

R Markdown

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BIOF 339

BIOF 339: Practical R

R Markdown basics

A mashup of Markdown and R

- Markdown is a text markup format that was meant to make writing HTML easier
- Convert Markdown to HTML, with simple text markup being converted to HTML code



A mashup of Markdown and R

Add pieces of R code

Fence it inside a *code chunk*

```
Looking at the *penguins* data.  
``{r}  
library(tidyverse)  
library(palmerpenguins)  
  
penguins %>% group_by(species) %>%  
  summarise(across(bill_length_mm:body_mass_g,  
                  ~mean(., na.rm=T)))  
``
```

A mashup of Markdown and R

Add pieces of R code

Fence it inside a *code chunk*

Add options

```
Looking at the *penguins* data.  
``{r, echo=FALSE, message=FALSE, warning=FALSE}  
library(tidyverse)  
library(palmerpenguins)  
  
penguins %>% group_by(species) %>%  
  summarise(across(bill_length_mm:body_mass_g,  
                  ~mean(., na.rm=T)))  
...`
```

A mashup of Markdown and R

Add pieces of R code

Fence it inside a *code chunk*

Add options

Name the chunk

```
Looking at the *penguins* data.  
  
``{r means, echo=FALSE, message=FALSE, warning=FALSE  
library(tidyverse)  
library(palmerpenguins)  
  
penguins %>% group_by(species) %>%  
  summarise(across(bill_length_mm:body_mass_g,  
                  ~mean(., na.rm=T)))  
...`
```

A mashup of Markdown and R

You can set the chunk options for the entire document at the beginning of the document.

```
``{r setup, include=FALSE}  
knitr::opts_chunk()$set(echo = FALSE, eval = TRUE,  
  message=FALSE, warning=FALSE, comment = "")  
``
```

The option `include=FALSE` is equivalent to `echo = FALSE, eval = TRUE, results = 'hide'`

Details of these options are [here](#)

A mashup of Markdown and R

The `rmarkdown` package leverages the `pandoc` universal document converter to allow a R Markdown document to be converted to several different formats, as we'll see later.

To specify this, and some metadata, R Markdown uses a YAML header at the very beginning of the R Markdown document

The YAML section begins and ends with three dashes

```
---  
title: "My report"  
author: "Abhijit"  
date: 'October 03, 2021'  
output: html_document  
---
```

YAML is another kind of structured text format.

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Rich R Markdown Documents

What can you create from R Markdown?

- Documents
 - HTML
 - Microsoft Word
 - PDF (requires [LaTeX](#))
- Presentations
 - HTML ([ioslides](#), [revealjs](#), [xaringan](#))
 - PDF ([beamer](#))
 - PowerPoint

What can you create from R Markdown?

- Interactive documents
 - The `htmlwidgets` meta-package
- Dashboards
 - The `flexdashboard` package
- Books
 - The `bookdown` package
- Websites & Blogs
 - R Markdown
 - `blogdown` package

What can you create from R Markdown?

- Resumes/CVs
 - The [vitae](#) package
- Research papers
 - include citations
 - include appropriate formatting
 - probably need [LaTeX](#)

See the RMarkdown gallery

The basic differences are in the front-matter at the top of your RMarkdown document

HTML document

```
---  
title: "Lectures"  
date: "Fall 2018"  
output: html_document  
---
```

Word document

```
---  
title: "Lectures"  
date: "Fall 2018"  
output: word_document  
---
```

Presentations

ioslides

```
---  
title: "Lecture 2: \nData Frame, Matrix, List"  
author: "Abhijit Dasgupta"  
date: "September 19, 2018"  
output: ioslides_presentation  
---
```

revealjs

```
---  
title: "Lecture 2: \nData Frame, Matrix, List"  
author: "Abhijit Dasgupta"  
date: "September 19, 2018"  
output:  
  revealjs::revealjs_presentation:  
    theme: default  
    highlight: default  
    transition: fade  
    slide_level: 1  
---
```

Slides delimited by markdown sections

```
# Slide 1  
  
This is my first slide  
  
# Slide 2  
  
This is my second slide
```

Presentations

Powerpoint

```
---  
title: "Lecture 2: \nData Frame, Matrix, List"  
author: "Abhijit Dasgupta"  
date: "September 19, 2018"  
output: powerpoint_presentation  
---
```

Slides delimited by markdown sections

```
# Slide 1  
  
This is my first slide  
  
# Slide 2  
  
This is my second slide
```


Presentations

xaringan

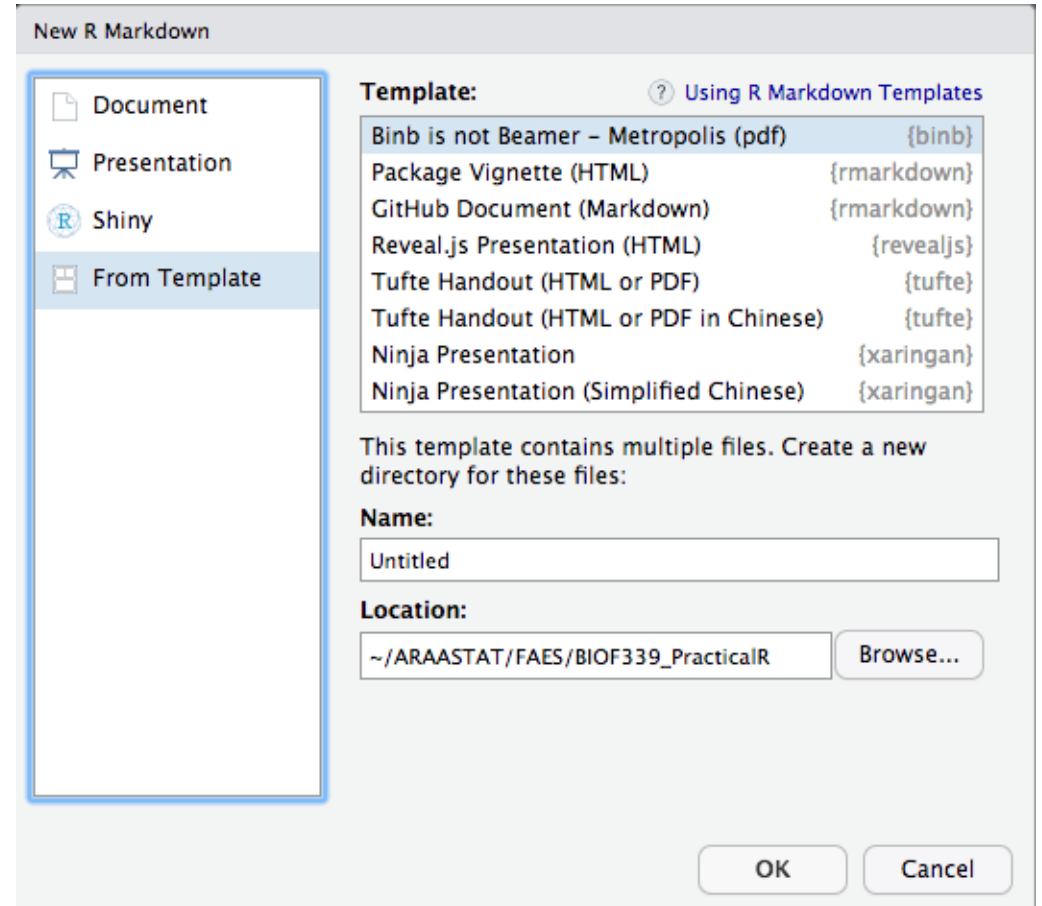
```
---  
title: "Lecture 2: \nData Frame, Matrix, List"  
author: "Abhijit Dasgupta"  
date: "September 19, 2018"  
output:  
  xaringan::moon_reader:  
    css: [default, './robot.css', './robot-fonts.css]  
    #css: [default, metropolis, metropolis-fonts]  
    nature:  
      ratio: '16:9'  
      highlightLanguage: R  
      countIncrementalSlides: false  
      highlightStyle: zenburn  
      highlightLines: true  
---
```

Slides delimited by ---

```
---  
# Slide 1  
This is my first slide  
---  
# Slide 2  
This is my second slide
```

R Markdown Templates

- Several packages provide RMarkdown templates
- You can include citations
 - EndNote, MEDLINE, RIS, BibTeX formats for references
 - See https://rmarkdown.rstudio.com/authoring_bibliographies_and_citations.html



You can even use other coding languages in R Markdown!!

The [knitr](#) package allows for [many](#) other computer languages to be run within a R Markdown document.

Of particular note are Python and Julia, which can be interfaced from R using the [reticulate](#) and [JuliaCall](#) packages, respectively

This is an example of a Python manual written using R Markdown



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Creating documents from R scripts

Creating documents from R scripts

A typical R workflow is to do your analyses using R scripts (.R) and then, at the end, copy-and-paste code to create a R Markdown file for reporting.

This is actually not necessary

You can actually create R Markdown-based documents **directly from R scripts**

This is done using `rmarkdown::render` applied to a R script formatted in a particular way, as we will see.

This can also be done in RStudio using the shortcut Ctrl/Cmd-Shift-K or the small binder icon.

Creating documents from R scripts

```
library(palmerpenguins)  
library(tidyverse)  
library(janitor)  
  
tabyl(penguins, species)
```

```
species  n  percent  
Adelie  152 0.4418605  
Chinstrap 68 0.1976744  
Gentoo  124 0.3604651
```

Creating documents from R scripts

```
#' # Exploring the penguins dataset
#'#' The following is relative frequencies of the diff

library(palmerpenguins)
library(tidyverse)
library(janitor)

tabyl(penguins, species)
```



You write lines starting with `#'`, i.e, hash and then single-quote

These are interpreted as Markdown lines

Creating documents from R scripts

```
#' # Exploring the penguins dataset
#'#' The following is relative frequencies of the diff
#+ message=FALSE, warning=FALSE

library(palmerpenguins)
library(tidyverse)
library(janitor)

tabyl(penguins, species)
```



You can then add code chunk options by starting a line with `#+`.

Creating documents from R scripts

```
#' # Exploring the penguins dataset
#'#' The following is relative frequencies of the diff
#+ message=FALSE, warning=FALSE

library(palmerpenguins)
library(tidyverse)
library(janitor)

tabyl(penguins, species) %>%
  adorn_pct_formatting() %>%
  knitr::kable()
```



Format the output for HTML

Creating documents from R scripts

```
#' ---  
#' title: Exploring penguins  
#' author: Abhijit  
#' date: "`r format(Sys.Date(), '%B %d, %Y')`"  
#' output:  
#'   html_document:  
#'     theme: cerulean  
#' ---  
#'  
#' # Exploring the penguins dataset  
#'  
#' The following is relative frequencies of the diff  
#+ message=FALSE, warning=FALSE  
  
library(palmerpenguins)  
library(tidyverse)  
library(janitor)  
  
tabyl(penguins, species) %>%  
  adorn_pct_formatting() %>%  
  knitr::kable()
```



Add header information, starting lines with `#'`, since these lines need to be text in the corresponding Rmd file

Creating documents from R scripts

```
#' ---  
#' title: Exploring penguins  
#' author: Abhijit  
#' date: "`r format(Sys.Date(), '%B %d, %Y')`"  
#' output:  
#'   html_document:  
#'     theme: cerulean  
#' ---  
#'  
#' # Exploring the penguins dataset  
#'  
#' The following is relative frequencies of the different species  
#+ message=FALSE, warning=FALSE, echo=FALSE  
  
library(palmerpenguins)  
library(tidyverse)  
library(janitor)  
  
tabyl(penguins, species) %>%  
  adorn_pct_formatting() %>%  
  knitr::kable()
```



Remove code to clean up HTML

Creating documents from R scripts

Resources

