Introduction

Critical thinking with data

MATH1062

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1 About

> **!** Important
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1.1 Quarto

A **technical writing** system that produces *reproducible*, *versioned*, and *extensible* documents – the next generation of **R Markdown**.

1.2 Features (HTML)

Follows the **University of Sydney** brand guidelines.

- **Logos** - Primary logo on the title slide (black), and secondary horizontal logo on all other slides.
- **Fonts** - *Source Sans Pro*, otherwise, *Times New Roman* (official alternate fonts to *Apercu Pro* and *Lyon Display*).
- **Colours** - Uses the official University of Sydney colours **Ochre**, **Charcoal**, **Heritage Rose**, **Jacaranda** and **Eucalypt**.

Renders to multiple formats with `quarto render`:

- **HTML** in reveal.js format
- **PDF** via LaTeX
- **MS Powerpoint** via Pandoc (TODO)

1.3 PDF output is not 1:1

The default PDF render is not 1:1 with the HTML output. To handle this, you can the following:

1. You **must** have Chrome, or a Chromium-based browser installed.
2. Open the HTML output in Chrome.
3. Press the `E` key to enter print mode.
4. Print to PDF using `ctrl` + `p` (Windows) or `cmd` + `p` (macOS).

2 Quick start

2.1 Installing Quarto

Quarto is available for Windows, macOS, and Linux. See installation instructions.

2.1.1 Recommendation

Visual Studio Code is recommended as the editor for Quarto. It is free, open-source, and has a lot of extensions that can be used to enhance the writing experience.

2.1.2 However...

Users familiar with RStudio can also use it to write Quarto documents. See here for more information.

2.2 Installing this template

There are three (3) ways:

2.2.1 1. Recommended: Use the Quarto CLI

With the **Quarto CLI** installed, run the following command in your terminal and follow the instructions:

```
quarto use template usyd-soles-edu/soles-revealjs
```

2.2.2 2. Download the template directly

You can download the template folder directly from GitHub, ready to use. Go to the repository and click on "< > Code", then "Download ZIP". Once you unzip the folder.

2.2.3 3. Clone the template repository

Go to the repository and click on "Use this template". Note that you will need to be familiar with Git and GitHub to use this method.

2.3 Editing the template

All written content is in the `template.qmd` file. You may rename this file to whatever you like.

2.3.1 HTML output

Slides that are generated from this template are in HTML format. You can view the slides by opening the `.html` file in your browser. This file is generated in the same folder as the `.qmd` file.

2.3.2 Options

Edit the `_quarto.yml` file to override the default options. For example, you can enable or disable the table of contents, change the theme, and more. You will need to know about Quarto project basicsto do this.

2.4 Markdown

2.4.1 Flavour

Quarto uses **Pandoc-flavoured Markdown** for text formatting.

2.4.2 Formatting

Bold and *italic*. `Inline code`. What about a link? And a footnote[1]? We can also use subscript$_{s}$ and superscript^{s}.

2.4.3 Lists

- Lists **must** be preceded by a blank line.
- We can also created nested lists:

  1. This list is ordered.
     - Next item in the list, nested and back to unordered.

3 Advanced features

3.1 Reproducible workflows

The advantage of Quarto over traditional slide software is that it allows code and output to be embedded in the document. This means that you can create a document that is **reproducible** and **versioned**.

For example, the source of this slide is in the `template.qmd` file.

[1]This is a footnote.

3.2 Code example 1

Using R, we show how to fit a linear regression model and print the model summary. Click on the code dropdown to see the code.

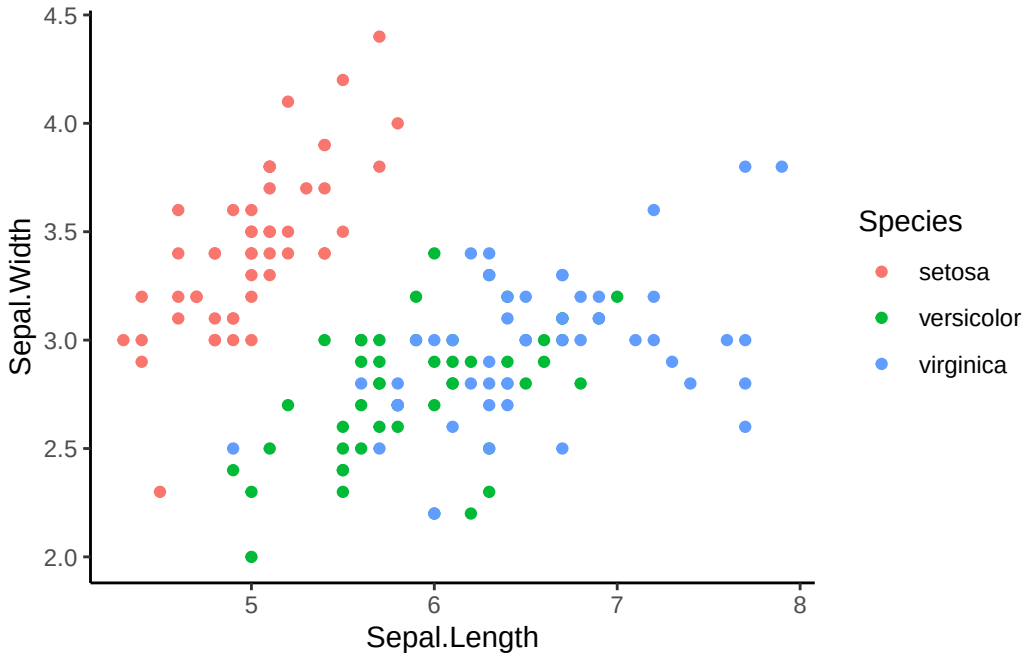
```r
# fit a linear regression model
model <- lm(mpg ~ wt, data = mtcars)
# print the model summary
summary(model)
```

```
Call:
lm(formula = mpg ~ wt, data = mtcars)

Residuals:
    Min      1Q  Median      3Q     Max
-4.5432 -2.3647 -0.1252  1.4096  6.8727

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  37.2851     1.8776  19.858  < 2e-16 ***
wt           -5.3445     0.5591  -9.559 1.29e-10 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.046 on 30 degrees of freedom
Multiple R-squared:  0.7528,    Adjusted R-squared:  0.7446
F-statistic: 91.38 on 1 and 30 DF,  p-value: 1.294e-10
```

3.3 Code example 2

In this example code folding is not activated, allowing viewers to see the code that generates the plot.

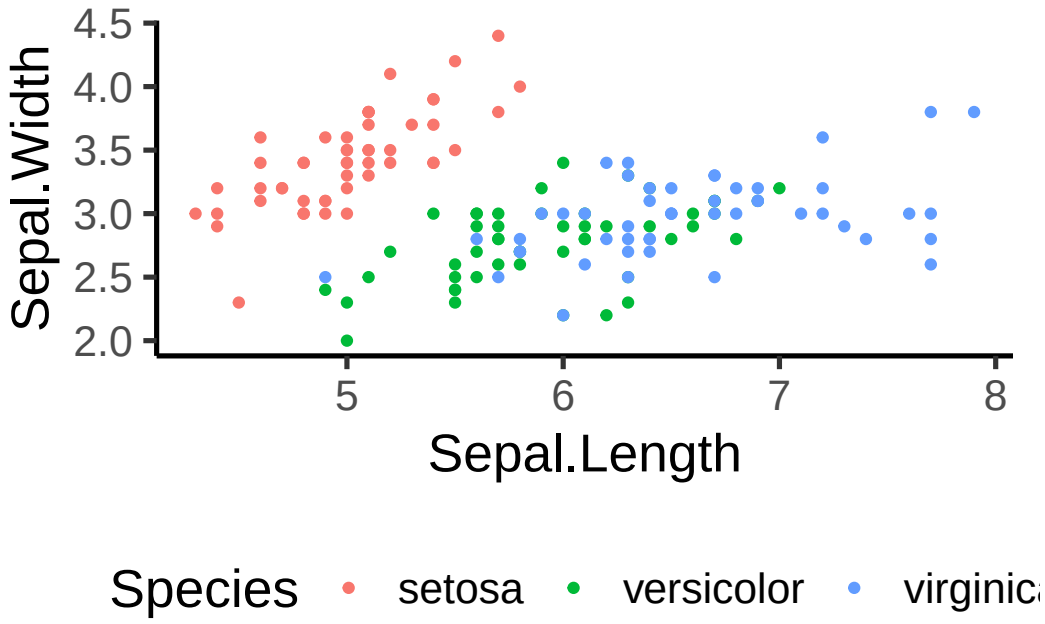
```r
library(ggplot2)
# plot a very nice plot based on iris dataset
ggplot(iris, aes(x = Sepal.Length, y = Sepal.Width, color = Species)) +
    geom_point() +
    theme_classic()
```



3.4 Code example 3

In this example we use the `#| output-location: column` execution option to automatically place the output in a column next to the code. As execution options are not shown in Quartz slides, you will need to view the `.qmd` source of this slide to see how it is implemented.

```
ggplot(iris, aes(x = Sepal.Length,
       y = Sepal.Width, color = Species)) +
    geom_point() +
    theme_classic(base_size = 20) +
    theme(legend.position = "bottom")
```



3.5 Equations

Equations are based on **LaTeX** and powered by **MathJax**.

3.5.1 Inline equations

Inline equations are surrounded by `$`. For example, the equation $y = \beta_0 + \beta_1 x + \epsilon$ is a linear regression model.

3.5.2 Display equations

Display equations are surrounded by `$$`. For example, one way to display the equation for a Fourier series is:

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} \left[a_n \cos\left(\frac{2\pi n x}{L}\right) + b_n \sin\left(\frac{2\pi n x}{L}\right) \right]$$

3.6 Callout blocks

> **Note**
>
> Callout blocks are a way to draw attention to important points. They are rendered in a larger font size in this template.

> **Tip**
>
> Read more about callout blocks in the Quarto documentation.

4 Thanks!

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