

# R SHINY

Building Interactive Web Applications with R

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# WORKSHOP PREREQUISITES

## Software requirements:

- Have **R** installed
- Have **R Studio** installed

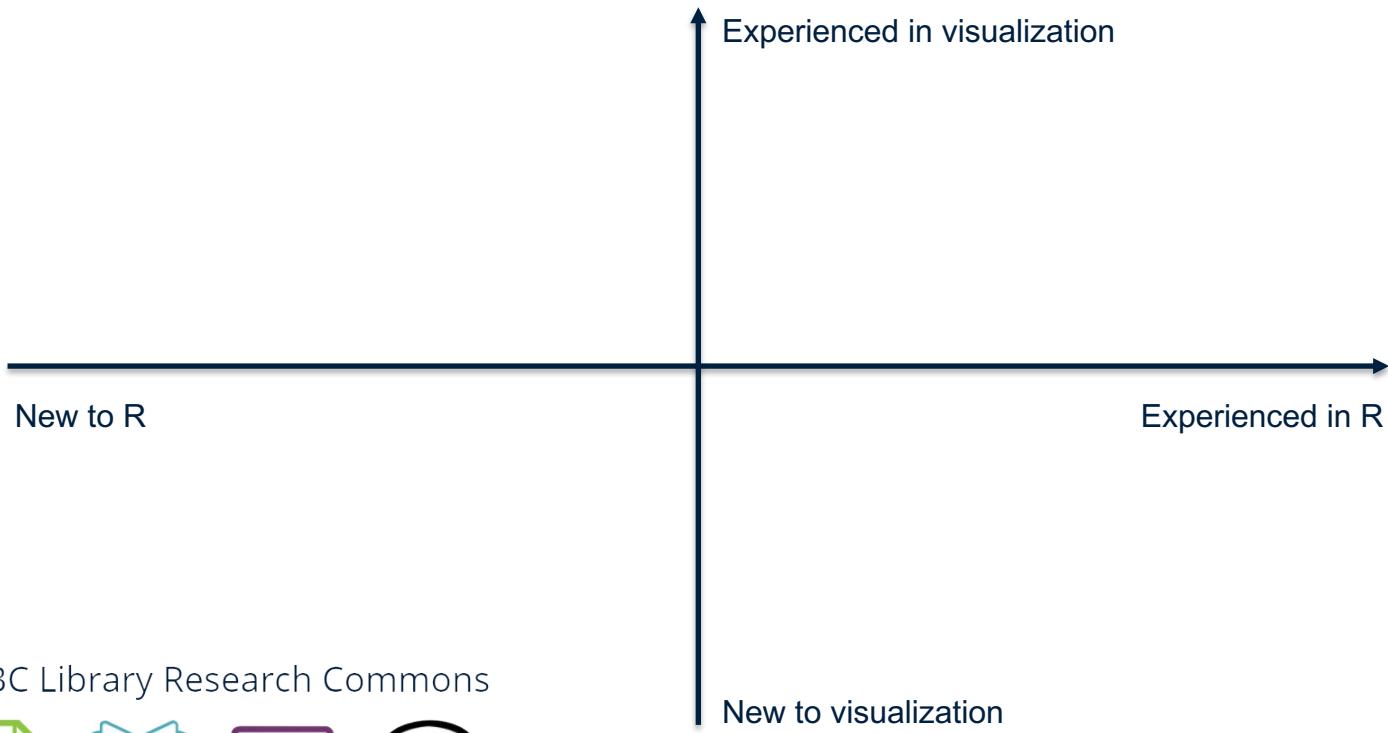
## Assumed prior knowledge:

- Have some experience developing visualizations or manipulating data in R (e.g. knowledge of **ggplot2** and **dplyr**)

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# YOUR EXPERIENCE WITH R AND VISUALIZATION



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# LEARNING OBJECTIVES

1. Become familiar with **shiny** package for making web applications
2. Learn how to make a simple shiny app in R
3. Learn how to expand on your app with more advanced features

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# INTRODUCTION TO SHINY



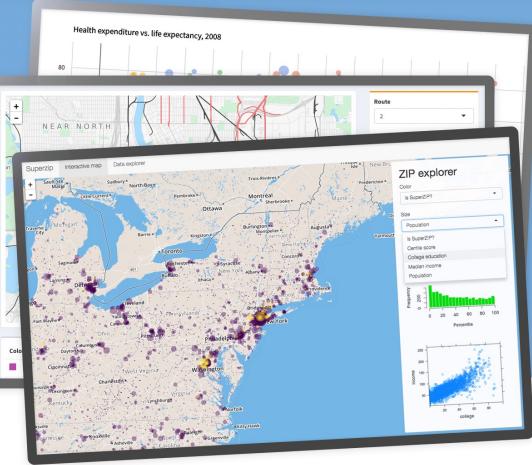
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# WHAT IS SHINY?

Shiny from R Studio

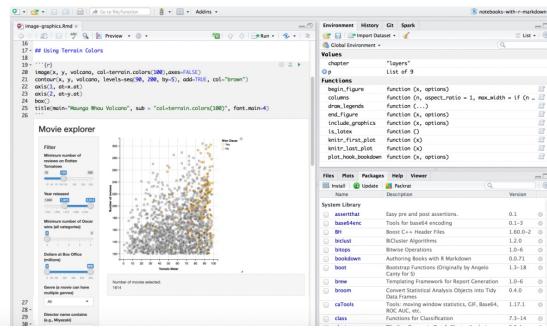
Get Started    Gallery    Articles    App Stories    Reference    Deploy    Help    Contribute    



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 or embed them in R Markdown documents or build dashboards. You can also extend your Shiny apps with CSS themes, [htmlwidgets](#), and JavaScript actions.

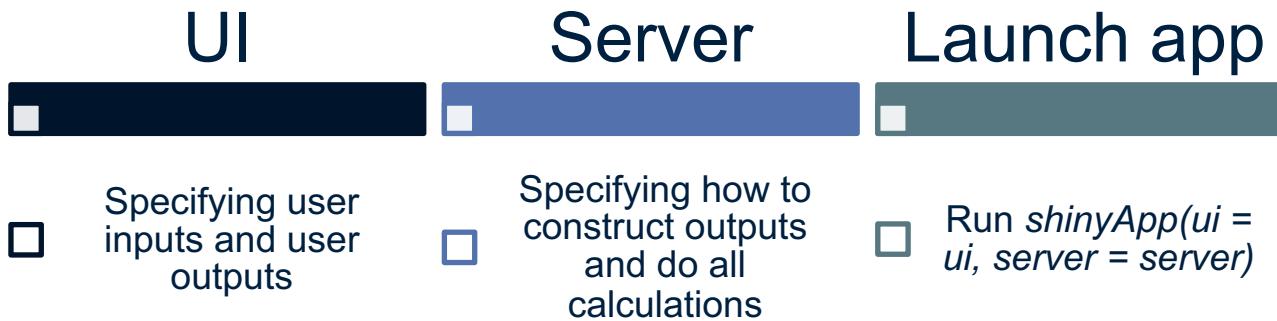


## WHAT IS SHINY USED FOR?

1. Developing interactive visualizations/tables (which can be incorporated on your website, in R markdown file, or in Tableau)
2. Developing data-oriented web applications
3. Developing full websites



# STRUCTURE OF A SHINY APP



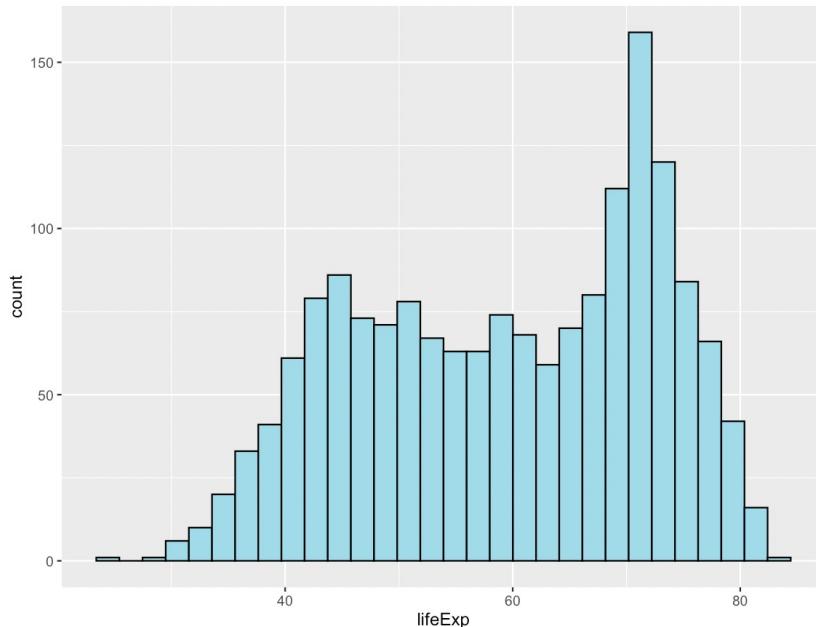
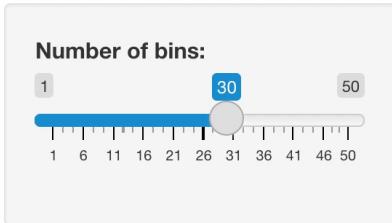
Note: previously you would have two separate files: ***ui.r*** and ***server.r***, now there is a combined ***app.R*** file

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# TIME TO SEE OUR FIRST SHINY APP!

## Life expectancy data



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# Shiny Widgets Gallery

For each widget below, the Current Value(s) window displays the value that the widget provides to shinyServer. Notice that the values change as you interact with the widgets.



## Action button

Action

Current Value:

```
[1] 0  
attr("class")  
[1] "integer"  
"shinyActionButtonValue"
```

[See Code](#)

## Date input

2014-01-01

Current Value:

```
[1] "2014-01-01"
```

[See Code](#)

## Numeric input

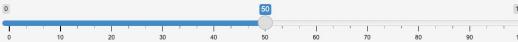
1

Current Value:

```
[1] 1
```

[See Code](#)

## Slider



Current Value:

```
[1] 50
```

## Single checkbox

Choice A

Current Value:

```
[1] TRUE
```

[See Code](#)

## Checkbox group

Choice 1  
 Choice 2  
 Choice 3

Current Values:

```
[1] "1"
```

[See Code](#)

## Date range

2022-03-26 to 2022-03-26

Current Values:

```
[1] "2022-03-26" "2022-03-26"
```

[See Code](#)

## File input

[Browse...](#) No file selected

Current Value:

```
NULL
```

[See Code](#)

## Radio buttons

Choice 1  
 Choice 2  
 Choice 3

Current Values:

```
[1] "1"
```

[See Code](#)

## Select box

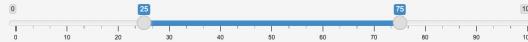
Choice 1

Current Value:

```
[1] "1"
```

[See Code](#)

## Slider range



Current Values:

```
[1] 25 50 75
```

## Text input

Enter text...

Current Value:

```
[1] "Enter text..."
```

[See Code](#)

# ADDITIONAL WIDGETS OFFERED BY SHINYWIDGETS

shinyWidgets

☰ Overview

switchInput

Pretty Checkboxes & Radios

Awesome Checkboxes & Radios

checkboxGroup Buttons

radio Buttons

materialSwitch

pickerInput

sliderText

progressBar

bttn

dropdowns & sweetalert

## shinyWidgets Overview

Awesome checkbox Group

Checkboxes with status

A  B  C

Value :  
NULL

[>Show code](#)

[+ More examples](#)

Awesome checkbox

A single checkbox

Value :  
[1] TRUE

[>Show code](#)

[+ More examples](#)

Material Design Switch

Primary switch

Value :  
[1] FALSE

[>Show code](#)

[+ More examples](#)

Bootstrap Switch

Value :  
[1] TRUE

[>Show code](#)

[+ More examples](#)

Select Picker

With plain HTML

Value :  
[1] "Badge danger"

[>Show code](#)

[+ More examples](#)

Search field

Click search icon to update or hit 'Enter'

A placeholder

Value :  
[1] ""

[>Show code](#)

Multi.js

Countries :

Search...

France  
 United Kingdom  
 Germany  
 United States of America  
 Belgium  
 China

Value :  
NULL

[>Show code](#)

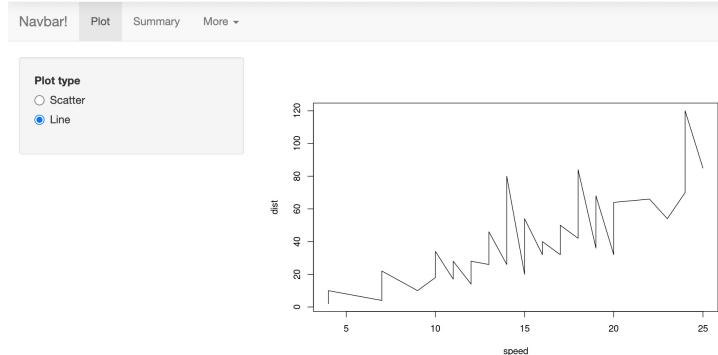


# FOUR APPLICATION LAYOUTS

## Horizontal/vertical layering

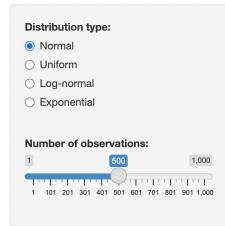


## Navbar

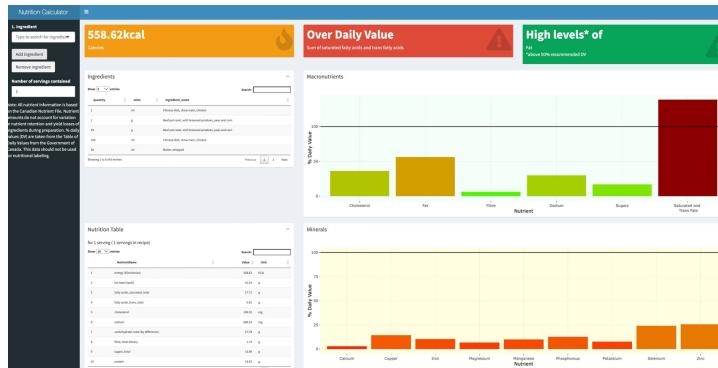


## Tabssets

### Tabssets



## ShinyDashboard



# Gallery

Welcome to the Shiny Gallery! Below you can find a myriad of Shiny apps to be inspired by and to learn from. We have organized the apps in two main categories:

- **Shiny User Showcase** comprised of contributions from the Shiny app developer community.
- **Shiny Demos** that are designed to highlight specific features of shiny, the package.

## Shiny User Showcase

The Shiny User Showcase is comprised of contributions from the Shiny app developer community. The apps are categorized into application areas and presented with a brief description, tags, and for many, the source code. Note that many of these apps are winners and honorable mentions of our [annual Shiny contest!](#)

### Education

Apps designed for teaching

Didactic modeling process: Linear regression

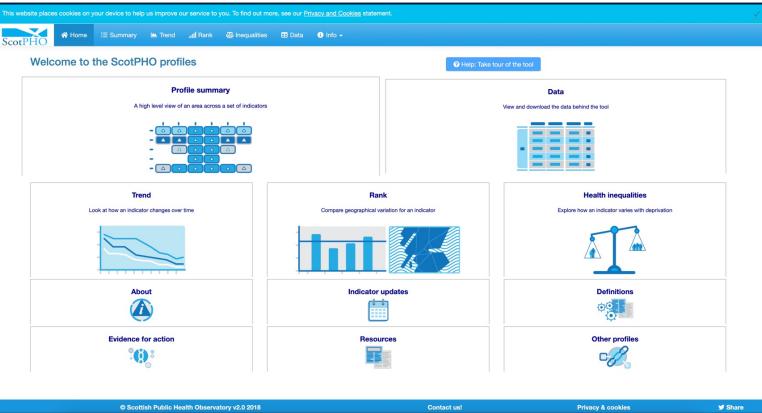
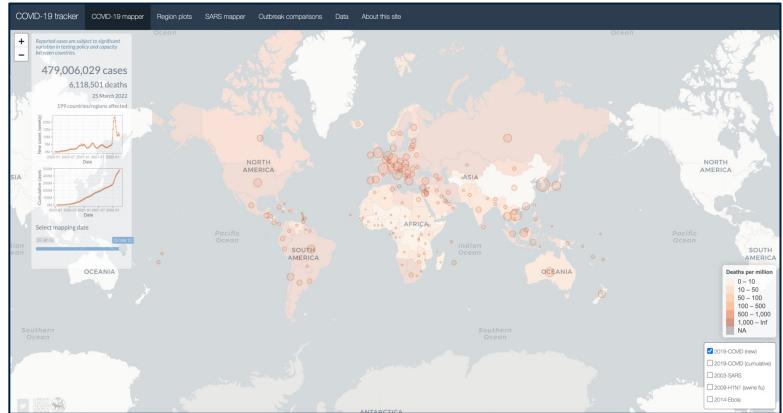
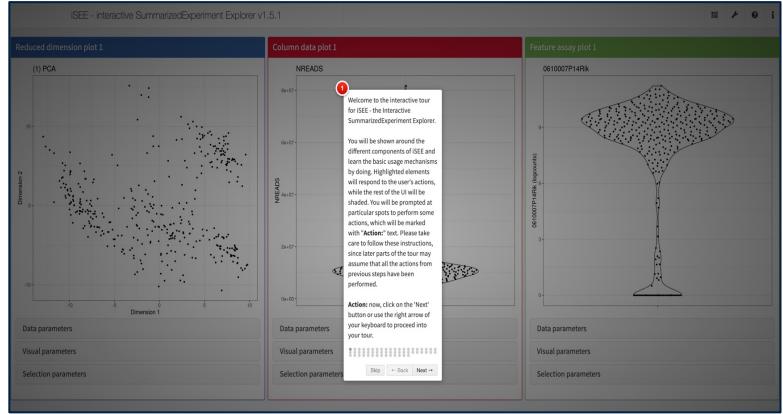
R/Shiny package to learn immune response modeling

NCAA Swimming Team Finder for Incoming College Athletes

Radiant - A shiny app for statistics and machine learning



# SHINY APP EXAMPLES

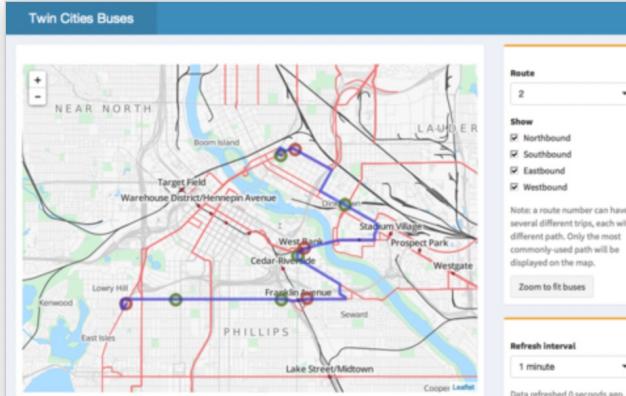


# MODIFYING THE APP FURTHER

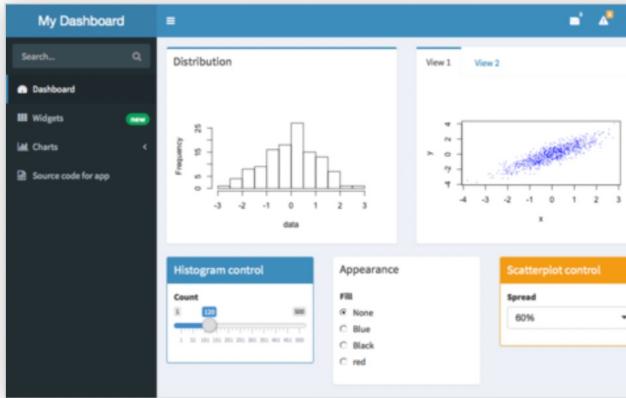
WITH

# SHINY DASHBOARD

Dashboard



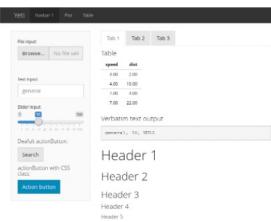
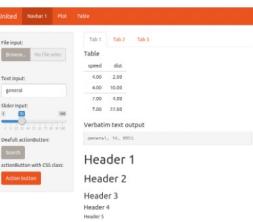
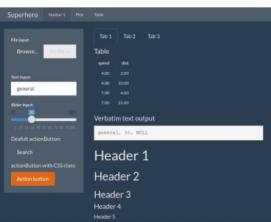
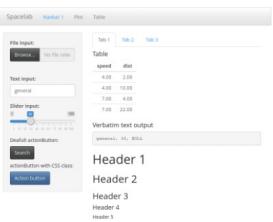
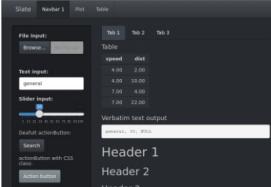
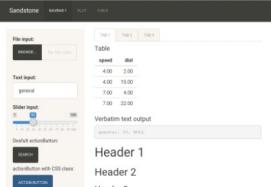
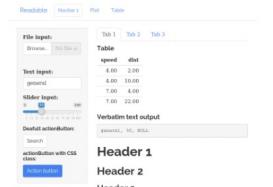
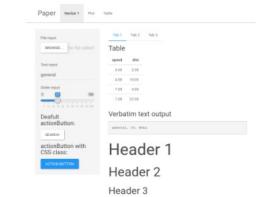
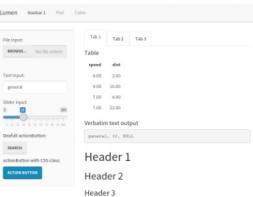
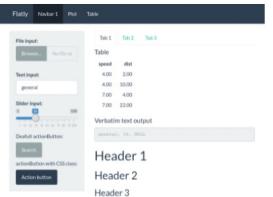
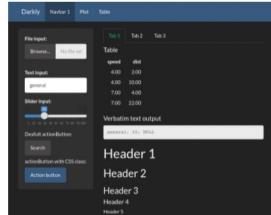
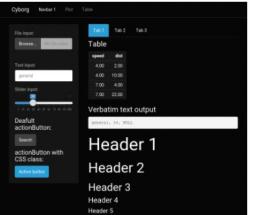
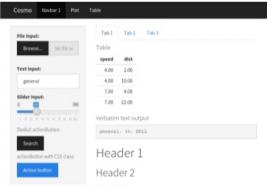
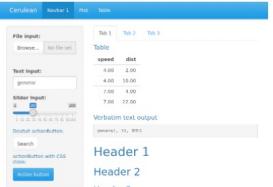
**shinydashboard** makes it easy to use [Shiny](#) to create dashboards like these:



# MODIFYING THE APP FURTHER

## WITH

# CSS THEMES



# MODIFYING THE APP FURTHER

## WITH

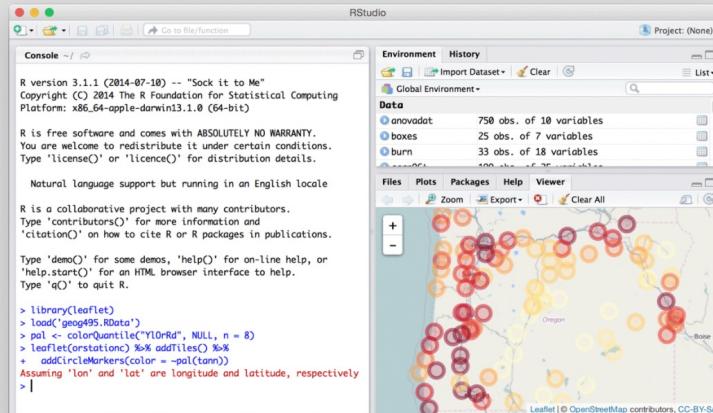
# HTML WIDGETS

### Bring the best of JavaScript data visualization to R

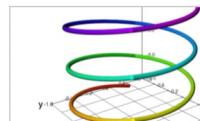
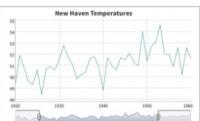
Use JavaScript visualization libraries at the R console, just like plots

Embed widgets in R Markdown documents and Shiny web applications

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



### 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 »](#)

# MODIFYING THE APP FURTHER

## WITH

# JAVA SCRIPT

**shinyJS**

Overview Quick Start Example Advanced Extend Help

# shinyjs

Easily improve the user experience of your Shiny apps in seconds

[DEMO](#) [GET STARTED](#)

Created by Dean Attali [View on GitHub](#)

## What is shinyjs?

shinyjs lets you perform common useful JavaScript operations in Shiny apps that will greatly improve your apps.  
*Without having to know any JavaScript.*

# Hosting and deployment

When it's time to put your Shiny app on the web, you can choose to deploy on your own servers or on our hosting service.



## Deploy to the cloud

### Shinyapps.io

Host your Shiny apps on the web in minutes with Shinyapps.io. It is easy to use, secure, and scalable. No hardware, installation, or annual purchase contract required. Free and paid options available.

[Learn more](#)[FAQ](#)

## Deploy on-premises or in your VPC (open source)

### Shiny Server

Deploy your Shiny apps and interactive documents on-premises with open source Shiny Server, which offers features such as multiple apps on a single server and deployment of apps behind firewalls.

[Learn more](#)

## Deploy on-premises or in your VPC (commercial)

### RStudio Connect

RStudio Connect is our flagship publishing platform for the work your teams create in R. With RStudio Connect, you can share Shiny applications, R Markdown reports, dashboards and plots, as well as Python-based content, including Flask, Dash, Streamlit and Bokeh, in one convenient place with push-button publishing from the RStudio IDE. Features include scheduled execution of reports and flexible security policies to bring the power of data science to your entire enterprise.

[Learn more](#)[FAQ](#)

THREE  
WAYS TO  
LAUNCH  
YOUR  
SHINY APP

# DEPLOYING IT ON SHINYAPPS.IO

shinyapps.io by RStudio

Home Features Pricing Support Log In

FREE

\$0 /month

New to Shiny? Deploy your applications for FREE.

5 Applications

25 Active Hours

Community Support

RStudio Branding

STARTER

\$9 /month  
( or \$100/year )

More applications. More active hours!

25 Applications

100 Active Hours

Premium Email Support

BASIC

\$39 /month  
( or \$440/year )

Take your users to the next level!

Unlimited Applications

500 Active Hours

Performance Boost

Premium Email Support

STANDARD

\$99 /month  
( or \$1,100/year )

Password protection? Authenticate your users!

Unlimited Applications

2,000 Active Hours

Authentication

Performance Boost

Premium Email Support

PROFESSIONAL

\$299 /month  
( or \$3,300/year )

Professional has it all! Personalize your domains.

Unlimited Applications

10,000 Active Hours

Authentication

Account Sharing

Performance Boost

Custom Domains

Premium Email Support

Sign Up Now



# BENEFITS OF SHINY APPS

- Expansive interactivity
  - ✓ Great for data that should be presented interactively
- Breath and depth of content you can include
  - ✓ A project can have its own web page with multiple pages
- Diversity of features
  - ✓ From simple graphs and tables to networks and maps
- Works very well with many R packages
  - ✓ Shiny developers are constantly expanding shiny functionality
- Open-source and mostly free
- Lots of available educational resources, code examples you can use
  - ✓ Very active global community of R Shiny users and [annual Shiny contests](#)



# “COSTS” OF SHINY APPS

- Requires a basic-intermediate understanding of coding
  - ✓ Significant time commitment
- Restrictions on publishing the app and using it for free
  - E.g. 25 free user hours/month
- Getting to 90% of what you want is easy, the other 10% can take forever
- Sadly doesn't work with all R packages
- Things can take a long time to load and process
  - Depending on the size of your data and what you are visualizing



# WHAT DO YOU NEED TO KNOW TO BUILD SHINY APPS?

## **MUST know:**

- Making basic and static visualizations in R (e.g. knowledge *ggplot2* package)
- Cleaning/manipulating your data in R (e.g. knowledge of *dplyr*, *tidyR* packages)
- Writing out simple Shiny syntax

## **OPTIONAL but USEFUL to know:**

- Making interactive visualizations in R (e.g. *plotly*, *chorddiag*, *visNetwork*, *tmap* packages)
- Knowing some *html* and *css* to modify various visual aspects of the app
- Some prior experience in non-R coding can be helpful (but not necessary)

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# LET'S MAKE OUR FIRST SHINY APP!

## Gapminder Shiny App

Country

Afghanistan, Albania, Algeria, Angola, Argenti ▾

Continent

Africa  Americas  Asia  Europe  
 Oceania

Life Expectancy

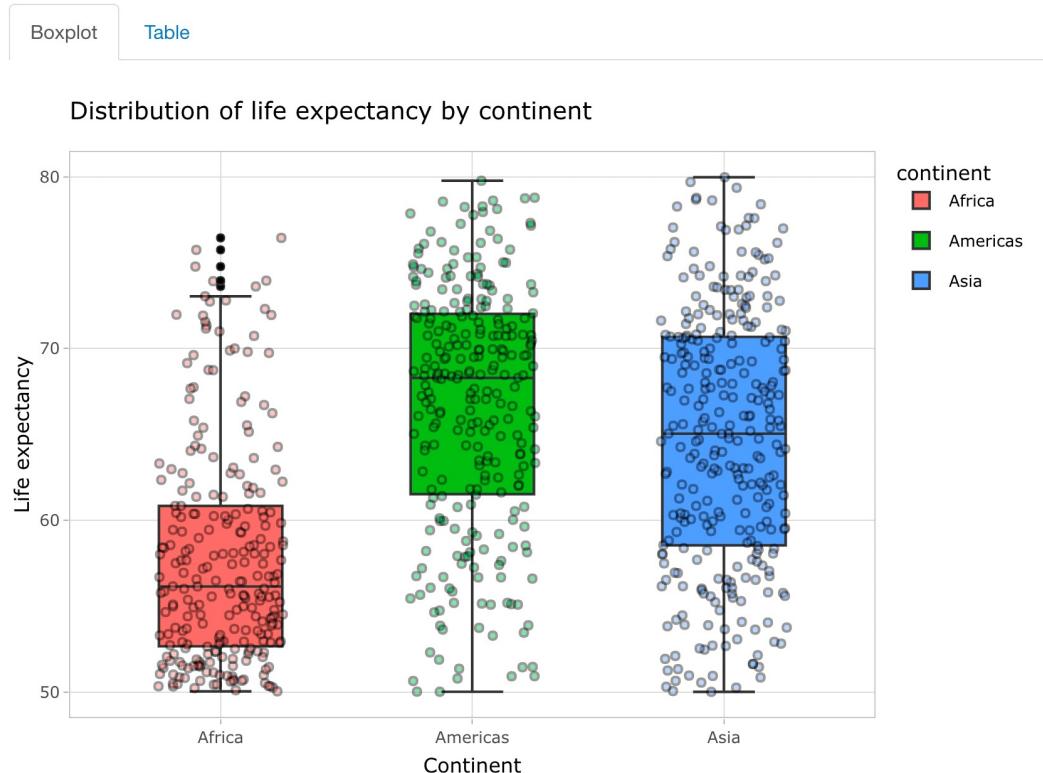
20



Year

1952, 1957, 1962, 1967, 1972, 1977, 1982, 1! ▾

Reset all inputs

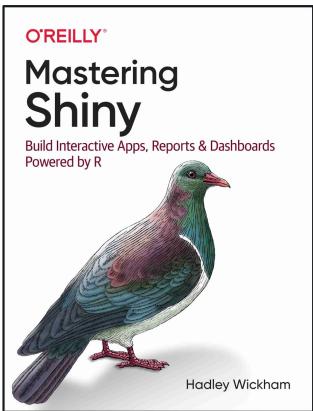


# ADDING MORE FEATURES TO OUR SHINY APP

## Gapminder Shiny App



# SHINY RESOURCES



The screenshot shows the landing page for a course titled 'Building Web Applications WITH SHINY'. The page features a large blue hexagonal logo with the word 'Shiny' in white. Below the logo, the title 'Building Web Applications' is displayed in large, bold, white letters, with 'WITH SHINY' in smaller letters underneath. A decorative background with various icons like lightbulbs, charts, and molecules is visible. At the bottom left, there's a 'WELCOME!' section with links for 'GETTING PRACTICE', 'RUNNING THE APP LOCALLY', 'READY, STEADY, GO!', and 'QUESTIONS?'. The main content area has a heading 'Welcome!' and a paragraph about the course, followed by a bulleted list of four modules: 'Module 1: Hello Shiny! - Architecture of a shiny app', 'Module 2: Reactive flow - Inputs to rendering functions to outputs', 'Module 3: Reactivity essentials - Diving deeper into reactive programming', and 'Module 4: Customizing UI - Understanding how to build a user interface'.

The screenshot shows a video player for the 'How to Start Shiny (Complete)' tutorial. The video title is 'How to start with Shiny, Part 1: How to build a Shiny App'. The video is 2:25:34 long. The player interface includes a play button, a progress bar, and a RStudio logo. The video content shows a histogram of waiting times with a slider input for bin width. The RStudio logo is in the top right corner of the video frame. Below the video, there are three columns of numbered links:

Part 1 - How to build a Shiny app	Part 2 - How to customize reactions	Part 3 - How to customize appearance
<a href="#">1. Introduction</a>	<a href="#">11. Introduction</a>	<a href="#">24. Introduction</a>
<a href="#">2. R</a>	<a href="#">12. Review of Part 1</a>	<a href="#">25. Review of Parts 1 and 2</a>
<a href="#">3. App architecture</a>	<a href="#">13. Reactivity</a>	<a href="#">26. HTML UI</a>
<a href="#">4. App template</a>	<a href="#">14. Reactive values</a>	<a href="#">27. Adding static content</a>
<a href="#">5. Inputs and outputs</a>	<a href="#">15. Reactive functions</a>	<a href="#">28. Building layouts</a>
<a href="#">6. The server function</a>	<a href="#">16. render()</a>	<a href="#">29. Panels and tabssets</a>
<a href="#">7. Sharing apps</a>	<a href="#">17. reactive()</a>	<a href="#">30. Prepackaged layouts</a>
<a href="#">8. Shinyapps.io</a>	<a href="#">18. isolate()</a>	<a href="#">31. CSS</a>
<a href="#">9. Shiny servers</a>	<a href="#">19. observeEvent()</a>	<a href="#">32. Recap - Part 3</a>
<a href="#">10. Recap - Part 1</a>	<a href="#">20. eventReactive()</a>	
	<a href="#">21. reactiveValues()</a>	
	<a href="#">22. Recap - Part 2</a>	
	<a href="#">23. Parting tips</a>	

# THANK YOU FOR ATTENDING!

Please fill out a short feedback survey 😊

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