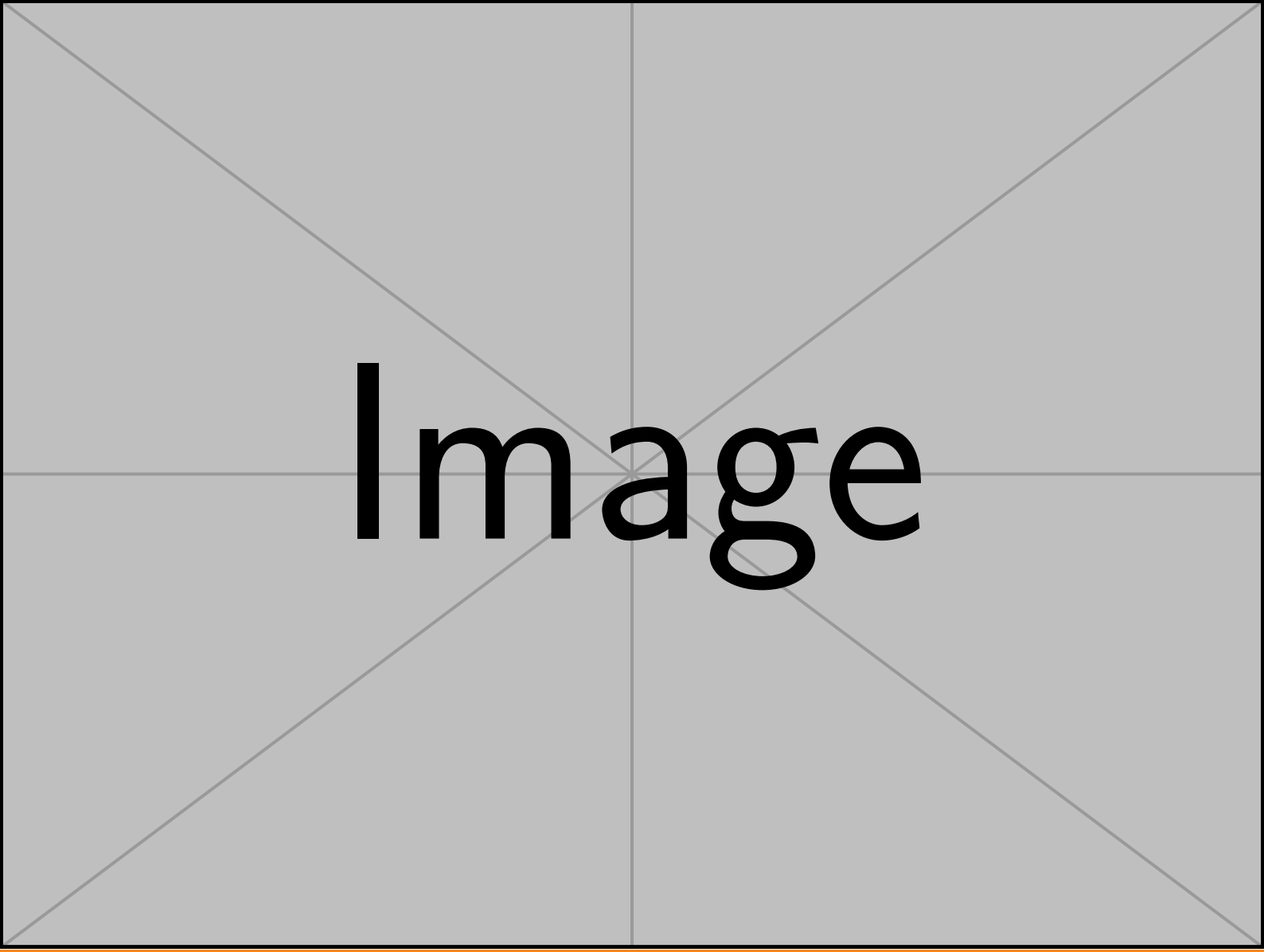

Elegant Bookdown Template

优雅的 Bookdown 书籍模版

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组织：ElegantLaTeX Program

时间：2020-03-21

版本：3.10

自定义：信息

Victory won't come to us unless we go to it. — M. Moore

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第一章 欢迎

> A Markdown-formatted document should be publishable as-is, as plain text, without looking like it's been marked up with tags or formatting instructions.
>
> — John Gruber

这是一份 R Markodwn 文档。Markdown 提供一种简洁的格式语法，支持数学公式 $\boldsymbol{\alpha}$（粗体）和 α（正常），用来生成 HTML、PDF 和 MS Word 文档。

当你点击 **Knit** 按钮时，就会生成一份包含正文和代码执行结果的文档。你可以像这样嵌入 R 代码块：

```
summary(cars)
```

```
##      speed           dist
##  Min.   : 4.0   Min.   :  2.00
##  1st Qu.:12.0   1st Qu.: 26.00
##  Median :15.0   Median : 36.00
##  Mean   :15.4   Mean   : 42.98
##  3rd Qu.:19.0   3rd Qu.: 56.00
##  Max.   :25.0   Max.   :120.00
```

1.1 运行环境

```
xfun::session_info(c("rmarkdown", "bookdown", "knitr"), dependencies = FALSE)
```

```
## R version 3.6.2 (2017-01-27)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 16.04.6 LTS
##
## Locale:
##   LC_CTYPE=en_US.UTF-8       LC_NUMERIC=C
##   LC_TIME=en_US.UTF-8        LC_COLLATE=en_US.UTF-8
##   LC_MONETARY=en_US.UTF-8    LC_MESSAGES=en_US.UTF-8
##   LC_PAPER=en_US.UTF-8       LC_NAME=C
```

```
##   LC_ADDRESS=C               LC_TELEPHONE=C
##   LC_MEASUREMENT=en_US.UTF-8 LC_IDENTIFICATION=C
##
## Package version:
##   bookdown_0.18 knitr_1.28    rmarkdown_2.1
##
## Pandoc version: 2.9.2
```

```
ruler()
```

```
----+----1----+----2----+----3----+----4----+----5----+----6----+----
12345678901234567890123456789012345678901234567890123456789012345678
```

1.2 Pandoc

Pandoc 自诞生以来已历 15 个春秋，Github 星级 18.5k，而日常使用的 Hive 不过区区 3k。Pandoc 现已被各大 Linux 发行版（如 CentOS/Ubuntu 等）收录。下面给出一个使用 Pandoc 的简单例子

```
echo "hello, world!" > note.md
pandoc note.md -s -o note.tex # markdown 文本转化为 tex 文本
pandoc note.md -o note.pdf    # markdown 文本转化为 pdf 文档
pandoc note.md -o note.html   # markdown 文本转化为 html 文档
```

Pandoc 支持数十种文档输出格式，更多命令参数说明见 https://pandoc.org/MANUAL.html。可不可以不要 R，也不要 R Markdown 呢？当然可以，详见 https://github.com/annProg/PanBook，基于 Pandoc's Markdown 实现一次写作，多样输出！

1.3 各类 Block

引理 1.1

For any two random variables X_1, X_2, they both have the same probability distribution if and only if

$$\varphi_{X_1}(t) = \varphi_{X_2}(t)$$

♡

定理 1.1

If $X_1, \ldots, X_n$ are independent random variables, and $a_1, \ldots, a_n$ are some constants, then the characteristic function of the linear combination $S_n = \sum_{i=1}^n a_i X_i$ is

$$\varphi_{S_n}(t) = \prod_{i=1}^n \varphi_{X_i}(a_i t) = \varphi_{X_1}(a_1 t) \cdots \varphi_{X_n}(a_n t)$$

♡

命题 1.1

The distribution of the sum of independent Poisson random variables $X_i \sim \text{Pois}(\lambda_i)$, $i = 1, 2, \cdots, n$ is $\text{Pois}(\sum_{i=1}^n \lambda_i)$.

♠

证明 The characteristic function of $X \sim \text{Pois}(\lambda)$ is $\varphi_X(t) = e^{\lambda(e^{it}-1)}$. Let $P_n = \sum_{i=1}^n X_i$. We know from Theorem 1.3 that

$$\begin{aligned}\varphi_{P_n}(t) &= \prod_{i=1}^n \varphi_{X_i}(t) \\ &= \prod_{i=1}^n e^{\lambda_i(e^{it}-1)} \\ &= e^{\sum_{i=1}^n \lambda_i(e^{it}-1)}\end{aligned}$$

This is the characteristic function of a Poisson random variable with the parameter $\lambda = \sum_{i=1}^n \lambda_i$. From Lemma 1.3, we know the distribution of P_n is $\text{Pois}(\sum_{i=1}^n \lambda_i)$.

注 In some cases, it is very convenient and easy to figure out the distribution of the sum of independent random variables using characteristic functions.

推论 1.1

The characteristic function of the sum of two independent random variables X_1 and X_2 is the product of characteristic functions of X_1 and X_2, i.e.,

$$\varphi_{X_1+X_2}(t) = \varphi_{X_1}(t)\varphi_{X_2}(t)$$

♡

✍ **练习 1.1Characteristic Function of the Sample Mean** Let $\bar{X} = \sum_{i=1}^n \frac{1}{n} X_i$ be the sample mean of n independent and identically distributed random variables, each with characteristic function φ_X. Compute the characteristic function of $\bar{X}$.

解 Applying Theorem 1.3, we have

$$\varphi_{\bar{X}}(t) = \prod_{i=1}^n \varphi_{X_i}\left(\frac{t}{n}\right) = \left[\varphi_X\left(\frac{t}{n}\right)\right]^n.$$

TODO: 要做的还有很多

警告

这是警告

提示

这是提示

注意

这是注意

普通说明

第二章 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)
```

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
)
```

表 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

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
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

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).

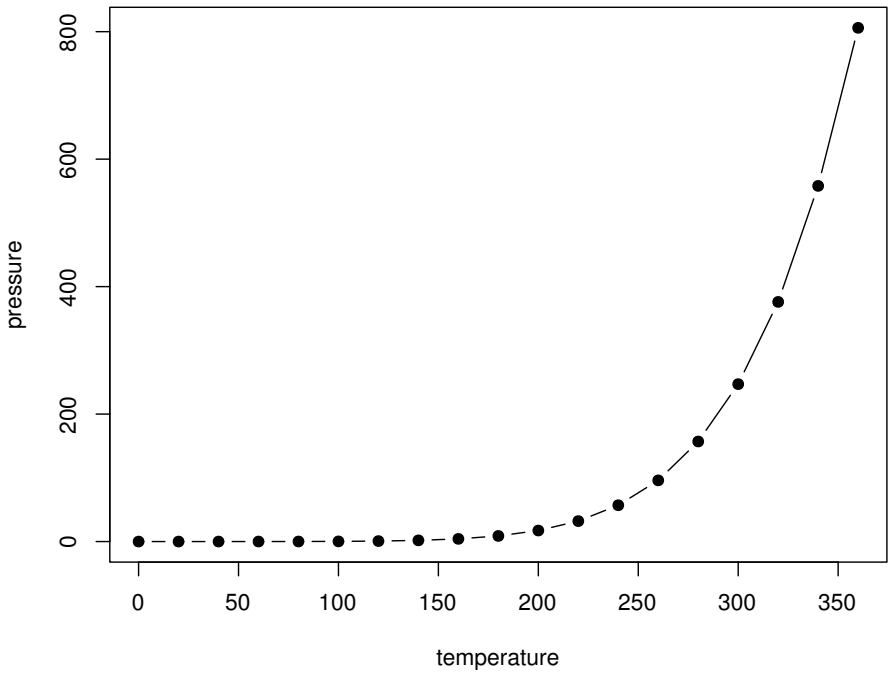

图 2.1: Here is a nice figure!

第三章 Literature

Here is a review of existing methods.

第四章 Methods

We describe our methods in this chapter.

第五章 Applications

Some *significant* applications are demonstrated in this chapter.

5.1 Example one

5.2 Example two

第六章 Final Words

We have finished a nice book.

参考文献

Xie, Yihui. 2015. *Dynamic Documents with R and Knitr*. 2nd ed. Boca Raton, Florida: Chapman; Hall/CRC. http://yihui.name/knitr/.

———. 2020. *Bookdown: Authoring Books and Technical Documents with R Markdown*. https://CRAN.R-project.org/package=bookdown.