4.8 Introduction to R: Shiny

Julia Gallucci

Data Science Institute, University of Toronto

2023-06-12

Acknowledgements

Slides are adapted from Anjali Silva, originally from Amy Farrow under the supervision of Rohan Alexander, University of Toronto. Slides have been modified by Julia Gallucci, 2023.

Overview

- Creating your first Shiny app (Wickham, 2021, Chapter 1)

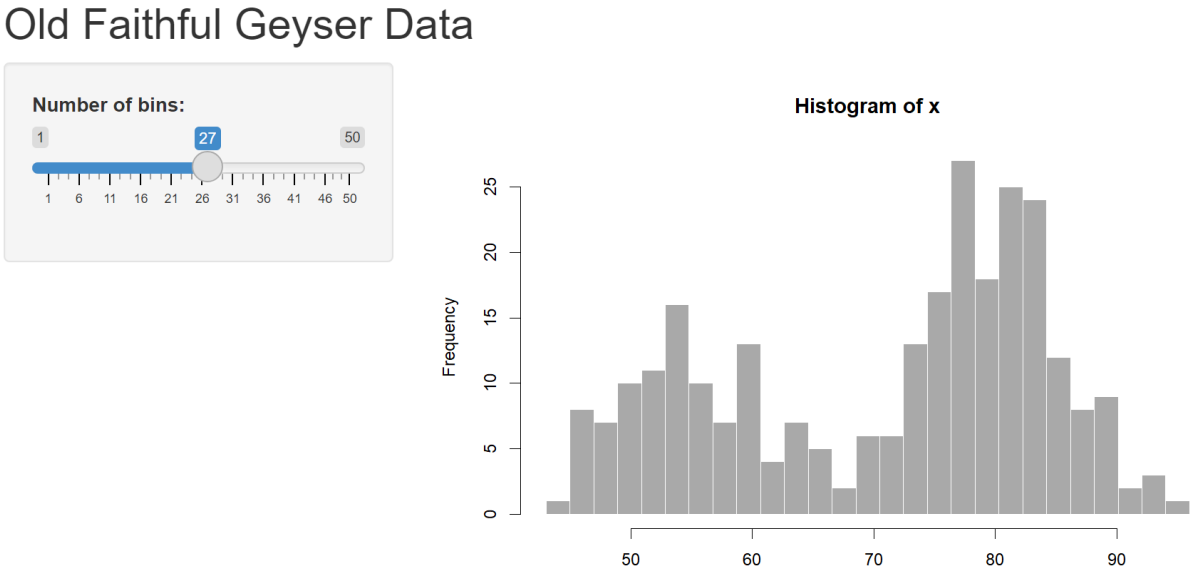
What you need

Packages:

- `library(shiny)`
- `library(ggplot2)`

Creating an App Directory and File

- File > New File > Shiny Web App > Single File > Create
- Hit Run App. What happens?



Note where it says "Listening on http://127.0.0.1:. This is the URL where your app can be found, which is local at this point.

App Layout

```
library(shiny)

ui <- fluidPage(
<Define UI for application to draw
graphs etc>
)

server <- function(input, output) {
<Define the server logic necessary for
the graphs above>
}

# Run the application
shinyApp(ui = ui, server = server)
```

A Basic App

```
ui <- fluidPage(
  "Hello, world!"
  )

server <- function(input, output,
session) {
}

shinyApp(ui, server)
```

Adding UI Controls

```
ui <- fluidPage(
  selectInput("dataset",
              label = "Dataset",
choices = ls("package:datasets")),
  verbatimTextOutput("summary"),
  tableOutput("table")
)
```

- fluidPage specifies the basic visual layout of the page
- selectInput is what makes it so the user can interact with the app by providing a value, for example in a dropdown menu.
- verbatimTextOutput and tableOutput specify where to put the outputs

Adding Behavior

Shiny apps use reactive programming, which tells the app how to perform an action but does not instruct it to perform the action.

Adding Behavior

```
server <- function(input, output,
session) {
  output$summary <- renderPrint({
    dataset <- get(input$dataset,
                   "package:datasets")
    summary(dataset)
  })
  output$table <- renderTable({
    dataset <- get(input$dataset,
                   "package:datasets")
      dataset
    })
  }
```

This tells the app how to construct the table and summary outputs. Note that verbatimTextOutput("summary") above matches output$summary, and tableOutput("table") above matches output$table. Each type of output has a different render function.

Reducing Duplication with Reactive Expressions

```
server <- function(input, output,
session) {
dataset <- reactive({ # reactive
expression is created
get(input$dataset, "package:datasets")
  })

  output$summary <- renderPrint({
summary(dataset()) #reactive expression
is called
  })

  output$table <- renderTable({
    dataset()
  })
}
```

Exercises

Experiment with the code below until you have an app that produces a table and histogram(s) for each of the datasets on the dropdown.

Exercises

```
datasets <- c("economics", "seals")
ui <- fluidPage(
selectInput("dataset", "Dataset",
choices = datasets),
  verbatimTextOutput("summary"),
  tableOutput("plot")
)
server <- function(input, output,
session) {
  dataset <- reactive({
get(input$dataset, "package:ggplot2")
  })
  output$summary <- renderPrint({
    summary(dataset())
  })
  output$plot <- renderPlot({
    plot(dataset)
  }, res = 96)
}
shinyApp(ui, server)
```

Questions?