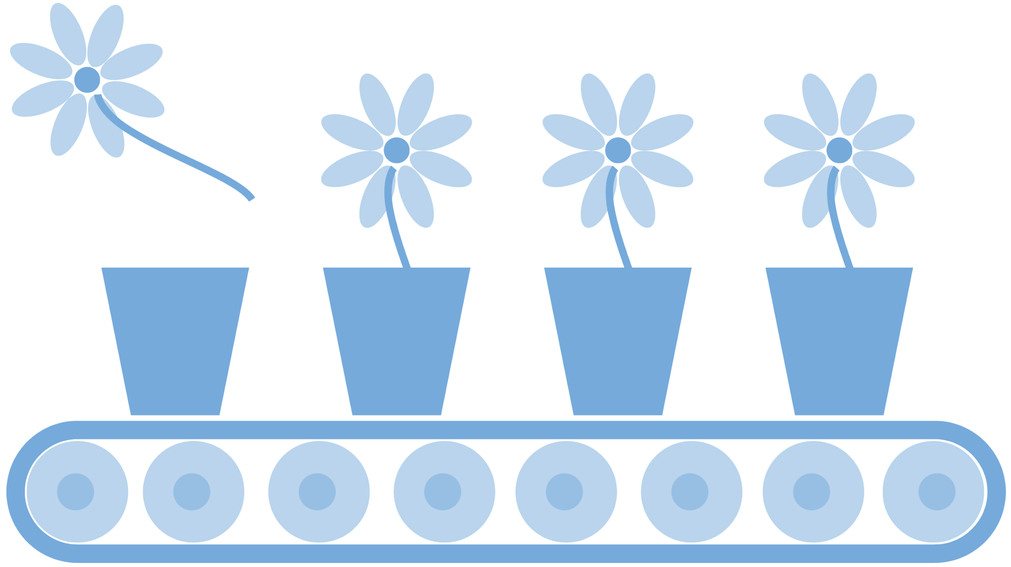
Reproducibility in Production

September 2019



Garrett Grolemund

rstd.io/repro-in-production

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How the Reproducibility Crisis in Academia is Affecting Scientific Research

—Forbes, 2017

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1. **Reproducibility in Production**
   Garrett Grolemund - Today!

2. **RStudio Connect in Production**
   Thomas Mock - September 18, 2019

3. **Interactivity in Production**
   Kelly O'Briant - October 2, 2019

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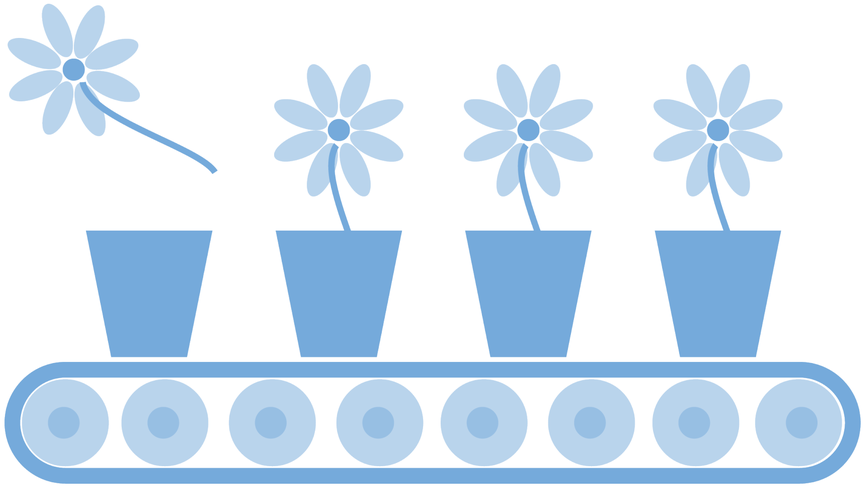
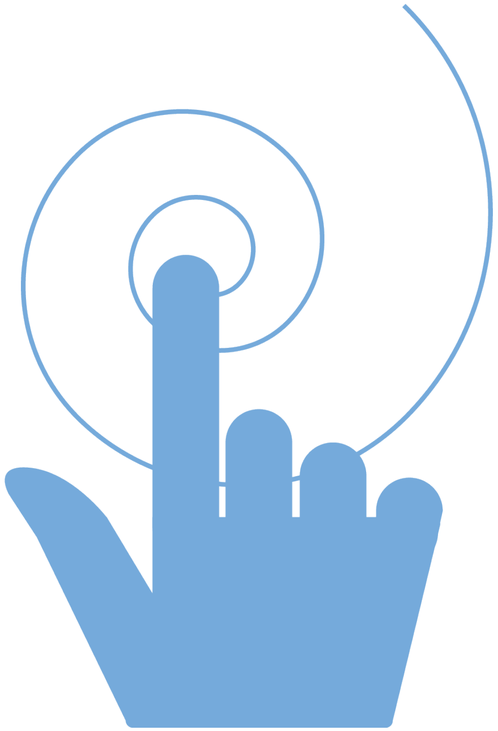
Computational Documents



Authors

Generate reports efficiently



Users

Interact with content

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Outline

1. Computational Documents
2. R Markdown
3. Tips
4. Thinking about Interactivity

R Markdown

rmarkdown.rstudio.com/formats

RStudio Formats

R Markdown formats from RStudio (see below for additional formats created by the R community)

Documents

Notebook	Interactive R Notebooks
HTML	HTML document w/ Bootstrap CSS
PDF	PDF document (via LaTeX template)
Word	Microsoft Word document (docx)
ODT	OpenDocument Text document
RTF	Rich Text Format document
Markdown	Markdown document (various flavors)

Presentations

ioslides	HTML presentation with ioslides
reveal.js	HTML presentation with reveal.js
Slidy	HTML presentation with W3C Slidy
Beamer	PDF presentation with LaTeX Beamer
PowerPoint	PowerPoint presentation

Journals

jss_article	Journal of Statistical Software (JSS)
acm_article	Association for Computing Machinery (ACM)
acs_article	American Chemical Society (ACS) Journal
ctex	Documents based on the LaTeX package ctex
elsevier_article	Submissions to Elsevier journals

More

flexdashboard	Interactive dashboards
bookdown	HTML, PDF, ePub, and Kindle books
Websites	Multi-page websites
blogdown	Customizable websites and blogs
pkgdown	Package documentation websites
Tufte Handout	Handouts in the style of Edward Tufte
Package Vignette	R package vignette (HTML)
Github Document	GitHub Flavored Markdown document.

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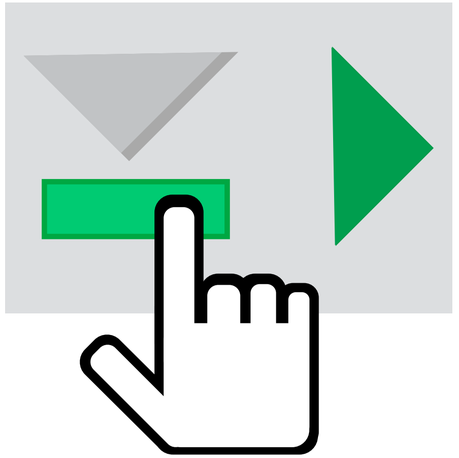
Recap

Plain text files

Embedded code



Notebook interface

Generate reports

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Tips

rmarkdown.rstudio.com/lesson-1.html

Introduction

Overview

R Markdown provides an authoring framework for data science. You can use a single R Markdown file to both

- save and execute code
- generate high quality reports that can be shared with an audience

R Markdown documents are fully reproducible and support dozens of static and dynamic output formats. This 1-minute video provides a quick tour of what's possible with R Markdown:

RStudio

bookdown.org/yihui/rmarkdown

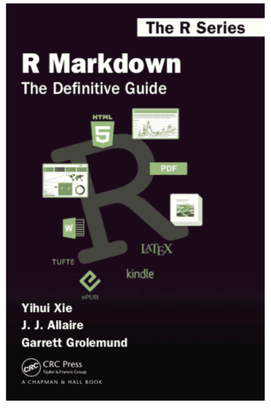
R Markdown: The Definitive Guide

Yihui Xie, J. J. Allaire, Garrett Grolemund

2019-06-03

Preface

Note: This book has been published by Chapman & Hall/CRC. The online version of this book is free to read here (thanks to Chapman & Hall/CRC), and licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.



RStudio

yihui.name/knitr

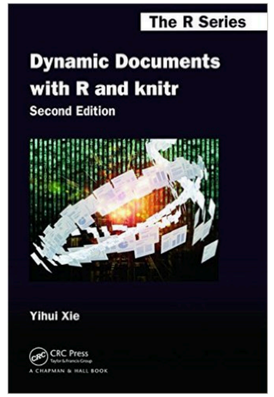
knitr: elegant, flexible, and fast dynamic report generation with R

knitr

Elegant, flexible, and fast dynamic report generation with R

Overview

The **knitr** package was designed to be a transparent engine for dynamic report generation with R, solve some long-standing problems in Sweave, and combine features in other add-on packages into one package (**knitr** ≈ Sweave + cacheSweave + pgfSweave + weaver + `animation::saveLatex` + `R2HTML::RweaveHTML` + `highlight::HighlightWeaveLatex` + 0.2 * brew + 0.1 * SweaveListingUtils + more).



- Transparency means that the user has full access to every piece of the input and output, e.g., `1 + 2` produces `[1] 3` in an R terminal, and **knitr** can let the user decide whether to put `1 + 2` between `\begin{verbatim}` and `\end{verbatim}`, or `<div class="rsource">` and `</div>`, and put `[1] 3` in `\begin{Routput}` and `\end{Routput}`; see the hooks page for details
- **knitr** tries to be consistent with users' expectations by running R code as if it were pasted in an R terminal, e.g., `qplot(x, y)` directly produces the plot (no need to `print()` it), and *all* the plots in a code chunk will be written to the output

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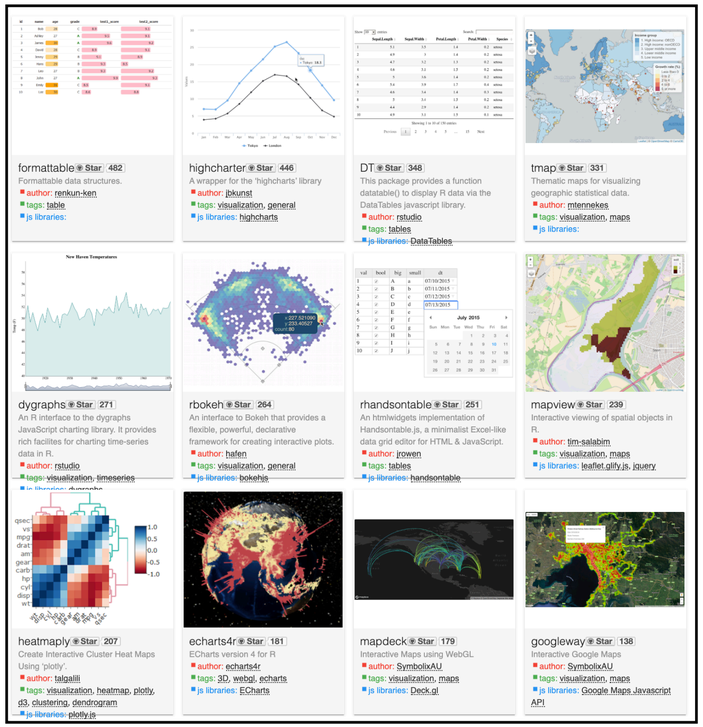

htmlwidgets

Self-contained
interactive widgets

Shiny

Interactive GUI
to a live R session

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www.htmlwidgets.org

htmlwidgets for R

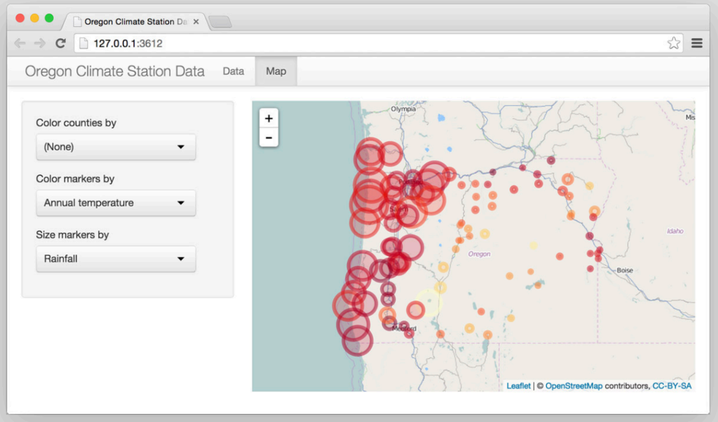
Home | Showcase | Develop | Flexdashboard | Crosstalk | Gallery | GitHub

Bring the best of JavaScript data visualization to R

Use JavaScript visualization libraries **at the R console**, just like plots

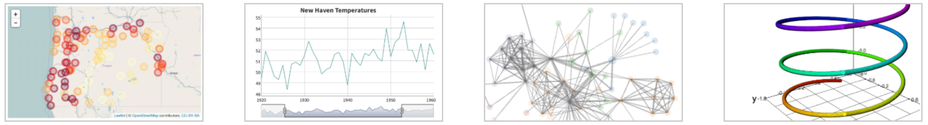
Embed widgets in **R Markdown** documents and **Shiny** web applications

Develop new widgets using a framework that seamlessly bridges R and JavaScript



At the R console | In R Markdown docs | In Shiny apps

Widgets in action



Just a line or two of R code can be used to create interactive visualizations. See the featured widgets in the showcase and browse over 50 available widgets in the gallery.

See the showcase »

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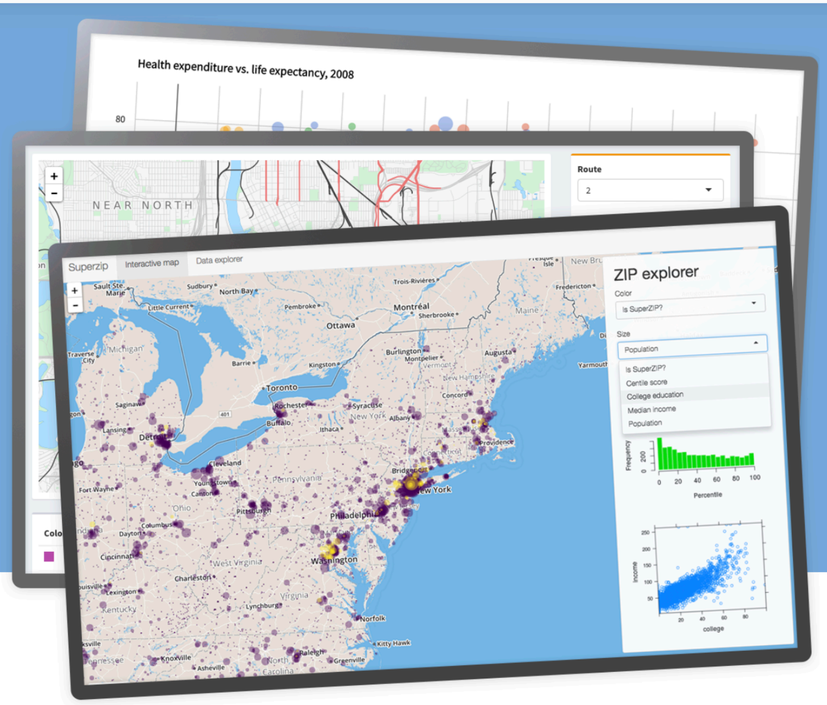
shiny.rstudio.com

Shiny

from RStudio

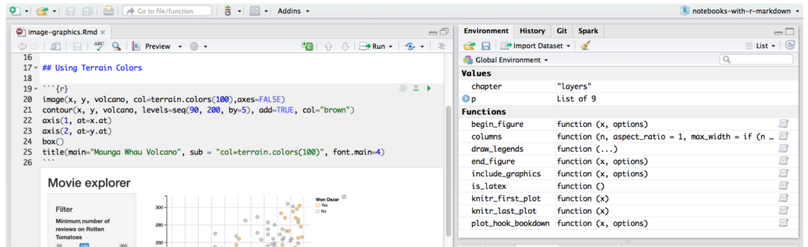
Get Started Gallery Articles Reference Deploy Help Contribute



Interact. Analyze. Communicate.

Take a fresh, interactive approach to telling your data story with Shiny. Let users interact with your data and your analysis. And do it all with R.

Shiny is an R package that makes it easy to build interactive web apps straight from R. You can host standalone apps on a webpage



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Recap

Inline code

multi-language support

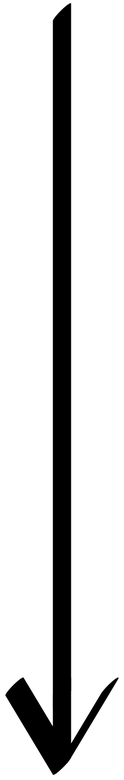
echo = FALSE

.Rmd with parameters

.Rmd with htmlwidgets

.Rmd with Shiny components

MORE INTERACTIVE



.Rmd

.Rmd with parameters

.Rmd with htmlwidgets

.Rmd with Shiny components

Shiny app

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Thinking about Interactivity

MORE SOPHISTICATED

.Rmd

.Rmd with parameters

.Rmd with htmlwidgets

.Rmd with Shiny components

Shiny app

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CHANGE THE DATA MORE THAN ONCE PER SESSION?

.Rmd

.Rmd with parameters

.Rmd with htmlwidgets

.Rmd with Shiny components

Shiny app

RStudio®

.Rmd

.Rmd with parameters

.Rmd with htmlwidgets

.Rmd with Shiny components

Shiny app

NEED MORE THAN A DOCUMENT OR DASHBOARD?

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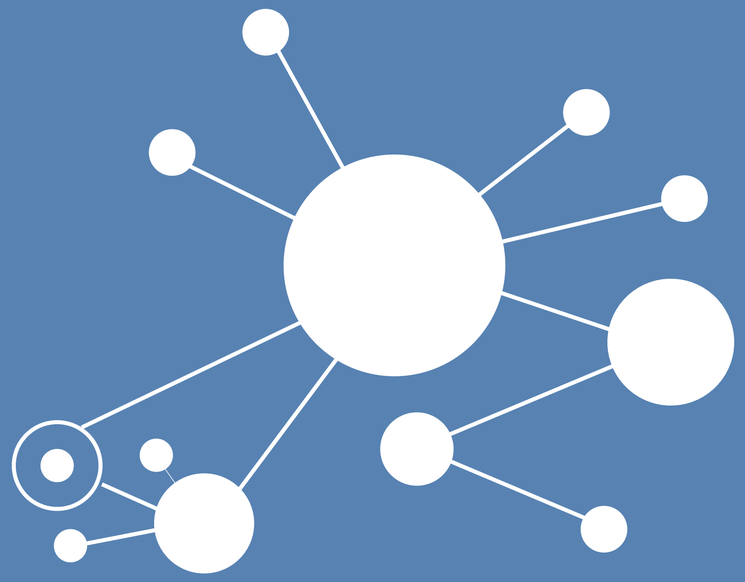
September 18
RStudio Connect in Production



Thank you!

Garrett Grolemund

rstd.io/repro-in-production