Module 3: R

Shiny

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Course Documents

- Visit: https://github.com/anjalisilva/IntroductionToR
- All course material will be available via IntroductionToR GitHub repository (https://github.com/anjalisilva/IntroductionToR). Folder structure is as follows:
    - Lessons - All files*: These folders contain all files.
    - Lessons - Data only: This folder contains data only.
    - Lessons - Lesson Plans only: This folder contains lesson plans only.
    - Lessons - PDF only: This folder contains slide PDFs only.
    - README - README file
    - .gitignore - Files to ignore specified by instructor

Course Contacts

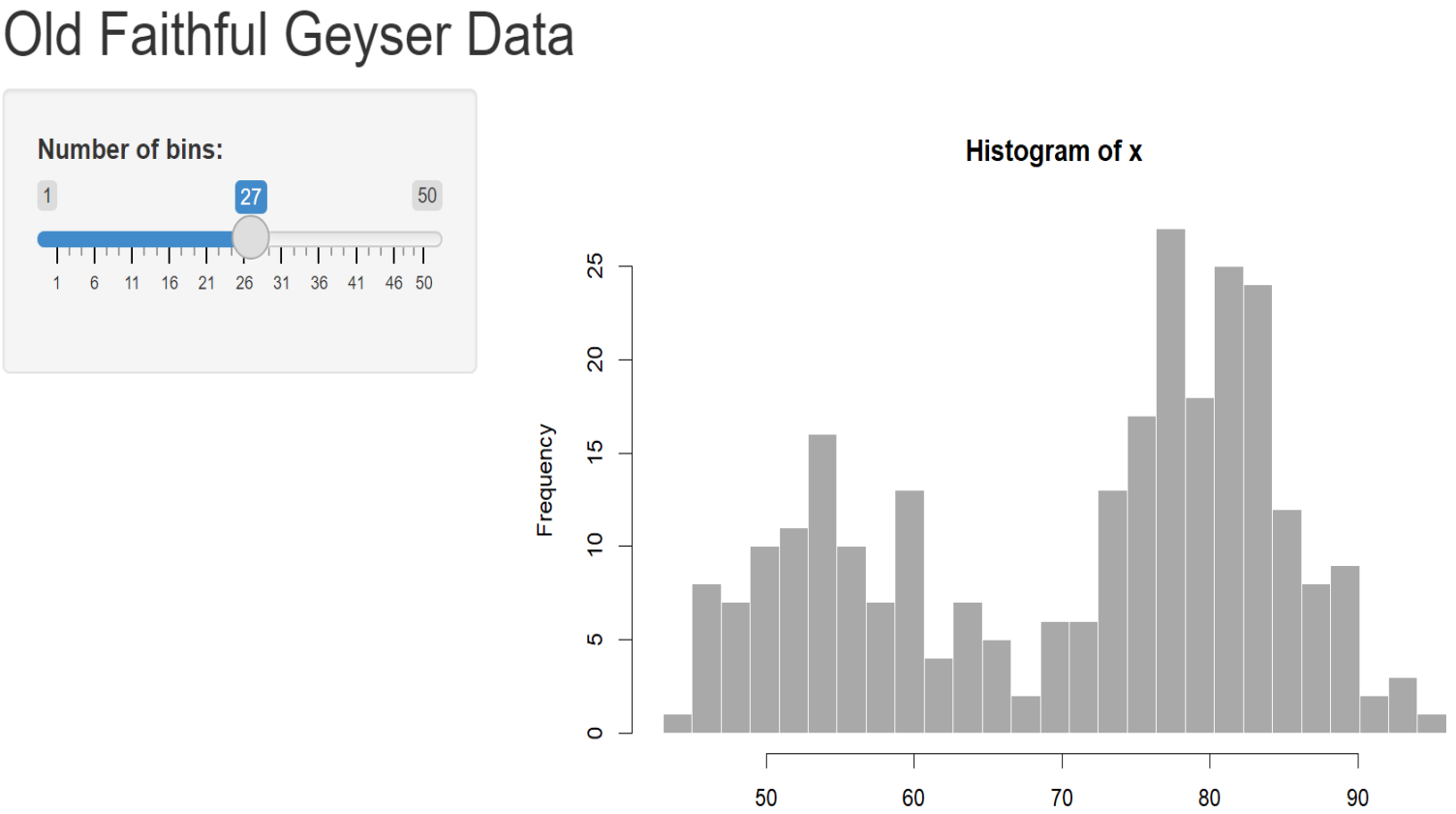
- Instructor: Anjali Silva Email: a.silva@utoronto.ca (Must use the subject line DSI-IntroR. E.g., DSI-IntroR: Inquiry about Lecture I.)
- TA: Tia Harrison Email: tia.harrison@mail.utoronto.ca

Overview

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

Creating an App Directory and File

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



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.

```
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.

```
library(shiny)
library(ggplot2)

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)
```

Any questions?