A First Course In Statistics

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Contents

Chapter 1

Prerequisites

Welcome to this introductory course in statistics with R! This book will help you get started and will guide you through the material of the course.

The material of this course is based on the **moxier** package. It consists of a series of **learnr** notebooks, (**?**), that will guide through your first steps into the wonderful world of statistics and statistical computing!

1.1 Getting started

Whilst we will dedicate Chapter 2 to the topic of software installation, we here introduce the main tools we will use throughout this course: **R** and **RStudio**.

1.1.1 R

So, what do we talk about when we talk about R? According to the R project website, R is a software environment that includes:

- an effective data handling and storage facility,
- a suite of operators for calculations on arrays, in particular matrices,
- a large, coherent, integrated collection of intermediate tools for data analysis,
- graphical facilities for data analysis and display either on-screen or on hardcopy, and
- a well-developed, simple and effective programming language which includes conditionals, loops, user-defined recursive functions and input and output facilities.

Quite a number of things! We will use this set of tools to dive deep into the principles of statistics and statistical computation.

Another thing that is worth noticing is that **R** is Free Software. It means anybody can contribute to its development. Common tools have emerged to solve problems. **R** can be extended with such tools, which are called *packages* in R parlance, to do all sort of incredible things. Packages are usually stored on CRAN, the Comprehensive R Archive Network, and they range from packages to send emails to machine learning.

1.1.2 RStudio

RStudio is an **R** IDE (Integrated Development Environment). But what does it mean? Basically, it is a set of software that helps you be more productive: it allows you to quickly manage files, see what variables you have defined and a vast number of other things. This book and the **moxier** package have been developed from within **RStudio**. We will see in a minute how to install it!

1.2 Some useful links

If you are interesting in learning more about **R** as a programming language, you can find many resources on the Internet. Some nice books are **Hands-On Programming with R**, (Grolemund, 2014) to get started and **Advanced R** (Wickham, 2019) to dive deep into the features of the language.

1.3 Licence

The **moxier** package is subject to the GPL-3 licence. For more information, visit https://mascaretti.github.io/moxier/.

Chapter 2

Introduction

You can label chapter and section titles using `{#label}` after them, e.g., we can reference Chapter 2. If you do not manually label them, there will be automatic labels anyway, e.g., Chapter 4.

Figures and tables with captions will be placed in `figure` and `table` environments, respectively.

```
par(mar = c(4, 4, .1, .1))
plot(pressure, type = 'b', pch = 19)
```

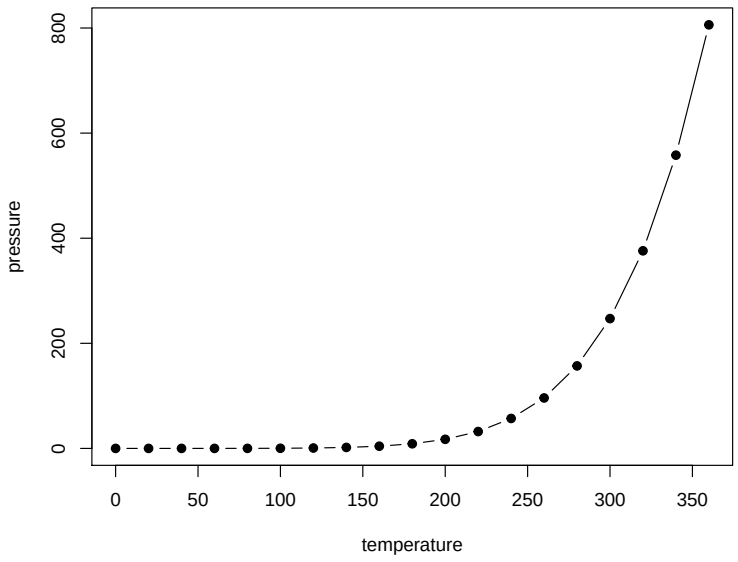

Figure 2.1: Here is a nice figure!

Table 2.1: Here is a nice table!

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3.0	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5.0	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa
4.6	3.4	1.4	0.3	setosa
5.0	3.4	1.5	0.2	setosa
4.4	2.9	1.4	0.2	setosa
4.9	3.1	1.5	0.1	setosa
5.4	3.7	1.5	0.2	setosa
4.8	3.4	1.6	0.2	setosa
4.8	3.0	1.4	0.1	setosa
4.3	3.0	1.1	0.1	setosa
5.8	4.0	1.2	0.2	setosa
5.7	4.4	1.5	0.4	setosa
5.4	3.9	1.3	0.4	setosa
5.1	3.5	1.4	0.3	setosa
5.7	3.8	1.7	0.3	setosa
5.1	3.8	1.5	0.3	setosa

Reference a figure by its code chunk label with the `fig:` prefix, e.g., see Figure 2.1. Similarly, you can reference tables generated from `knitr::kable()`, e.g., see Table 2.1.

```
knitr::kable(
  head(iris, 20), caption = 'Here is a nice table!',
  booktabs = TRUE
)
```

You can write citations, too. For example, we are using the **bookdown** package (Xie, 2020) in this sample book, which was built on top of R Markdown and **knitr** (Xie, 2015).

Chapter 3

Literature

Here is a review of existing methods.

Chapter 4

Methods

We describe our methods in this chapter.

Chapter 5

Applications

Some *significant* applications are demonstrated in this chapter.

5.1 Example one

5.2 Example two

Chapter 6

Final Words

We have finished a nice book.

Bibliography

Grolemund, G. (2014). *Hands-On Programming with R.* O'Reilly. ISBN 978-1449359010.

Wickham, H. (2019). *Advance R.* Chapman and Hall/CRC, Boca Raton, Florida, 2nd edition. ISBN 978-0815384571.

Xie, Y. (2015). *Dynamic Documents with R and knitr.* Chapman and Hall/CRC, Boca Raton, Florida, 2nd edition. ISBN 978-1498716963.

Xie, Y. (2020). *bookdown: Authoring Books and Technical Documents with R Markdown.* R package version 0.17.2.