Exploratory spatial data analysis with GeoDa

Spatial Data Analysis Center

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Introduction

This is bookdown we seek to find effective ways for translating philosophy of science and history of science to improve the practice of computational social science research and teaching. As computational thinking and data engineering have been gaining prominence in our fields of economics, public policy and geography to help analyze larger and more complex data, we increasingly see the need to re-introduce and translate scientific reasoning, theory building, and research design to this new context to avoid descriptive, expected and unreliable results.

It is a *sample* book written in **Markdown**. You can use anything that Pandoc's Markdown supports, e.g., a math equation.

The **bookdown** package can be installed from CRAN or Github:

```
install.packages("bookdown")
# or the development version
# devtools::install_github("rstudio/bookdown")
```

Remember each Rmd file contains one and only one chapter, and a chapter is defined by the first-level heading `#`.

To compile this example to PDF, you need XeLaTeX. You are recommended to install TinyTeX (which includes XeLaTeX): https://yihui.name/tinytex/.

Chapter 1

Introduction

With this proposal, we seek to find effective ways for translating philosophy of science and history of science to improve the practice of computational social science research and teaching. As computational thinking and data engineering have been gaining prominence in our fields of economics, public policy and geography to help analyze larger and more complex data, we increasingly see the need to re-introduce and translate scientific reasoning, theory building, and research design to this new context to avoid descriptive, expected and unreliable results.

You can label chapter and section titles using `{#label}` after them, e.g., we can reference Chapter 1. If you do not manually label them, there will be automatic labels anyway, e.g., Chapter **??**.

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)
```

Reference a figure by its code chunk label with the `fig:` prefix, e.g., see Figure 1.1. Similarly, you can reference tables generated from `knitr::kable()`, e.g., see Table 1.1.

```
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).

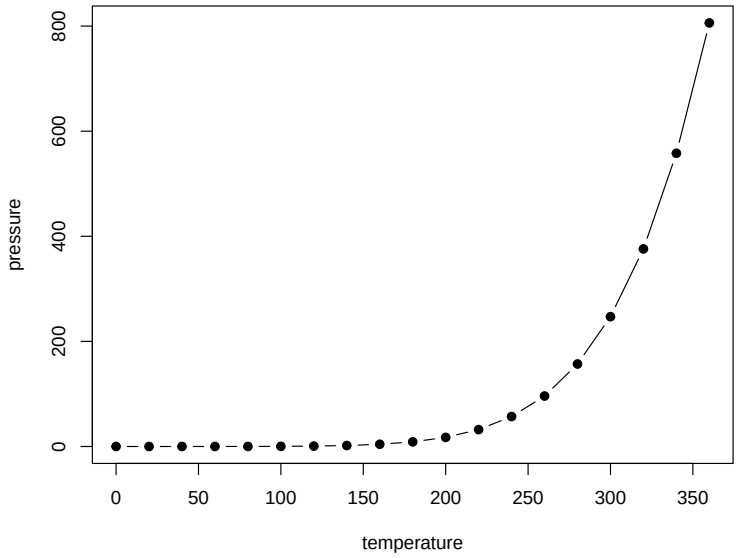

Figure 1.1: Here is a nice figure!

Table 1.1: 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

Chapter 2

The Problem

Without computational expertise and horsepower, quantitative data cannot be analyzed at scale in the social sciences. As a team of social science faculty and executive directors at UChicago who are relying on (spatial) statistical and computational analysis of data in our teaching and research, we embrace the analysis of bigger data and more powerful computation. However, a challenge we have been observing in this context is that computational and statistical tools often embody ways of reasoning that are not explicitly thought about – or sometimes there is a direct assumption that an engineering mode of reasoning applies to all problems. Assumptions that big data and computation are replacing the need for scientific reasoning and philosophy of science altogether are a purist example – such as (Anderson, 2008) argument for "the end of theory and the scientific method in the age of big data." Other examples include the push to "let the data speak for themselves," as embodied in some automated data analysis cases (Demiralp et a. 2017) or approaches that are primarily data-driven and atheoretical.

Bibliography

Anderson, C. (2008). The end of theory: The data deluge makes the scientific method obsolete. *Wired magazine*, 16(7):16–07.

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 0.20.6.