R Markdown

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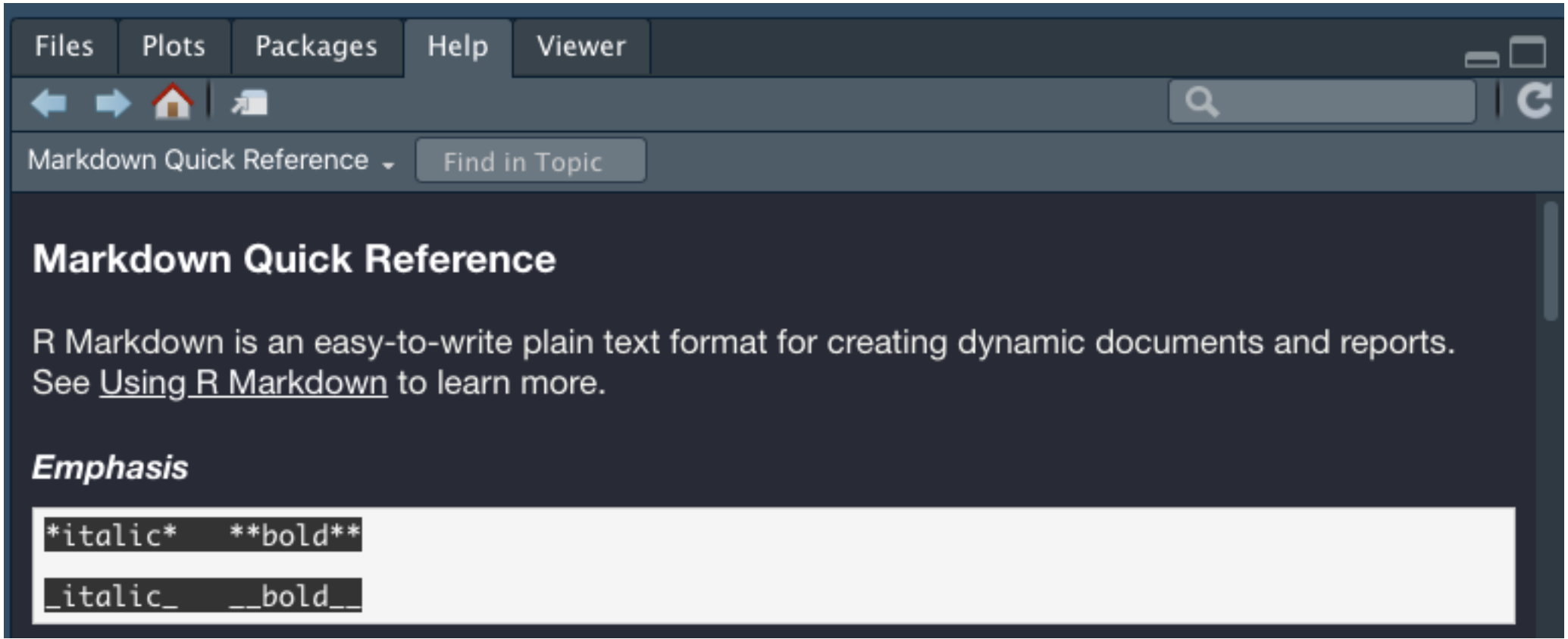
BIOF 339

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: 'November 25, 2020'
output: html_document
---
```

YAML is another kind of structured text format.

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

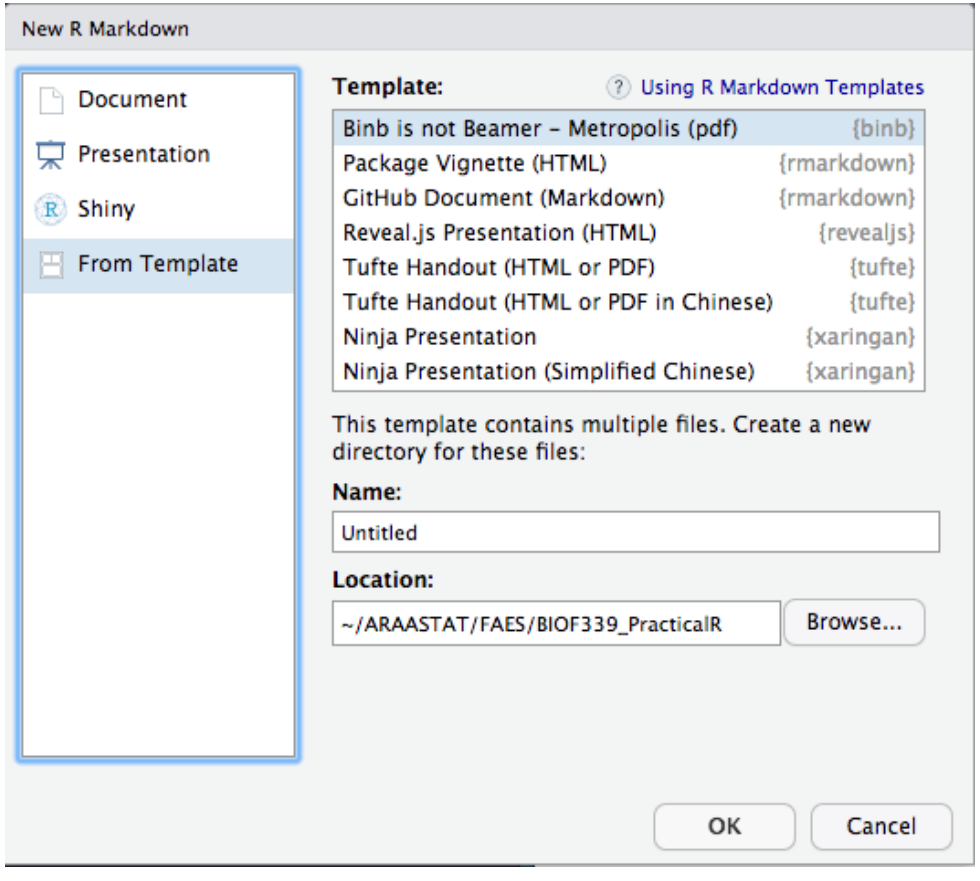
```
---
title: "Lecture 2: \nData Frame, Matrix, List"
author: "Abhijit Dasgupta"
date: "September 19, 2018"
output:
  xaringan::moon_reader:
    css: [default, './robot.css', './robot-fonts.css'
    #css: [default, metropolis, metropolis-fonts]
    nature:
      ratio: '16:9'
      highlightLanguage: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

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)
```

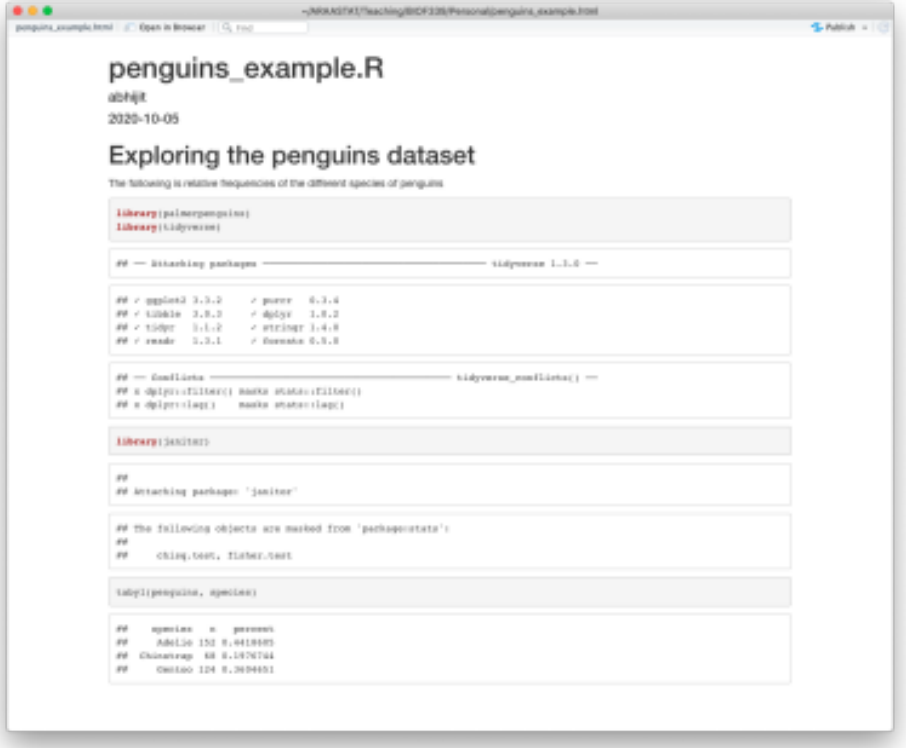
```
   species   n   percent
    Adelie 152 0.4418605
 Chinstrap  68 0.1976744
    Gentoo 124 0.3604651
```

Creating documents from R scripts

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

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

tabyl(penguins, species)
```

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

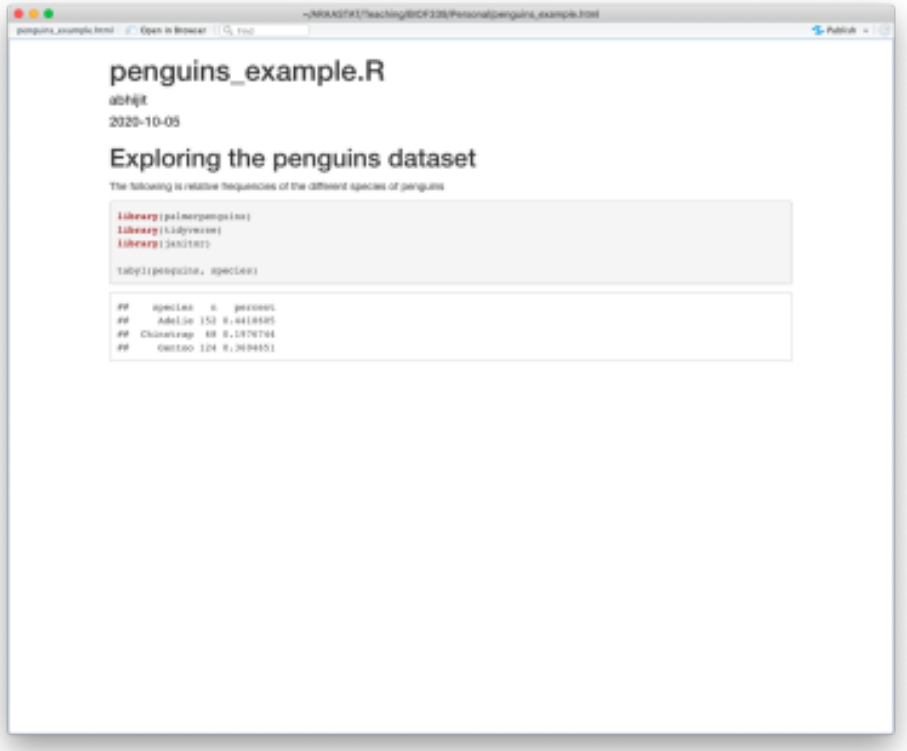
These are interpreted as Markdown lines



Creating documents from R scripts

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

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

tabyl(penguins, species)
```

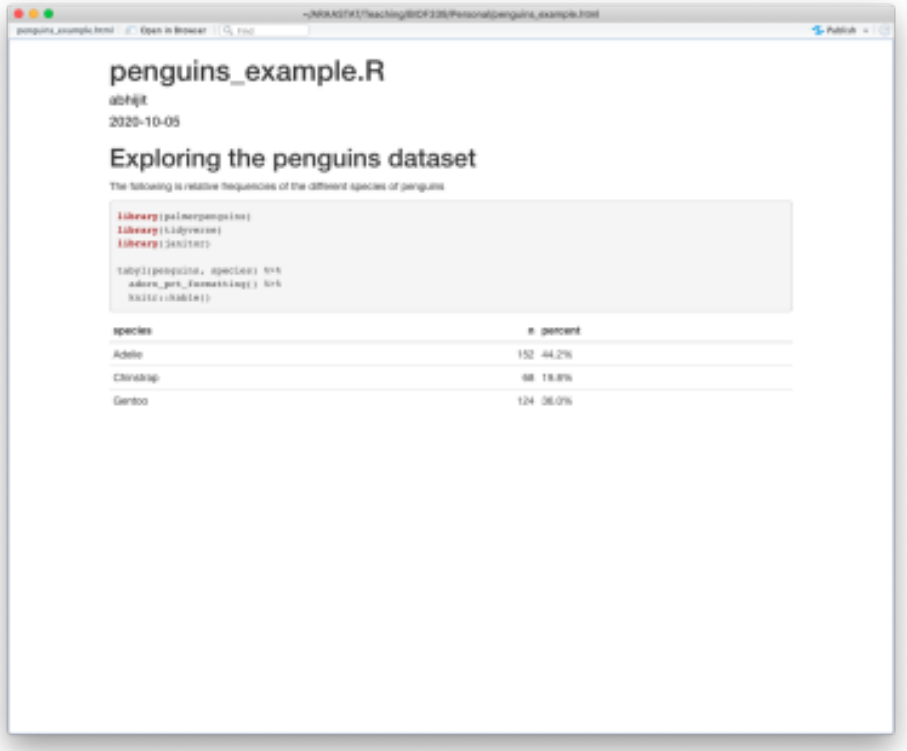
You can then add code chunk options by starting a line with #+.



Creating documents from R scripts

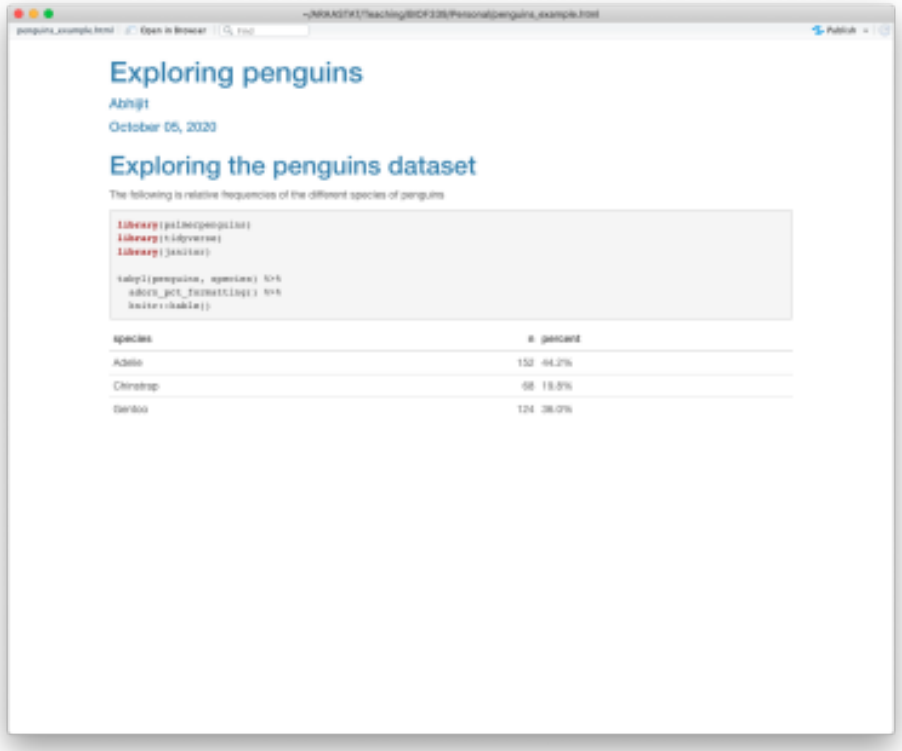
```
#' # Exploring the penguins dataset
#'
#' The following is relative frequencies of the diffe
#+ message=FALSE, warning=FALSE

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

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

Format the output for HTML



Creating documents from R scripts

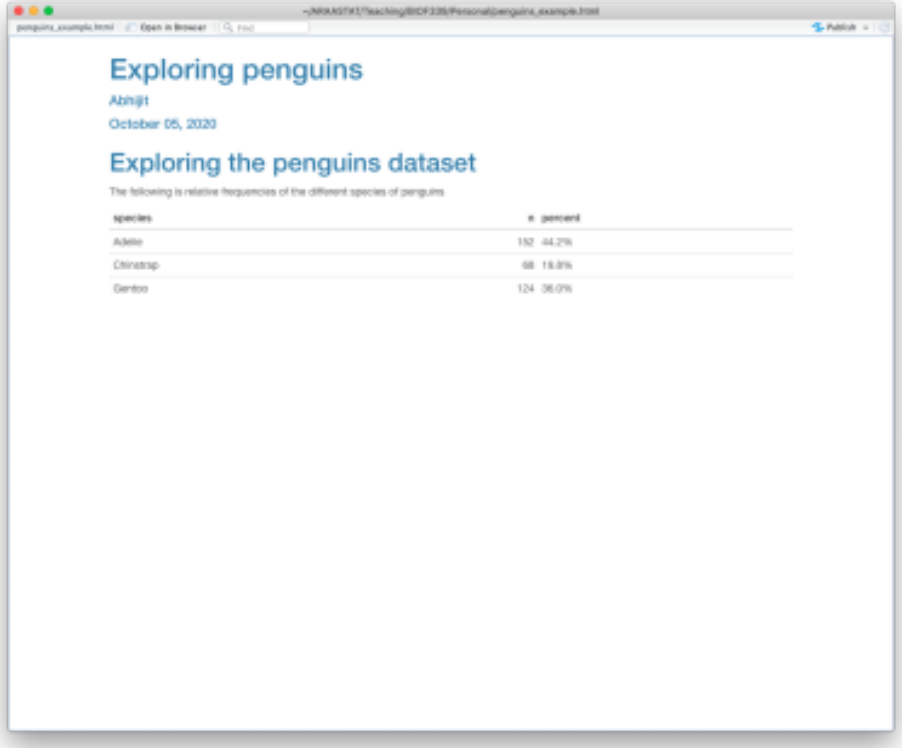
```
#' ---
#' title: Exploring penguins
#' author: Abhijit
#' date: "`r format(Sys.Date(), '%B %d, %Y')`"
#' output:
#'     html_document:
#'         theme: cerulean
#' ---
#'
#' # Exploring the penguins dataset
#'
#' The following is relative frequencies of the diffe
#+ message=FALSE, warning=FALSE

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 diffe
#+ 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