

30^a Semana de Estudos da Biologia

Introdução à linguagem R: manipulação e visualização de dados

1 Linguagem R, aplicações e material

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xaringan [presentation ninja]

23/10/2019



1 R, aplicações e material

Tópicos

1.1 Linguagem R

1.2 Linguagem R vs software RStudio

1.3 Aplicações da linguagem R

1.4 Apostilas, livros e sites

1.1 Linguagem R

Todos conhecem o R e o RStudio?



1.1 Linguagem R

Definições

O R é uma **linguagem de programação** voltada para a resolução de **problemas estatísticos** e para a **visualização gráfica** de dados (**Prof. Marcelo Perlin**)

O R é uma **linguagem de programação**, distribuído como um software livre e grátis (*free software*), direcionada ao **manejo, análise e visualização de dados**, com diversas **expansões** (*pacotes*) para o uso de **dados com formatos específicos** (**Maurício Vancine**)

O [Manual do R](#)¹ define o R como um **ambiente de programação**, com um conjunto integrado de ferramentas para **manipulação de dados, cálculos e apresentação gráfica** (**Venables et al. 2019**)

[1] [Venables et al. 2019](#)

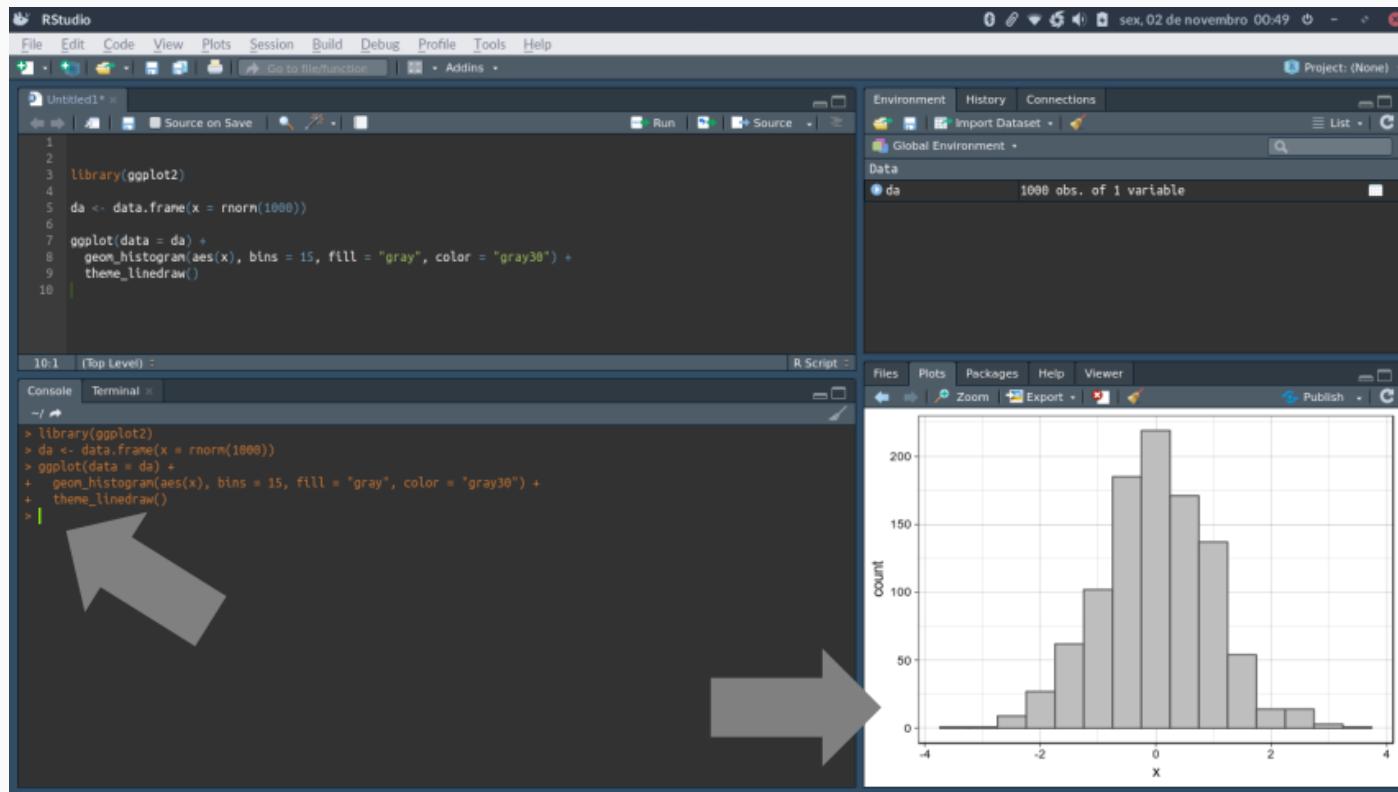
1.1 Linguagem R

O que é uma linguagem de programação?



1.1 Linguagem R

Funcionamento do R



1.1 Linguagem R

E por que usar o R?

1. É **grátis!**
2. Implementação de **rotinas** (repetir várias operações)!
3. Faz **gráficos** sensacionais!
4. Atualmente é a **principal linguagem** utilizada para análises de dados em Ecologia



E de onde surgiu o R?

1.1 Linguagem R

Histórico - Linguagem S

John M. Chambers (Universidade de Stanford, CA, EUA)

- Old S (1976-1987)
 - New S (1988-1997)
 - S4 (1998)
-
- Interface: S-PLUS (1988-2008)



1.1 Linguagem R

Histórico - Linguagem R

Robert Gentleman e Ross Ihaka (Universidade de Auckland, NZ)

- Desenvolvimento (1997-2000)
- Versão 1 (2000-2004)
- Versão 2 (2004-2013)
- Versão 3 (2013-atual)
- Interface: RStudio (2011-atual)
- Atualmente: **R Core Team**



[<http://vita.had.co.nz/papers/r-s.pdf>]

Não confundam a **Linguagem R** com o
software **RStudio**

1.2 R vs RStudio

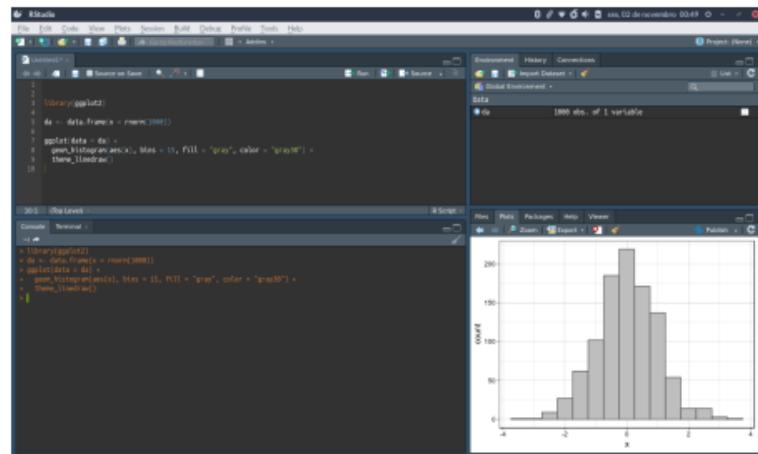
**Linguagem de
programação**



Robert Gentleman e Ross Ihaka

<https://www.r-project.org>

**Software
RStudio**



<https://www.rstudio.com>

E o que o R pode fazer?

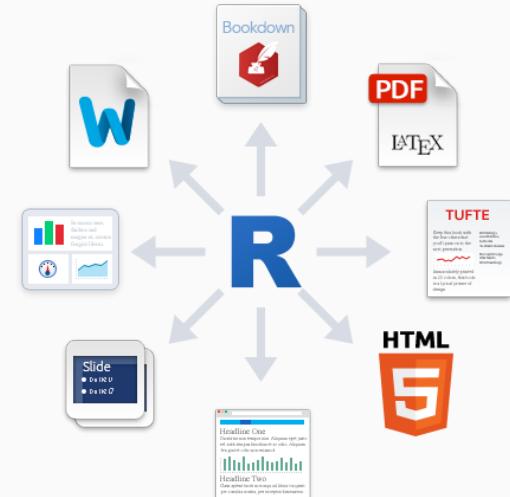
1.3 Aplicações da linguagem R

Análises e Visualização

- Estatísticas univariadas e multivariadas
- Análises de dados ecológicos (população, comunidades e ecossistemas)
- Análise de dados espaciais, temporais e sonoros
- Análise de dados funcionais, genéticos e filogenéticos
- Análise de dados geoespaciais, sensoriamento remoto
- Visualização de todos os dados anteriores
- Data Science

R Markdown

- Textos em HTML, PDF, Word, ODT, Markdown
- Apresentação de slides
- Websites e Blogs
- Livros
- Artigos para publicação
- Shiny



E onde estudar?

Há material, muito material disponível...

1.4 Apostilas, sites e livros

Apostilas

Apostila de introdução ao R

Prof. Victor Landeiro



[*] <https://sites.google.com/site/vllandeoror/>

1.4 Apostilas, sites e livros

Apostilas

Introdução ao uso do software R para as Ciências Biológicas

Prof. Marcos Vital



[*] <https://cantinhodor.wordpress.com/2015/03/28/a-boa-e-velha-apostila-basica-do-r/>

1.4 Apostilas, sites e livros

Apostilas

Learning statistics with R: a tutorial for psychology students and other beginners

Profa. Danielle Navarro



[*] <https://learningstatisticswithr.com>

[*] <https://learningstatisticswithr.com/book/>

1.4 Apostilas, sites e livros

Apostilas

Cheat Sheets

The R Markdown Cheat Sheet is a comprehensive guide to the RStudio interface and R Markdown features. It includes sections on RStudio workflow, R Markdown structure, code chunks, inline code, parameters, and more.

RStudio

- 1 Open a new .Rmd file at File > New File > R Markdown
- 2 Write document by editing template
- 3 Knit document to create report in IDE window
- 4 Preview output by clicking the preview button in the IDE window
- 5 Publish (optional) Use knit button or render Sync publish button to accounts at: • rpubs.com • GitHub • RStudio Connect
- 6 Examine build log in R Markdown console
- 7 Use output file that is saved alongside Rmd

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents.

Workflow

Shows the RStudio interface with the R Markdown tab selected. It highlights the "New File" button, the "R Markdown" template, and the "Knit" button.

.Rmd structure

YAML Header Options for rendering (e.g. pandoc options written as key-value pairs in YAML). A star (*) file. Between lines of ...

Text

Narration formatted with markdown, mixed with:

- Code chunks
- Comments
- RawMarkdown will run the code and append the results to the doc. It will use the location of the .Rmd file as the working directory

Code chunks

Comments are rendered as code. Each chunk:

- Begins with ``

RawMarkdown will run the code and append the results to the doc. It will use the location of the .Rmd file as the working directory

Inline code

Insert with `r <code>` Results appear as text without code. Built with `r getVersion()` Built with 3.2.3

Important chunk options

cache - cache results for future knits (default = FALSE)
cache.path - directory to save cached results (in default = "cache")
child - file to knit and then include (default = "child.R")
collapse - collapse all output into single block (default = FALSE)
comment - prefix for each line of results (default = "#")

Dependson - chunk dependencies for caching (default = NULL)
display - display code in output document (default = TRUE)
engine - code language used in chunk (default = "R")
error - display error messages in doc (TRUE) or stop render when errors occur (FALSE) (default = TRUE)
eval - run code in doc after running (default = TRUE)

Global options

Set with knitr opts_chunk\$set(), e.g.
```{r include=FALSE}  
knitr::opts\_chunk\$set(cache = TRUE)  
```

Message - display code messages in document (default = TRUE)
Results (default = "markup")

- "asis" - pass through results as they are and don't render results
- "asis" - put all results below all code

Tidy - tidy code for display (default = FALSE)
Warning - display code warnings in document (default = TRUE)

Parameters

Parameterize your documents to reuse with different inputs (e.g., data sets, values, etc.)

- 1 Add parameters Create and set parameters in the header and sub-values of param
- 2 Call parameters Call parameter values in code as params\$name>
- 3 Set parameters Set values with Knit with parameters or the params argument of render()
```{r doc.Rmd, params = list(n = 1, d = as.Date("2015-01-01"))}

**Interactive Documents**

Turn your report into an interactive Shiny document in 4 steps

- 1 Add runtime: shiny to the YAML header.
- 2 Call Shiny input functions to embed input objects.
- 3 Call Shiny render functions to embed reactive output.
- 4 Render with rmarkdown::run or click Run Document in RStudio IDE

**Dynamic Documents**

You can choose to report the finished report as a html, pdf, MS Word, ODT, RTF, or markdown document; or as a html or pdf based slide show.

**Embed code with knit syntax**

Code chunks

...{r echo=TRUE}  
getVersion()  
...{r}  
...{r}

Global options

Set with knitr opts\_chunk\$set(), e.g.  
```{r include=FALSE}  
knitr::opts_chunk\$set(cache = TRUE)
```

message - display code messages in document (default = TRUE)  
results (default = "markup")

- "asis" - pass through results as they are and don't render results
- "asis" - put all results below all code

  
tidy - tidy code for display (default = FALSE)  
  
warning - display code warnings in document (default = TRUE)

**Parameters**

Parameterize your documents to reuse with different inputs (e.g., data sets, values, etc.)

- 1 Add parameters Create and set parameters in the header and sub-values of param
- 2 Call parameters Call parameter values in code as params\$name>
- 3 Set parameters Set values with Knit with parameters or the params argument of render()  
```{r doc.Rmd, params = list(n = 1, d = as.Date("2015-01-01"))}

1.4 Apostilas, sites e livros

Sites

Material para cursos de R

The screenshot shows the homepage of the Curso-R website. The header is red with the text "Curso-R". On the right side of the header are social media icons for Twitter and GitHub. Below the header, there is a logo consisting of a hexagon with "%>%". To the right of the logo is the text "curso-r/material". There are two green buttons: "DOWNLOAD" and "★ STARS 21". A sidebar on the left lists various topics: Instalação, R básico, Pipe, Importação, Manipulação, Visualizações, Strings, Datas, Fatores, and Programação Funcional. The main content area has a red header "Material para cursos de R". Below it is a section titled "Introdução" which contains a list of tasks: Importar o banco de dados para o R, Estruturar os dados para a análise, Transformar, agregar e criar variáveis, Visualizar informações escondidas utilizando gráficos e tabelas, Modelar os dados para fazer inferência ou previsão, and Comunicar os resultados de forma eficiente. A note at the bottom states that the content is based on *R for Data Science*, which is based on the *tidyverse*. The "Público Alvo" section is at the bottom right.

[*] <http://material.curso-r.com/>

1.4 Apostilas, sites e livros

Sites

R resources



[*] <https://paulvanderlaken.com/2017/08/10/r-resources-cheatsheets-tutorials-books/>

1.4 Apostilas, sites e livros

Sites

R Ladies



[*] <https://rladies.org/>

1.4 Apostilas, sites e livros

Sites

R Ladies

[R Ladies - Brazil](#)

Gabriela de Queiroz



Data Scientist + Founder of R-Ladies + Mentor + Advocate

[*] <https://k-roz.com/>

1.4 Apostilas, sites e livros

Livros

Ciência de Dados com R: introdução (2018)

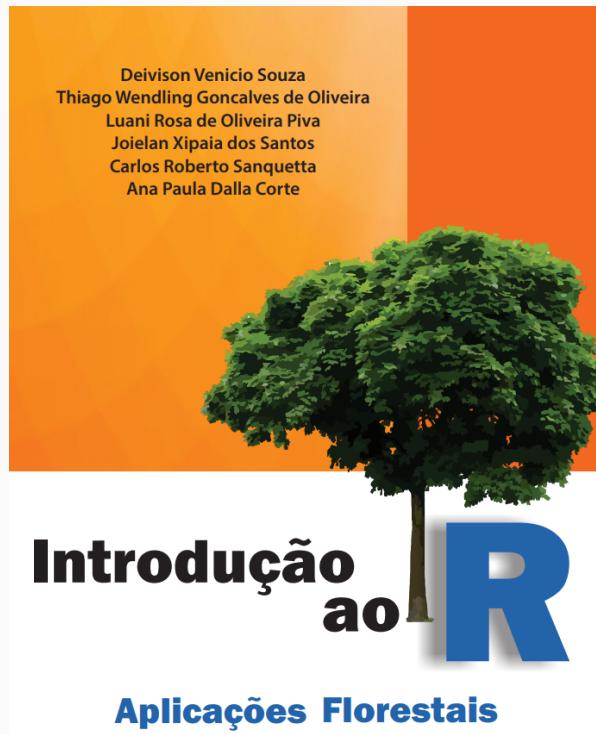


[*] <https://www.ipad.com.br/o-que-fazemos/publicacoes/introducao-ciencia-de-dados-com-r/>

1.4 Apostilas, sites e livros

Livros

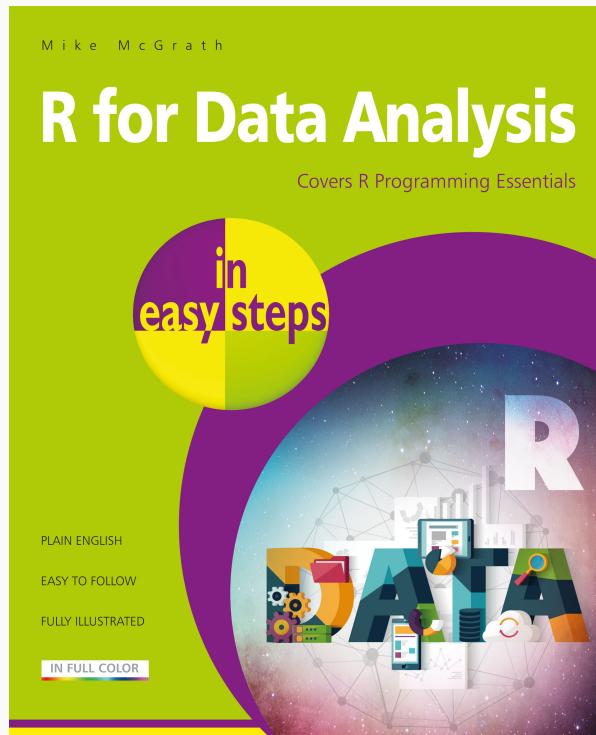
Introdução ao R: Aplicações Florestais (2018)



1.4 Apostilas, sites e livros

Livros

R for Data Analysis in easy steps - R Programming essentials (2018)

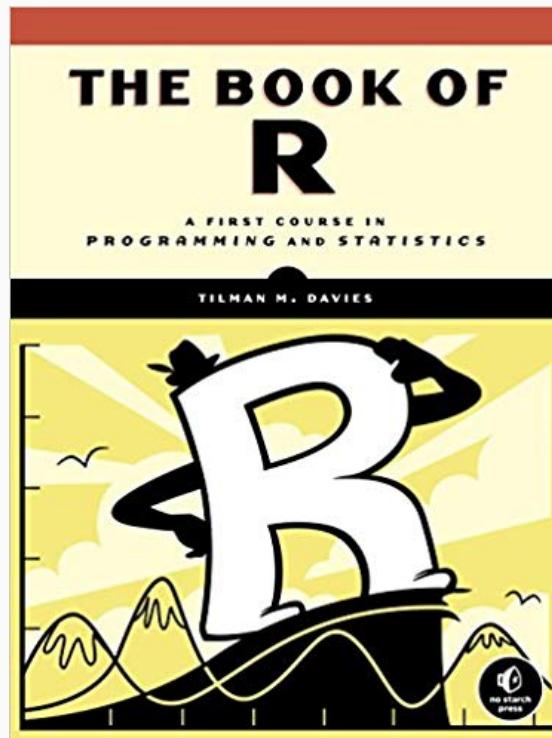


[*] https://ineasysteps.com/products-page/all_books/r-data-analysis-easy-steps/

1.4 Apostilas, sites e livros

Livros

**The Book of R: A First Course in Programming and Statistics
(2016)**

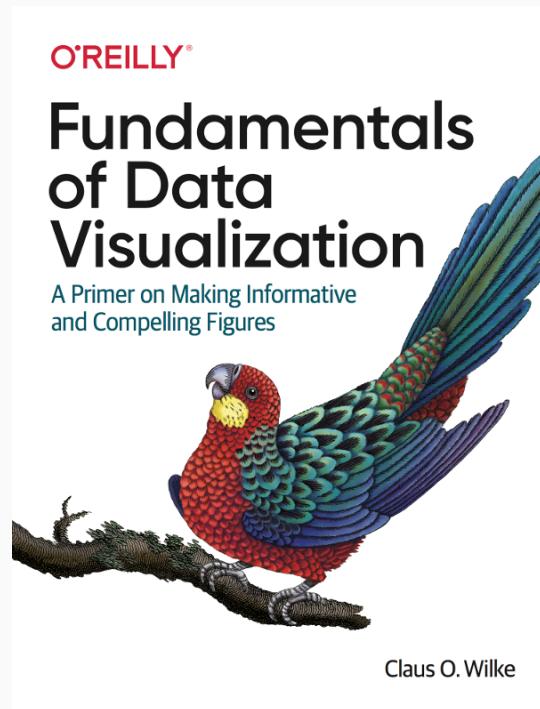


[*] <https://nostarch.com/bookofr>

1.4 Apostilas, sites e livros

Livros

Fundamentals of Data Visualization (2019)



[*] <https://serialmentor.com/dataviz/>

1.4 Apostilas, sites e livros

Livros

CRC The R Series (49 Livros)

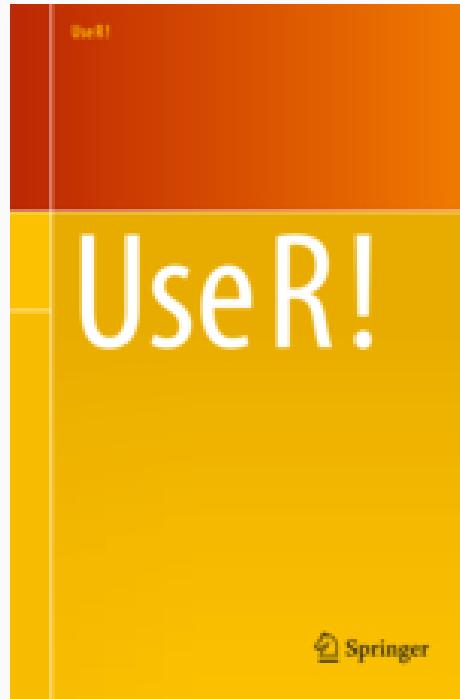


[*] <https://www.crcpress.com/Chapman--HallCRC-The-R-Series/book-series/CRCTHERSER>

1.4 Apostilas, sites e livros

Livros

Use R! (73 Livros)

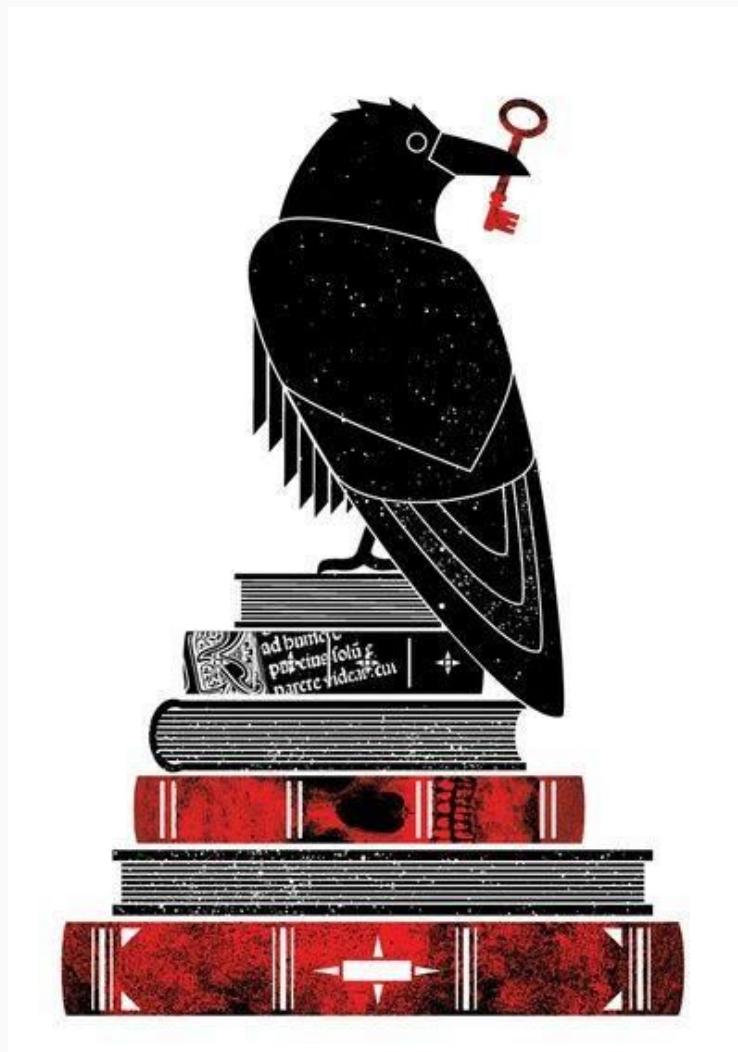


[*] <https://www.springer.com/series/6991?detailsPage=titles/>

Eu não estou disponibilizando os .pdfs dos
livros...

Entretanto, vocês mesmos podem baixar!

Library Genesis



[*] <https://libgen.is/>

Obrigado Alexandra Elbakyan!

Library Genesis

RU FORUM ▾ DOWNLOAD ▾ UPLOAD ▾ LAST ▾ OTHERS ▾ TOPICS ▾ DONATE

Library Genesis^{1M}

Letter of Solidarity
New torrents for fiction, over 1.5M files!
Added new interface for a series of comic books
Added new function of downloading single books via torrents (mirror [1])

Put Here the Name of the Book From Amazon → Search!

Search in :
 LibGen (Sci-Tech) Standards Fiction
 Comics Scientific articles Magazines

Search By Title

LibGen Search options:
Download type: Resumed dl with original filename
View results: Simple Detailed
Results per page 25
Search for a phrase: Yes No
Search in fields The column set default Title Author(s) Series
 Periodical Publisher Year ISBN Language MD5 Tags Extension

[*] <https://libgen.is/>

Library Genesis

The Survival Medicine Handbook: A Guide for When Help is Not on the Way Batch search for books

Download type: Resumed dl with original filename

View results: Simple Detailed **Search for a phrase:** Yes No

Search in fields The column set default Title Author(s) Series
 Periodical Publisher Year ISBN Language MD5 Tags Extension

2 books found

| ID | Author(s) | Title | Publisher | Year | Pages | Language | Size | Extension | Mirrors | Edit |
|---------|-------------------------|---|----------------|------|-------|----------|-------|-----------|--|------|
| 1155655 | Joseph Alton, Amy Alton | The Survival Medicine Handbook: A Guide for When Help is Not on the Way [Revised & enlarged]
0988872536, 9780988872530 | Doom and Bloom | 2013 | 588 | English | 13 Mb | epub | [1] [2] [3] [4] [edit] | |
| 1302414 | Joseph Alton, Amy Alton | The Survival Medicine Handbook... A Guide for When Help is Not on the Way | Doom and Bloom | 2013 | 408 | English | 23 Mb | pdf | [1] [2] [3] [4] [edit] | |

Library Genesis^{1M}

Letter of Solidarity
New torrents for fiction, over 1.5M files!
Added new interface for a series of comic books
Added new function of downloading single books via torrents (mirror [1])
also search "The Survival Medicine Handbook: A Guide for When Help is Not on the Way" in [non-Russian](#) [Russian fiction](#), [Comics](#)

**Choose from Here
Mirrors to Download**

[*] <https://libgen.is/>

Há uns 10 anos, um nome tem se destacado no avanço da linguagem R, na parte de *manejo e análises de dados*:

Hadley Wickham

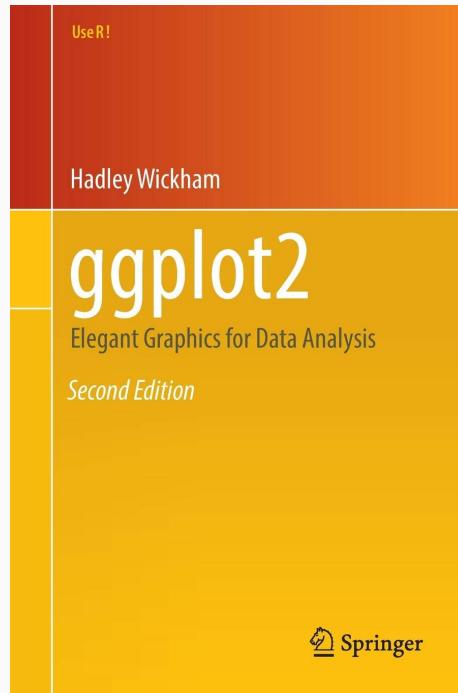
Cientista Chefe no RStudio e Professor Adjunto de Estatística na Universidade de Auckland, Stanford e Rice



1.4 Apostilas, sites e livros

Livros

ggplot2 (2009, 2016, work-in-progress)

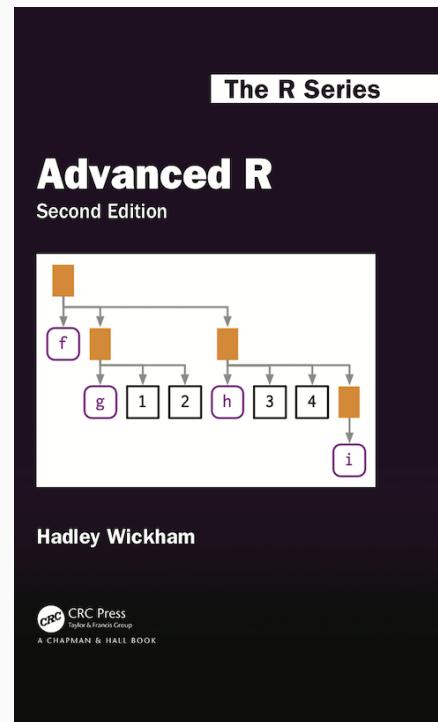


[*] <http://had.co.nz/ggplot2/>

1.4 Apostilas, sites e livros

Livros

Advanced R (2014 & 2019)



[*] <https://adv-r.hadley.nz/>

1.4 Apostilas, sites e livros

Livros

R packages (2015)

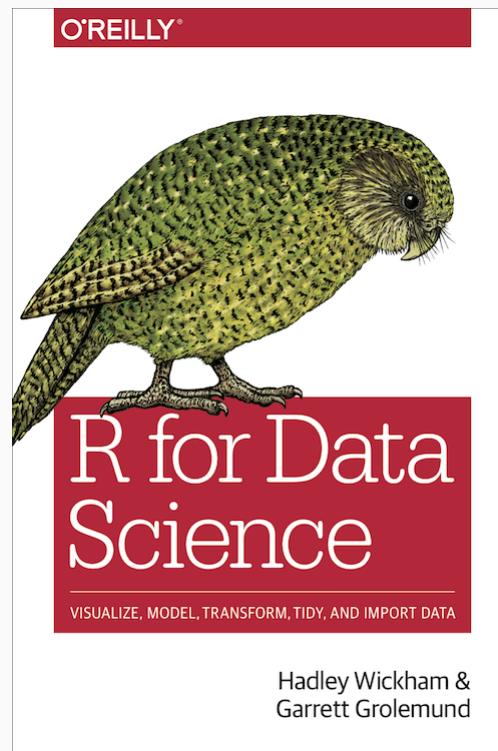


[*] <http://r-pkgs.had.co.nz/>

1.4 Apostilas, sites e livros

Livros

R for Data Science (2017)



[*] <https://r4ds.had.co.nz/>

Há uns 5 anos, outro nome tem se destacado no avanço da linguagem R, na parte de *R Markdown* (textos, sites e apresentações):

Yihui Xie

Engenheiro de software no RStudio

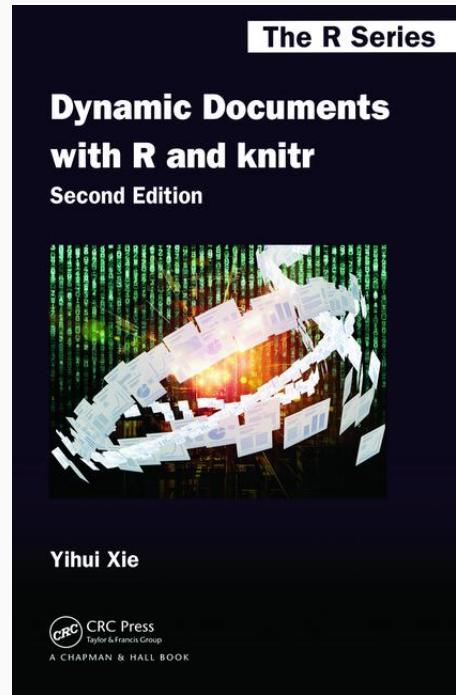


[*] <https://yihui.name/>

1.4 Apostilas, sites e livros

Livros

Dynamic Documents with R and knitr (2013 & 2015)



[*] <https://www.crcpress.com/Dynamic-Documents-with-R-and-knitr/Xie/p/book/9781498716963> 47 / 57

1.4 Apostilas, sites e livros

Livros

bookdown: Authoring Books and Technical Documents with R Markdown (2016)

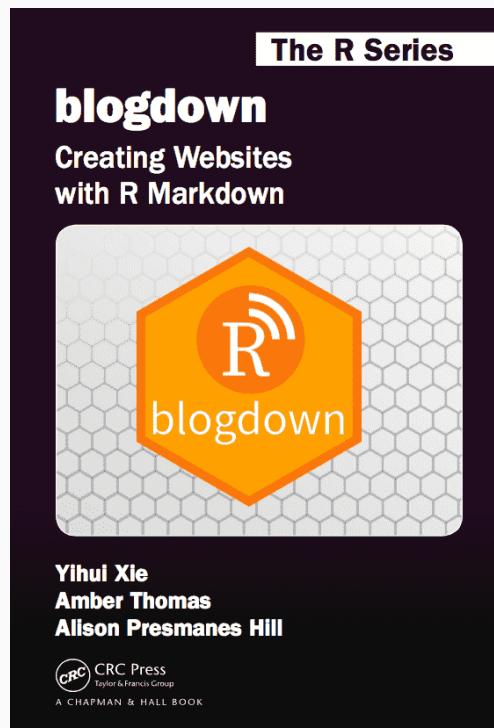


[*] <https://bookdown.org/yihui/bookdown/>

1.4 Apostilas, sites e livros

Livros

blogdown: Creating Websites with R Markdown (2016)

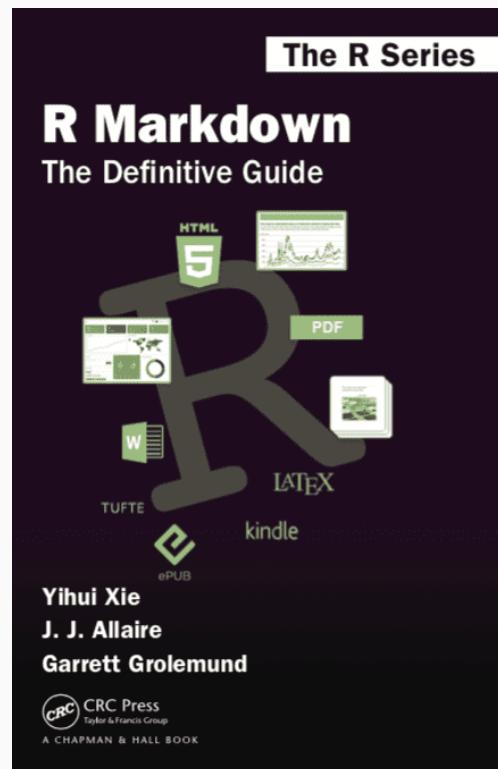


[*] <https://bookdown.org/yihui/blogdown/>

1.4 Apostilas, sites e livros

Livros

R Markdown: The Definitive Guide (2018)



[*] <https://bookdown.org/yihui/rmarkdown/>

Cara, são muitos livros, sites e apostilas. Qual
é o *melhor* para seguir no *íncio*?

Resposta: sigam esses *três*!

Recomendação

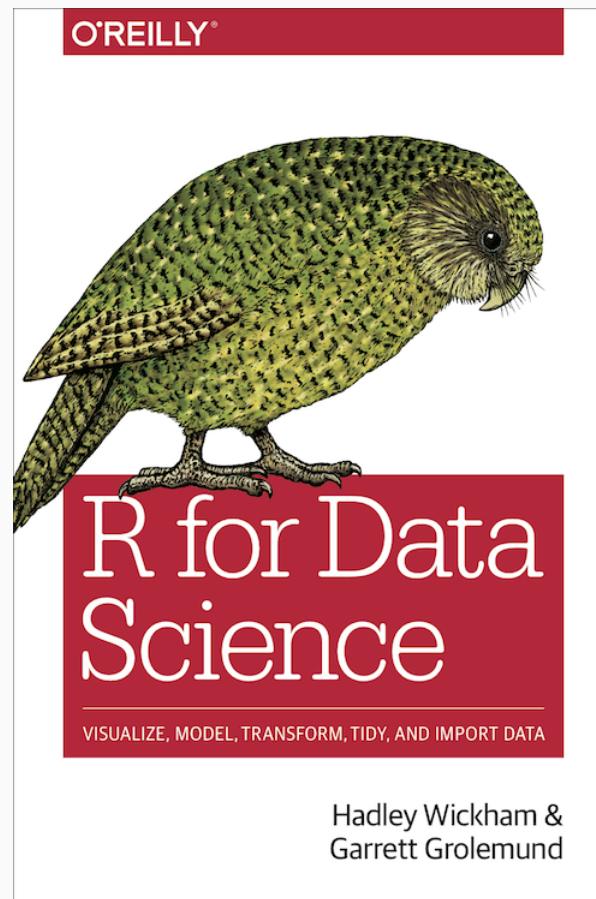
Ciência de Dados com R: introdução (2018)



[*] <https://www.ipad.com.br/o-que-fazemos/publicacoes/introducao-ciencia-de-dados-com-r/>

Recomendação

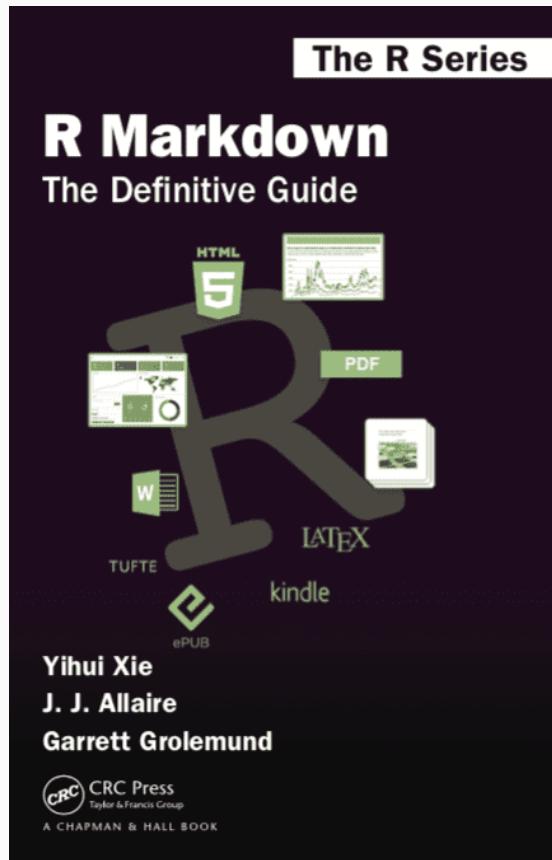
R for Data Science (2017)



[*] <https://r4ds.had.co.nz/>

Recomendação

R Markdown: The Definitive Guide (2018)



[*] <https://bookdown.org/yihui/rmarkdown/>

Dúvidas?

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 @mauriciovancine

Slides criados via pacote [xaringan](#) e tema [Metropolis](#)