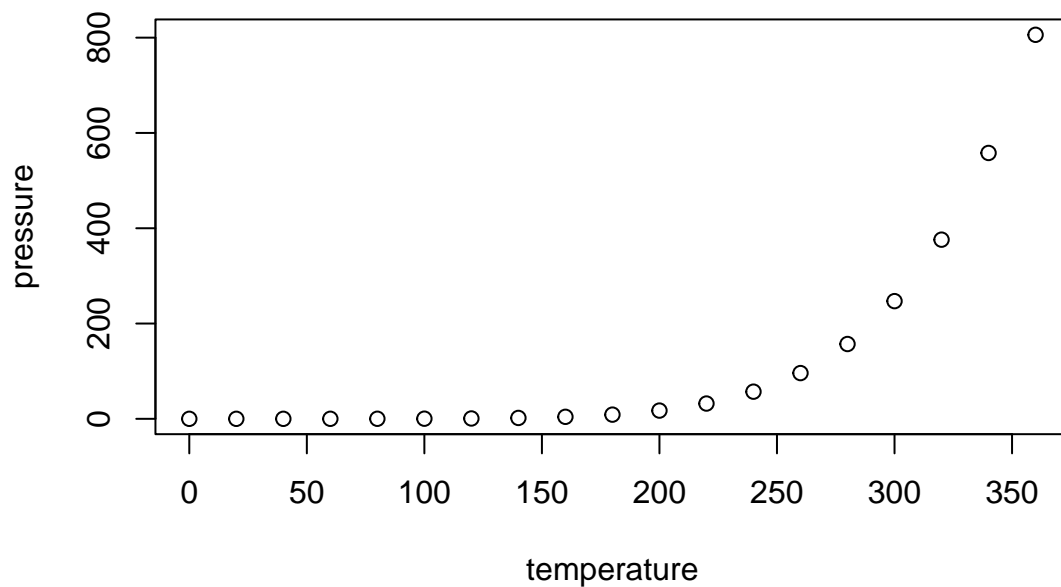
Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

You might want to create an object, but not include both the code and the output in the final `.html` file. To do this you can use, include = FALSE. Be aware though, when making reproducible research it's often not a good idea to completely hide some part of your analysis.

To insert an external figure, you can use the `include_graphics` function in the `knitr` R package, as shown above in the screenshot of the run options.

There are several options for inserting tables.

One is the `kable()` function from the `knitr` package. Also checkout the `gt()` function in the `gt` package and the `pander()` function in the `pander` package.

```
kable(pressure)
```

temperature	pressure
0	0.0002
20	0.0012
40	0.0060
60	0.0300
80	0.0900
100	0.2700
120	0.7500
140	1.8500
160	4.2000
180	8.8000
200	17.3000
220	32.1000

3

temperature	pressure
240	57.0000
260	96.0000
280	157.0000
300	247.0000
320	376.0000
340	558.0000
360	806.0000

You can manually create small tables using R Markdown syntax. For example:

Plant	Temp.	Growth
A	20	0.65
B	20	0.95
C	20	0.15

There are several other code chunk instructions that you could learn about (see **R Markdown Resources** below).

Formatting text

Once you knit your document, the output will display text formatted according to the following simple rules.

Italic

Italic

Bold

Bold

This is `code` in text

This is code in text

Header 1

Header 1 ## Header 2

Header 2 Note that when a # symbol is placed inside a code chunk it acts as a normal R comment, but when placed in text it controls the header size.

- Unordered list item

Unordered list item 1. Ordered list item

Ordered list item Link

Link

$A = \pi \times r^2$

Rendered equation example

The $ symbols tells R markdown to use LaTeX equation syntax.

Practice

To practice this, try writing some formatted text in your `.Rmd` document, add some additional code, and produce an `.html` and `.docx` file using the `Knit` button.

R Markdown Resources

Here are some tutorials and other potentially helpful documents. These same resources are also listed in the "R Markdown Resources" page on Canvas.

Official site
- [Website for R Markdown](#)

Books (online and free)
- [R Markdown: The Definitive Guide](#)
- [R Markdown Cookbook](#)
- [R Markdown | R for Data Science](#)

Tutorials
- [Getting started with R Markdown (Coding Club)](#)
- [R Markdown quick tour (RStudio)](#)
- [Getting started with R Markdown - Guide and Cheatsheet (Dataquest)](#)
- [Getting started with R Markdown (Data Carpentry)](#)