R Markdown for reproducible analysis

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What is R Markdown

R Markdown (.Rmd) is an authoring format that enables easy creation of dynamic documents, presentations, and reports from R. It combines the core syntax of markdown (an easy to write plain text format) with embedded R code chunks that are run so their output can be included in the final document. R Markdown documents are fully reproducible (they can be automatically regenerated whenever underlying R code or data changes).” – RStudio documentation.

Why R Markdown?

for Open Science

- Transparency
- Availability
- Accessibility
- Collaboration

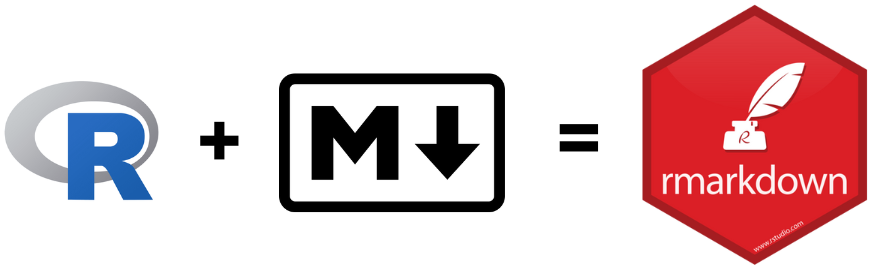
Why R Markdown?

for your work

There are many advantages to using R Markdown in your work:

- Human readable
- Simple syntax
- A Reminder for Your Future Self
- Easy to Modify
- Flexible export formats
- Easy to share

R + Markdown



How it works

Output formats

Write a single `.Rmd` file and then use it to render finished output in a variety of formats

Add Code and Results

```
```{r table2}
penguins %>%
  select(species, bill_length_mm:flipper_length_mm) %>%
  gtsummary::tbl_summary(by = species, missing = "no") %>%
  gtsummary::modify_caption("Flipper/Bill size by Species") %>%
  gtsummary::as_flex_table()

```
```

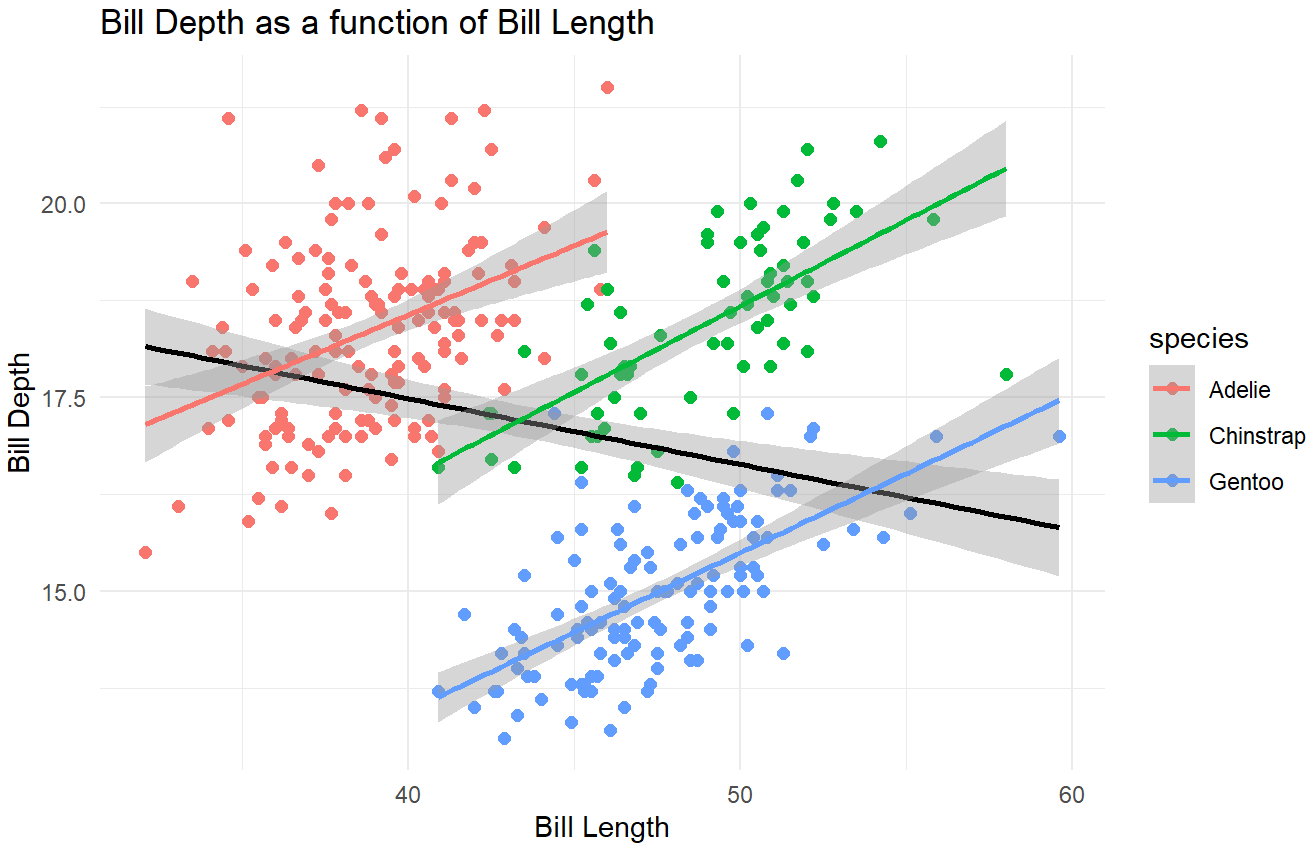
Flipper/Bill size by Species

Characteristic	Adelie, N = 152[1]	Chinstrap, N = 68[1]	Gentoo, N = 124[1]
bill_length_mm	38.8 (36.8, 40.8)	49.5 (46.3, 51.1)	47.3 (45.3, 49.5)
bill_depth_mm	18.40 (17.50, 19.00)	18.45 (17.50, 19.40)	15.00 (14.20, 15.70)
flipper_length_mm	190 (186, 195)	196 (191, 201)	216 (212, 221)

[1]Median (IQR)

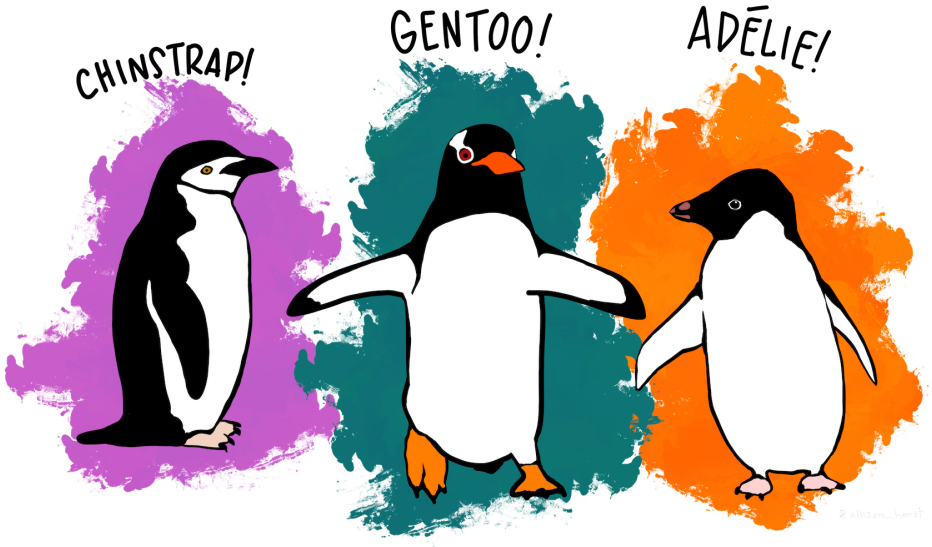
Add Text and reference to Plots

in Figure @ref(fig:corr-plot) we see examples of plotting in R.



Correlation Plot

Embed a picture



Artwork by @allison_horst

Embed a Youtube video

Introducing R Markdown Notebooks

Parameterised reports

Will show live in a while

```yaml
---
title: My Document
output: html_document
params:
  days:
    label: "Number of Previous Days"
    value: 90
    input: slider
    min: 30
    max: 360
  region:
    label: "Region:"
    value: Europe
    input: select
    choices: [North America, Europe, Asia, Africa]
---
```

Use it for

Reproducible data analysis

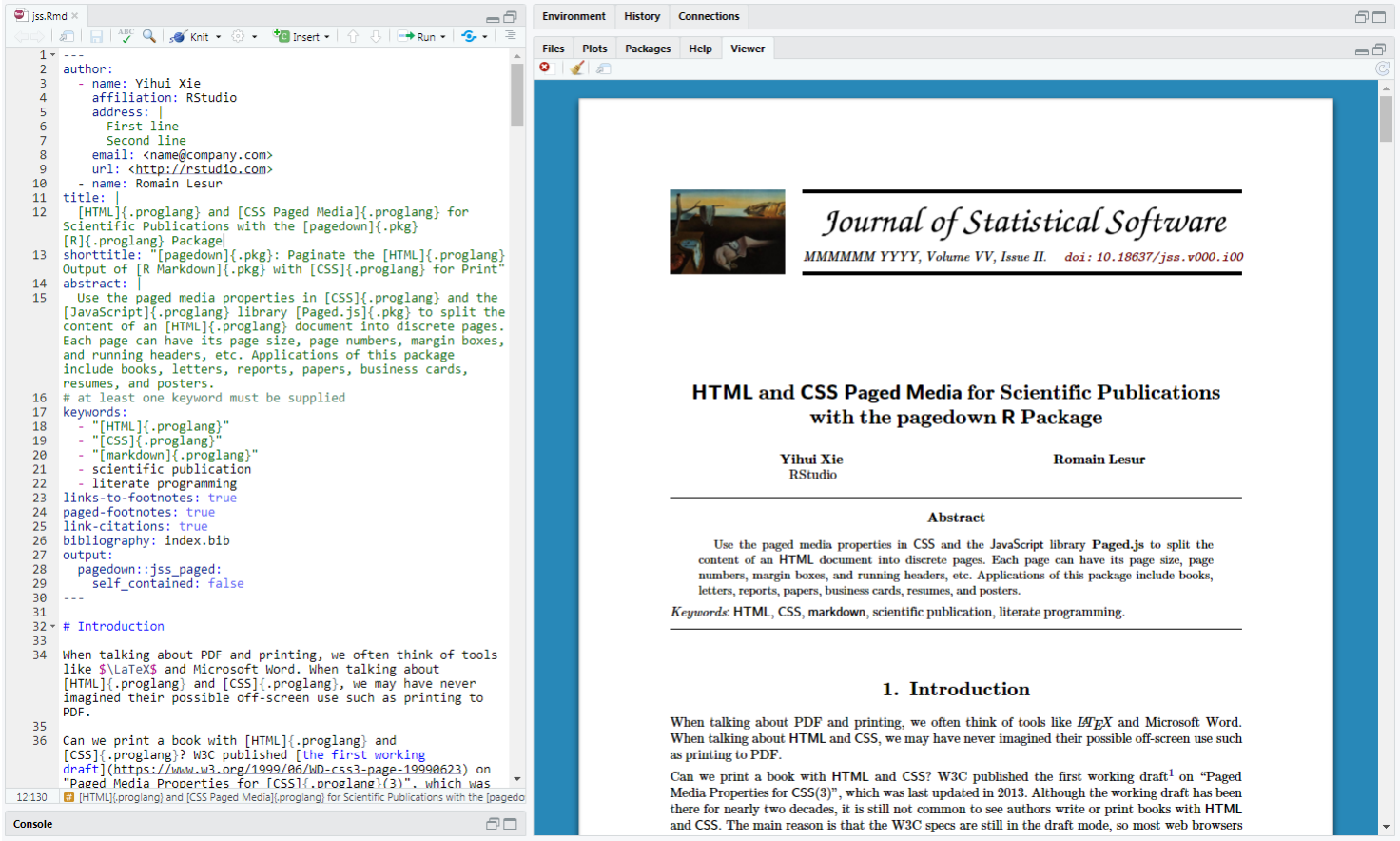
0:00 / 1:24

NYT interactive Rmakrdown document

Use it for Writing papers/articles

Use the Pagedown Package

See an example here



Use it for Authoring books

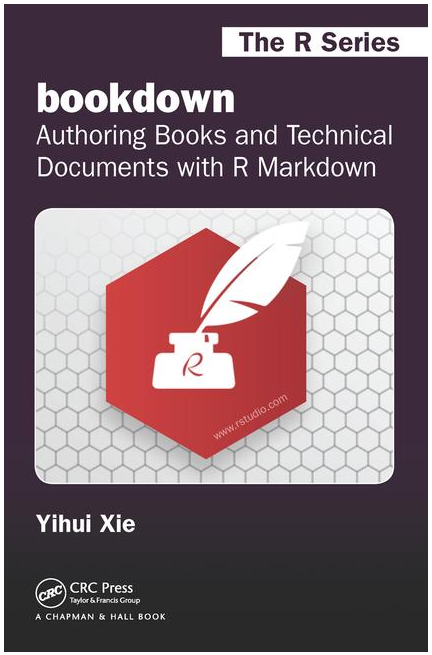
https://bookdown.org/

0:00 / 1:14

Use it for Authoring books

Techincal documentation and instructions

Bookdown book.
It's **free**



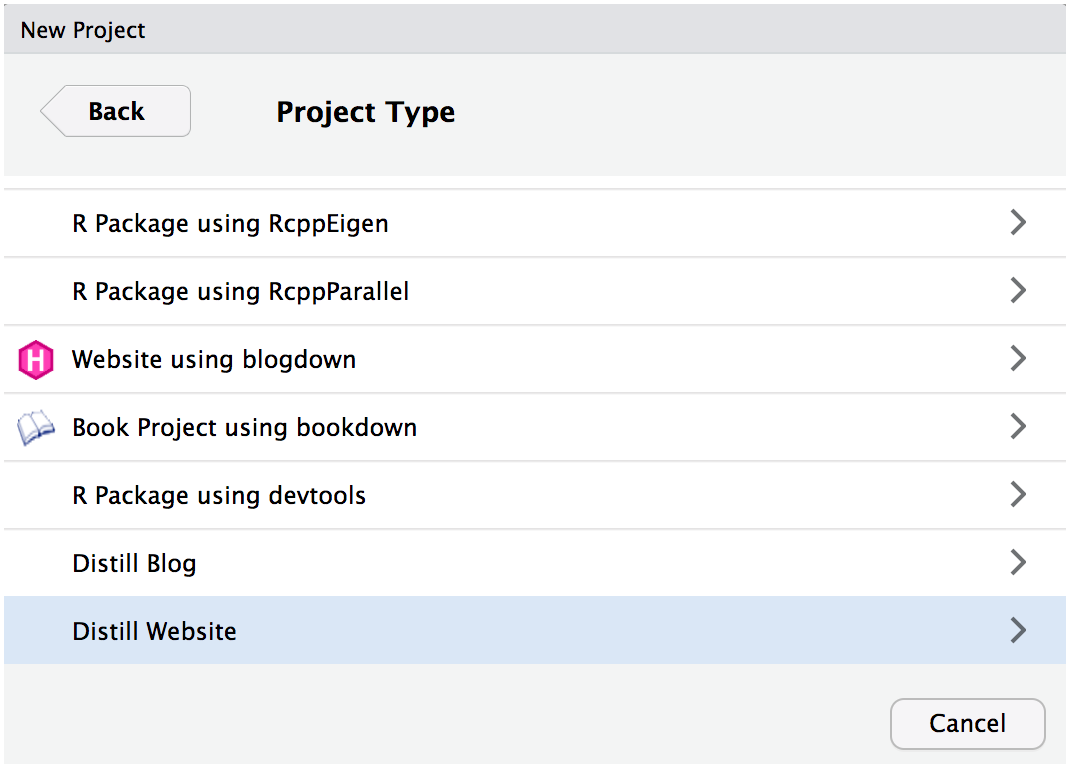
Use it for Creating websites

Techincal documentation and instructions in the Blogdown book.
It's **free**

Use it for Creating websites

More tools (and simpler)

- Distill for R Markdown



Syntax 1/3

Get the full reference guide [at R Studio website]

Syntax	Becomes
`Plain text`	Plain text
`End a line with two spaces` `to start a new paragraph.`	End a line with two spaces to start a new paragraph.
`*italics* and _italics_`	*italics* and *italics*
`**bold** and __bold__`	**bold** and **bold**
`superscript^2^`	superscript^{2}
`~~strikethrough~~`	~~strikethrough~~
`[link](www.rstudio.com)`	link
`# Header 1`	**Header 1**
`## Header 2`	**Header 2**
`### Header 3`	**Header 3**
`#### Header 4`	**Header 4**
`##### Header 5`	**Header 5**
`###### Header 6`	**Header 6**
`endash: --`	endash: –
`emdash: ---`	emdash: —
`ellipsis: ...`	ellipsis: …

Syntax 2/3

```
inline equation: $A = \pi*r^{2}$

image: ![](path/to/smallorb.png)

horizontal rule (or slide break):

***

> block quote

* unordered list
* item 2
    + sub-item 1
    + sub-item 2

1. ordered list
2. item 2
    + sub-item 1
    + sub-item 2

Table Header  | Second Header
------------- | -------------
Table Cell    | Cell 2
Cell 3        | Cell 4
```

inline equation: $A = \pi * r^2$

image:

horizontal rule (or slide break):

> block quote

- unordered list
- item 2
  - sub-item 1
  - sub-item 2

1. ordered list
2. item 2
   - sub-item 1
   - sub-item 2

Table Header	Second Header
Table Cell	Cell 2
Cell 3	Cell 4

Syntax 3/3

Syntax	Becomes

Make a code chunk with three back ticks followed by an r in braces. End the chunk with three back ticks:
 	
``{r}
paste("Hello", "World!")
``
	Make a code chunk with three back ticks followed by an r in braces. End the chunk with three back ticks:
	
	`paste("Hello", "World!")`
	
	`## [1] "Hello World!"`

Place code inline with a single back ticks. The first back tick must be followed by an R, like this `r paste("Hello", "World!")`.	Place code inline with a single back ticks. The first back tick must be followed by an R, like this Hello World!.

Add chunk options within braces. For example, `echo=FALSE` will prevent source code from being displayed:
 	
``{r eval=TRUE, echo=FALSE}
paste("Hello", "World!")
``
	Add chunk options within braces. For example, `echo=FALSE` will prevent source code from being displayed:
	
	`## [1] "Hello World!"`

Learn more about chunk options at http://yihui.name/knitr/options

Resources - Authoring Rmarkdown

Courses/Workshops

All these are with slides/code/data/examples and structured. Also, FREE

- Earth Data Analytics (very good)
- RMarkdown course ISGlobal
- Osaka City University
- Emi Tanaka
- Advanced R Markdown Workshop
- Alison Hill-1 (Very good)
- Alison Hill-2

Resources - Authoring Rmarkdown

Tips/ Cookbooks

- Rmarkdown Cookbook
- Rmakrdown for scientists
- Yan Holtz
- Keith McNulty

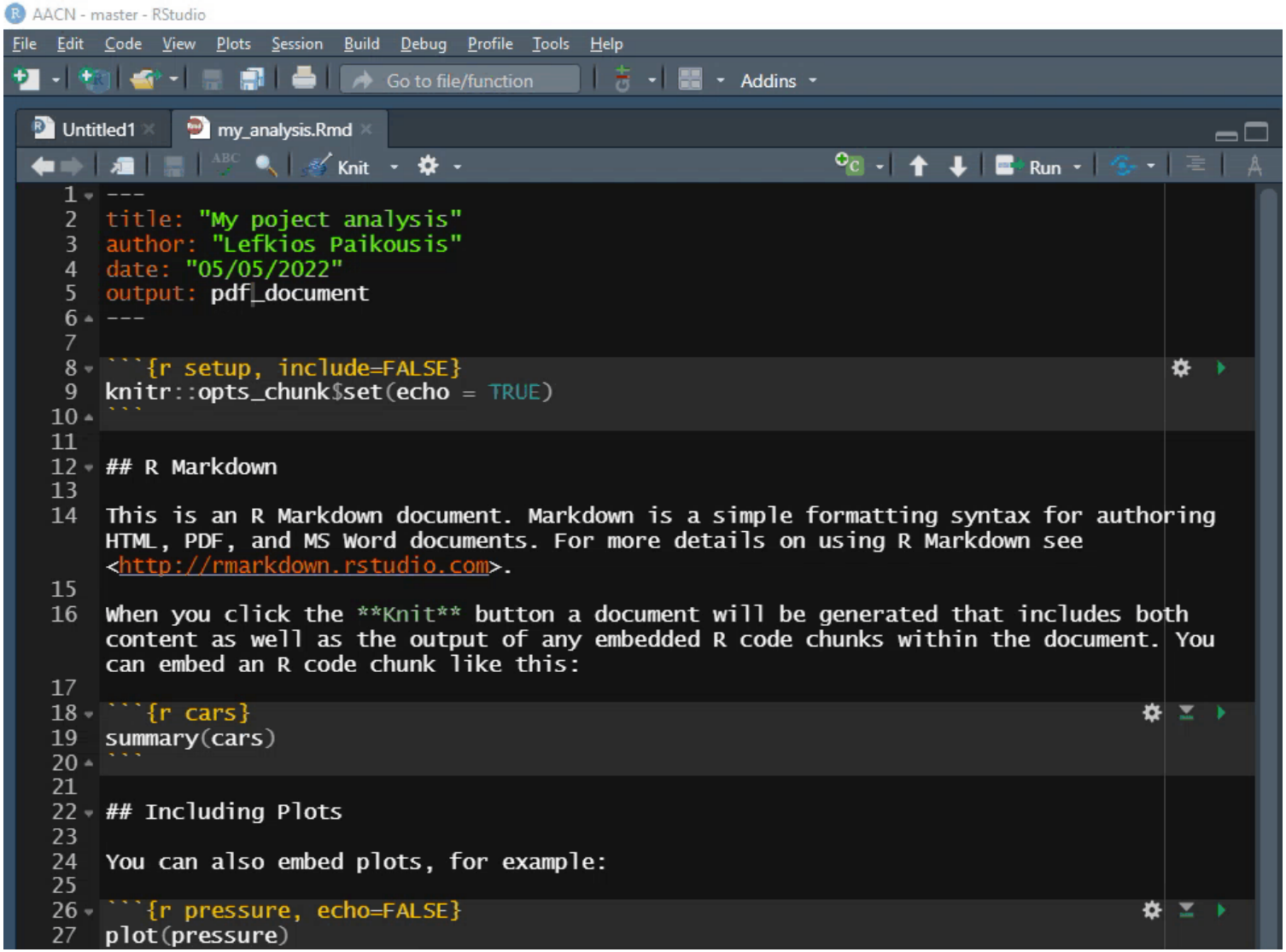
Resources

Websites with Rmarkdown

- Distill for R Markdown
- The Distillery (really usefull)
- Alison hill
- Tom Mock
- Yuzar
- Distill CSS defaults
- Mike Frank
- Showcase of Rmarkdown distill websites

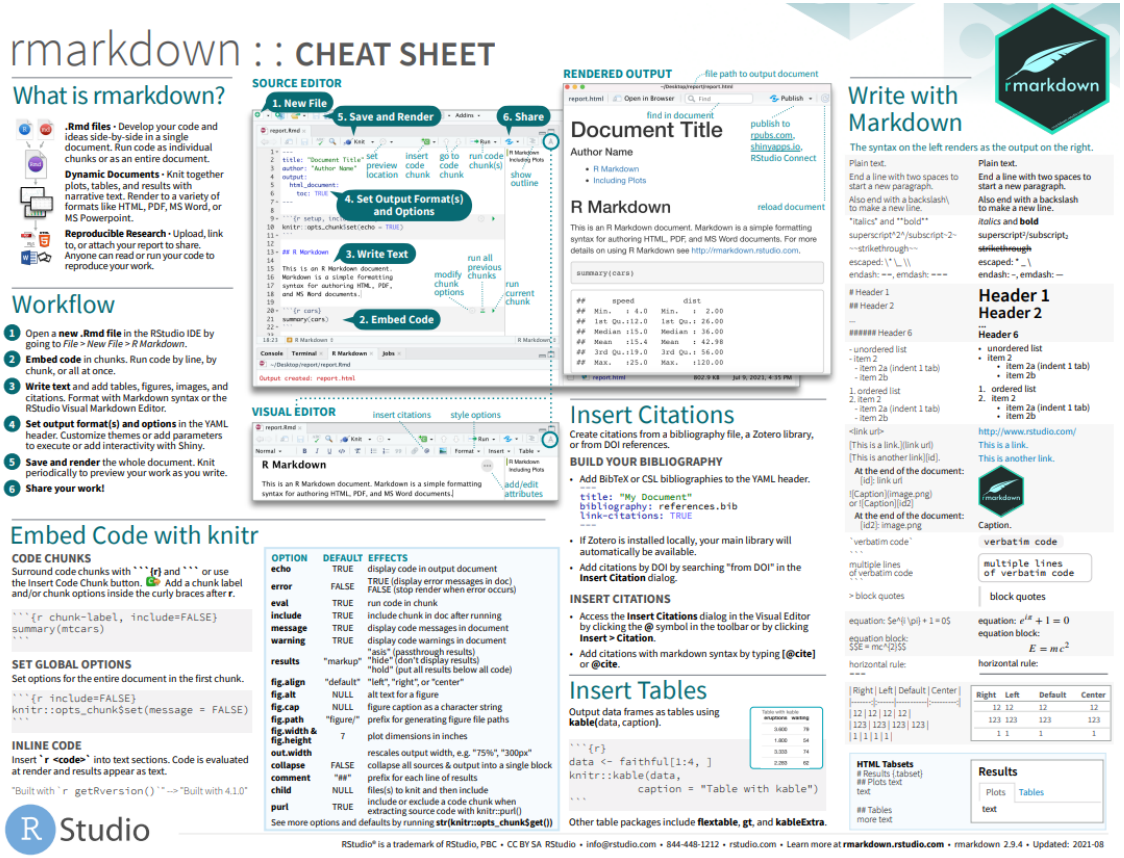
Need more help?

Help > Cheatsheets > R MarkdownCheatSheet



Need more help?

Cheatsheet



Thank you

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You can find the slides at https://github.com/lefkiospaikousis/Conference-May2022