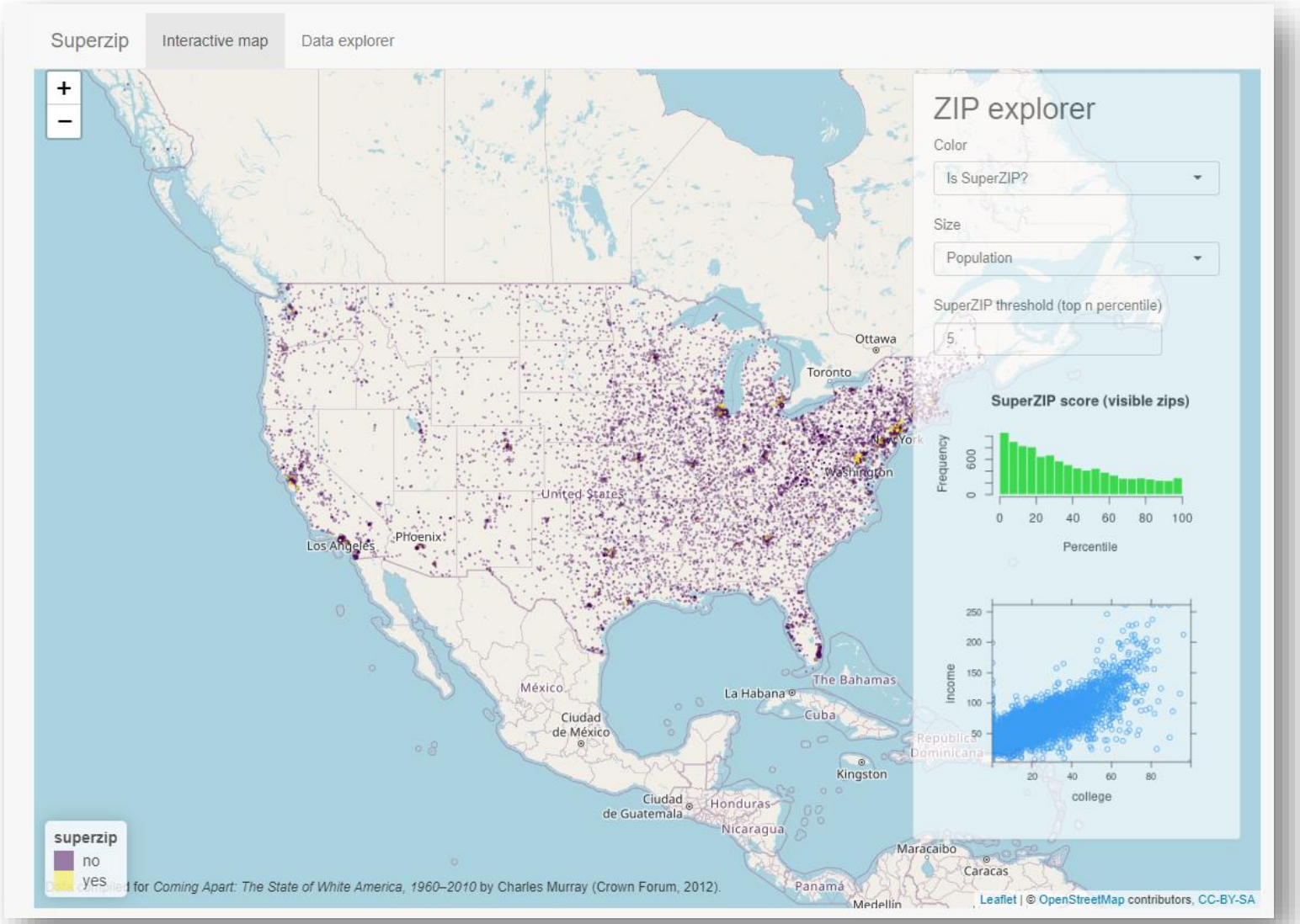
Bigfoot sightings: Learning to create Shiny modules by turning an existing app modular

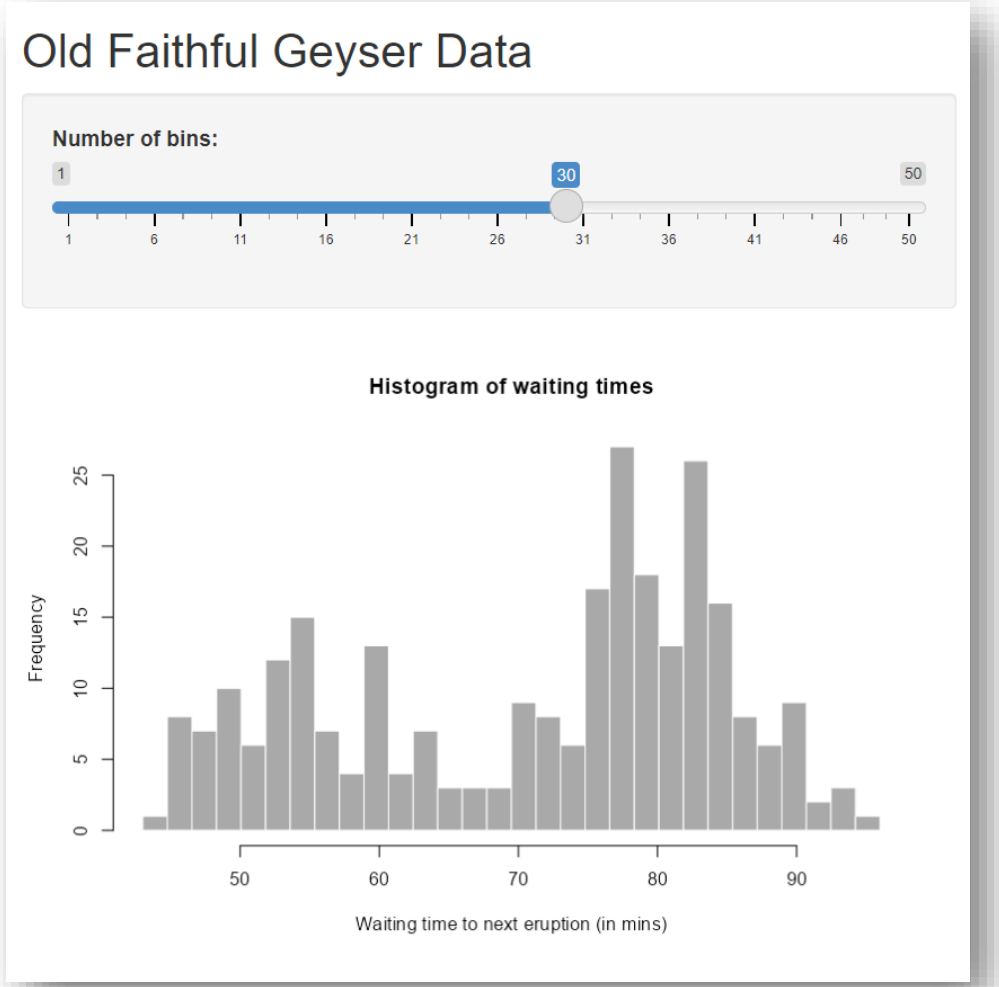
- Deepsha Menghani (she/her)

Shiny is a framework for building web applications using R and Python.



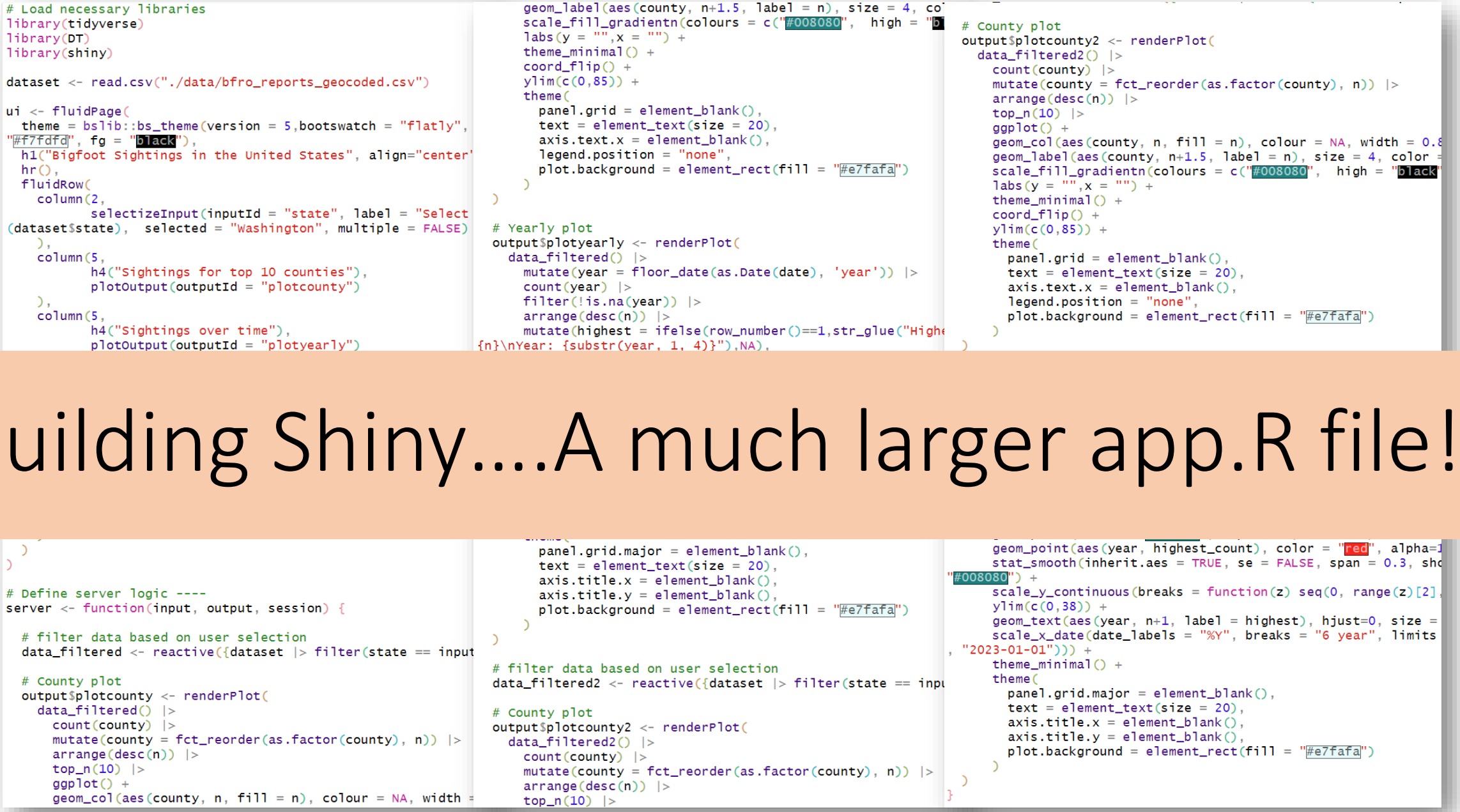
Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Learning Shiny…. A small app.R file




```r
# Define UI for application that draws a histogram
ui <- fluidPage(

    # Application title
    titlePanel("Old Faithful Geyser Data"),

    # Sidebar with a slider input for number of bins
    sidebarLayout(
        sidebarPanel(
            sliderInput("bins",
                        "Number of bins:",
                        min = 1,
                        max = 50,
                        value = 30)
        ),

        # Show a plot of the generated distribution
        mainPanel(
           plotOutput("distPlot")
        )
    )
)

# Define server logic required to draw a histogram
server <- function(input, output) {

    output$distPlot <- renderPlot({
        # generate bins based on input$bins from ui.R
        x    <- faithful[, 2]
        bins <- seq(min(x), max(x), length.out = input$bins + 1)

        # draw the histogram with the specified number of bins
        hist(x, breaks = bins, col = 'darkgray', border = 'white',
             xlab = 'Waiting time to next eruption (in mins)',
             main = 'Histogram of waiting times')
    })
}

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

Building Shiny....A much larger app.R file!



```r
# Load necessary libraries
library(tidyverse)
library(DT)
library(shiny)

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(
  theme = bslib::bs_theme(version = 5,bootswatch = "flatly",
"#f7fdfd", fg = "black"),
  h1("Bigfoot Sightings in the United States", align="center"
  hr(),
  fluidRow(
    column(2,
           selectizeInput(inputId = "state", label = "Select
(dataset$state),  selected = "Washington", multiple = FALSE)
    ),
    column(5,
           h4("Sightings for top 10 counties"),
           plotOutput(outputId = "plotcounty")
    ),
    column(5,
           h4("Sightings over time"),
           plotOutput(outputId = "plotyearly")
  )
)

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      mutate(county = fct_reorder(as.factor(county), n)) |>
      arrange(desc(n)) |>
      top_n(10) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width =
      geom_label(aes(county, n+1.5, label = n), size = 4, co
      scale_fill_gradientn(colours = c("#008080",  high = "b
      labs(y = "",x = "") +
      theme_minimal() +
      coord_flip() +
      ylim(c(0,85)) +
      theme(
        panel.grid = element_blank(),
        text = element_text(size = 20),
        axis.text.x = element_blank(),
        legend.position = "none",
        plot.background = element_rect(fill = "#e7fafa")
      )
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      mutate(year = floor_date(as.Date(date), 'year')) |>
      count(year) |>
      filter(!is.na(year)) |>
      arrange(desc(n)) |>
      mutate(highest = ifelse(row_number()==1,str_glue("Highe
{n}\nYear: {substr(year, 1, 4)}"),NA),
        panel.grid.major = element_blank(),
        text = element_text(size = 20),
        axis.title.x = element_blank(),
        axis.title.y = element_blank(),
        plot.background = element_rect(fill = "#e7fafa")
      )
  )

  # filter data based on user selection
  data_filtered2 <- reactive({dataset |> filter(state == inpu

  # County plot
  output$plotcounty2 <- renderPlot(
    data_filtered2() |>
      count(county) |>
      mutate(county = fct_reorder(as.factor(county), n)) |>
      arrange(desc(n)) |>
      top_n(10) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8
      geom_label(aes(county, n+1.5, label = n), size = 4, color =
      scale_fill_gradientn(colours = c("#008080",  high = "black"
      labs(y = "",x = "") +
      theme_minimal() +
      coord_flip() +
      ylim(c(0,85)) +
      theme(
        panel.grid = element_blank(),
        text = element_text(size = 20),
        axis.text.x = element_blank(),
        legend.position = "none",
        plot.background = element_rect(fill = "#e7fafa")
      )
  )

      geom_point(aes(year, highest_count), color = "red", alpha=1
      stat_smooth(inherit.aes = TRUE, se = FALSE, span = 0.3, sho
"#008080") +
      scale_y_continuous(breaks = function(z) seq(0, range(z)[2],
      ylim(c(0,38)) +
      geom_text(aes(year, n+1, label = highest), hjust=0, size =
      scale_x_date(date_labels = "%Y", breaks = "6 year", limits
, "2023-01-01"))) +
      theme_minimal() +
      theme(
        panel.grid.major = element_blank(),
        text = element_text(size = 20),
        axis.title.x = element_blank(),
        axis.title.y = element_blank(),
        plot.background = element_rect(fill = "#e7fafa")
      )
  )
}
```

Deepsha Menghani
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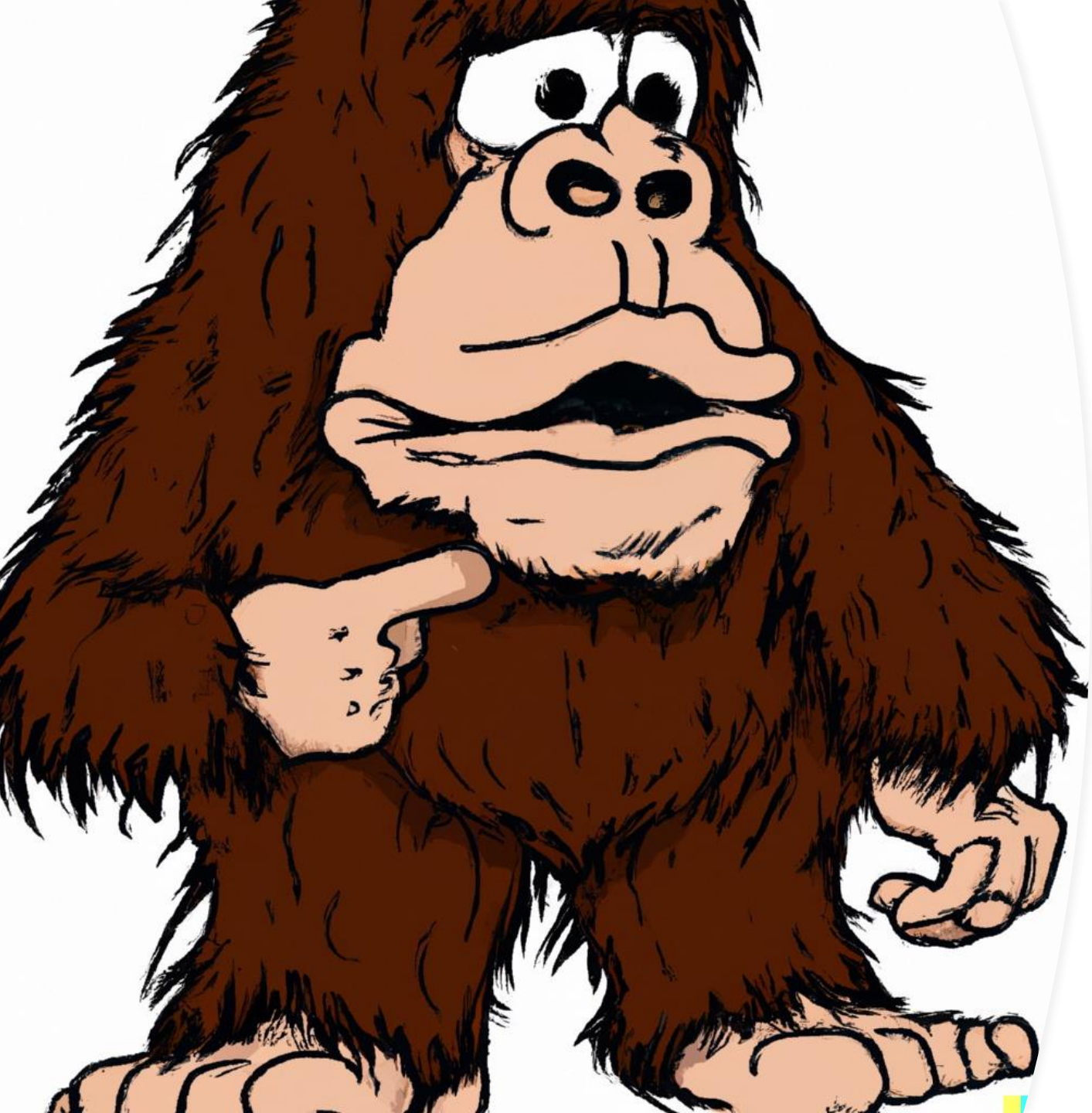


The challenges with a monolith app.R file

- Difficult to keep track of components
- Challenging to debug if something fails
- Harder for someone new to learn and contribute
- Tedious to reuse its elements within itself and other applications

Enter Shiny modules… A reusable piece of Shiny code written as a function

Functions

Shiny

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

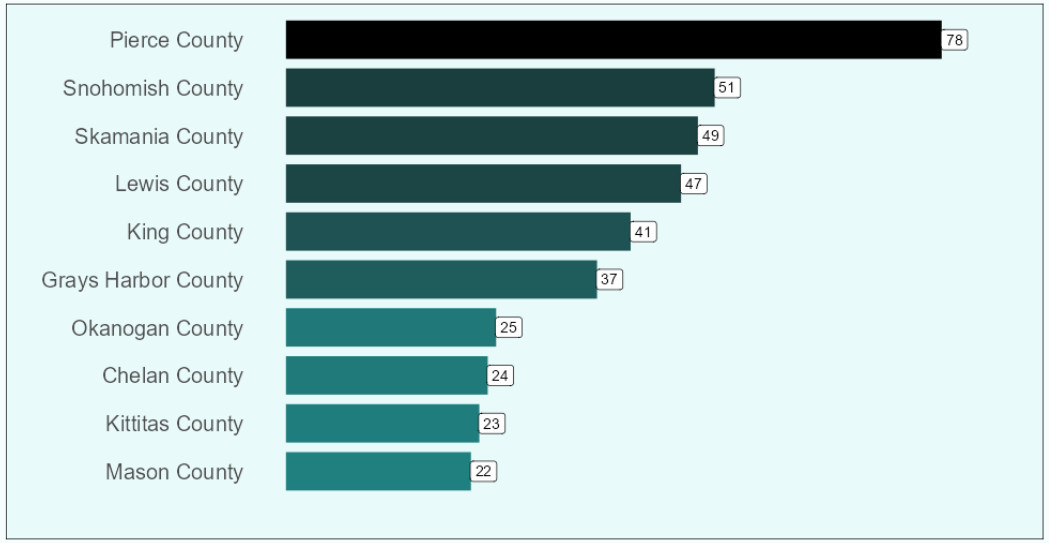
Let’s learn to write modules with a Shiny application

Bigfoot Sightings in the United States

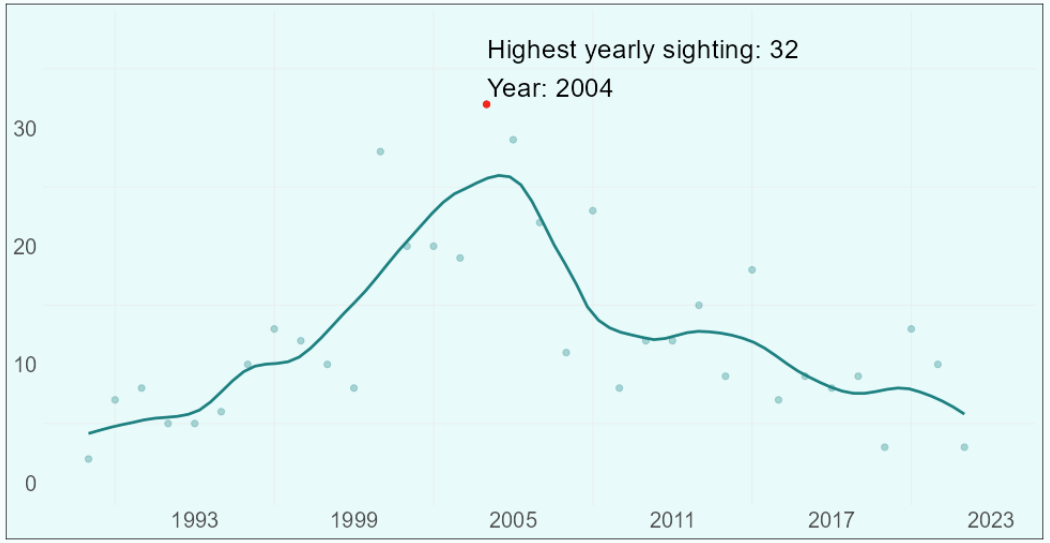
Select State

Washington

Sightings for top 10 counties



Sightings over time



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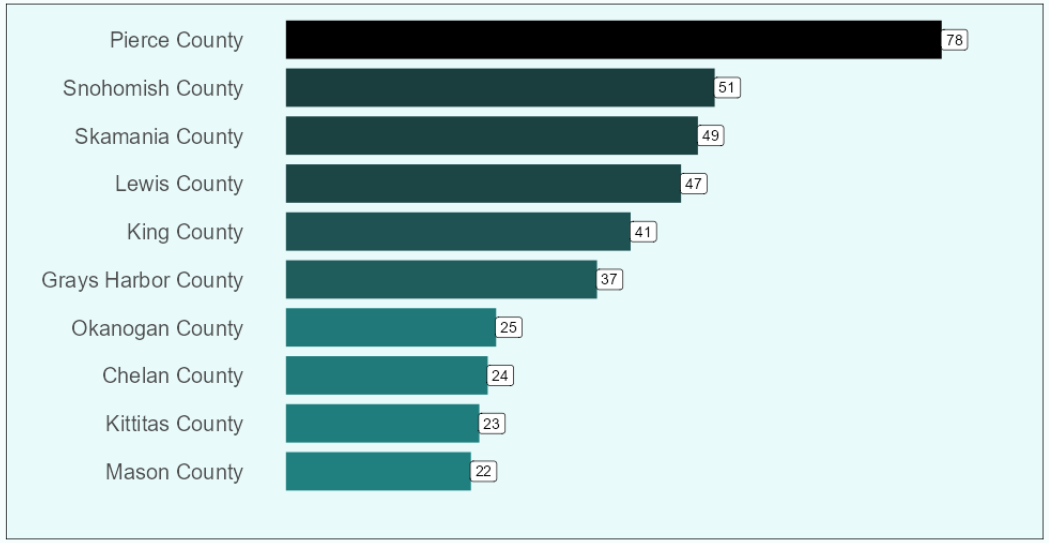
Step 1 : Decompose your application components

Bigfoot Sightings in the United States

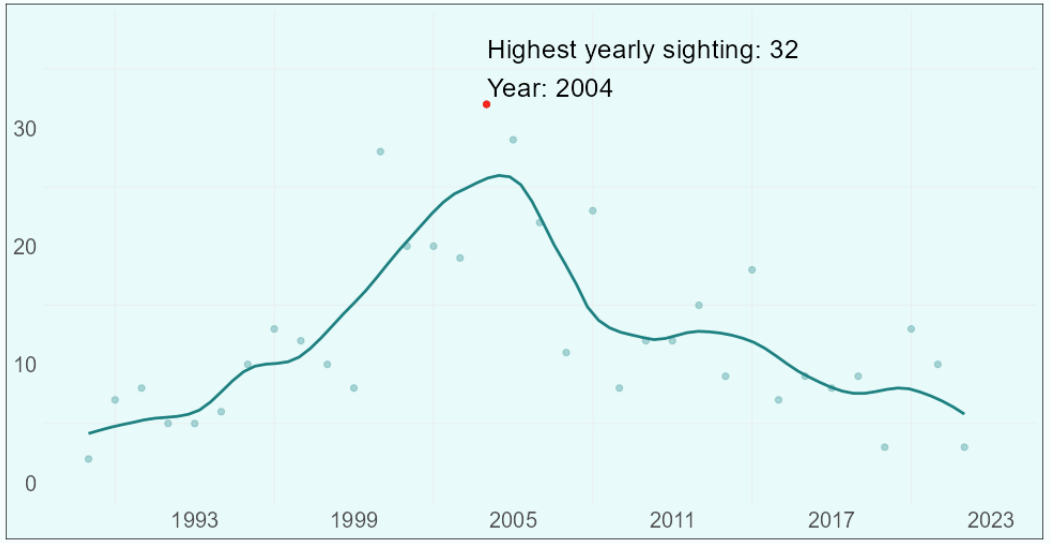
Select State

Washington

Sightings for top 10 counties



Sightings over time



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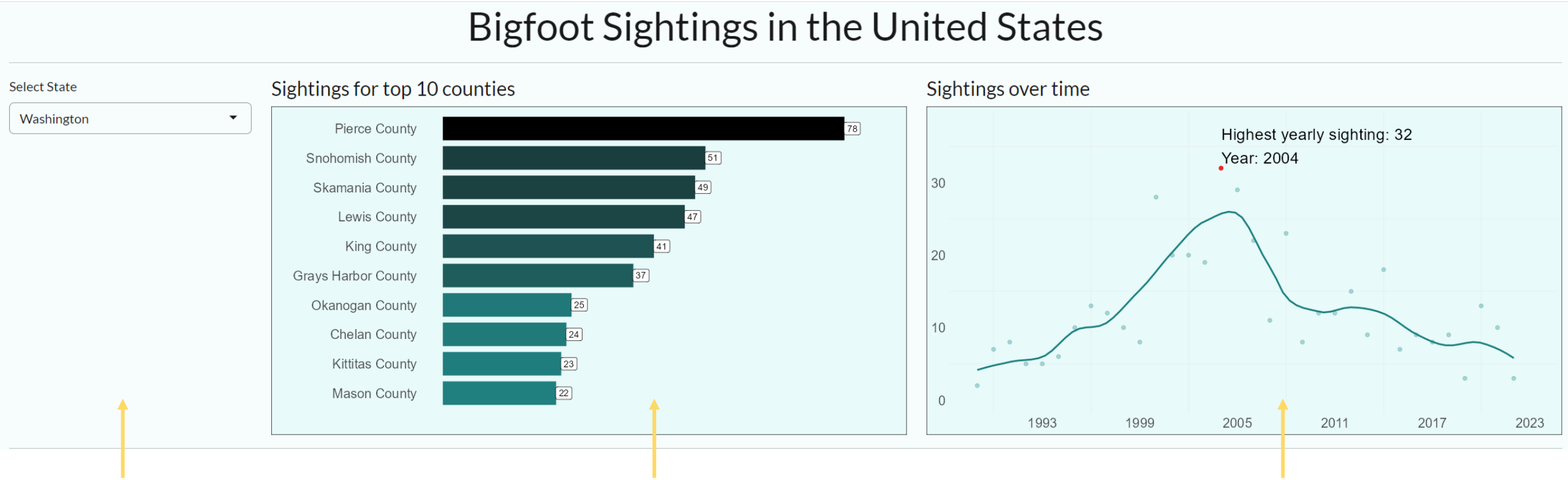
Step 1 : Decompose your application components



Input for filtering data

County plot (on filtered data)

Yearly plot (on filtered data)

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Main app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

3 ui elements

3 server elements

Note: All code is available in Github repo

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Main app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

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      count(year) |>
      ggplot(aes(year, n)) +
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      # ... rest of the plot code
  )
}

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

3 ui elements

3 server elements

State dropdown input and data filtering

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Main app.R file

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ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
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                  # Input state
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                  column(5, plotOutput(outputId = "plotcounty")),

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    data_filtered() |>
      count(county) |>
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      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

3 ui elements

3 server elements

County plot ui and code to create the plot

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Main app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
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                  column(2,selectizeInput(inputId = "state",
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                                          choices = unique(dataset$state),
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                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

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                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

3 ui elements

3 server elements

Yearly plot ui and code to create the plot

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Step 2 : Create modules (baby shiny apps) for the distributed components

- Module 1: Module_input.R
  - Ui: Create state input ui
  - Server: Filter data based on state input
- Module 2: Module_countyplot.R
  - Ui: Create county plot ui
  - Server: Generate the county plot with ggplot code
- Module 3: Module_yearlyplot.R
  - Ui: Create yearly plot ui
  - Server: Generate the yearly plot with ggplot code

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

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Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
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                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

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  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

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  output$plotyearly <- renderPlot(
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      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

ui and server components are written as two separate modules, just like a shiny app.

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}
```

```r
module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

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Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
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                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
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      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
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      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

In this module we want to ask user to input “state” and then filter data based on the user input

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
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Original app.R file

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    data_filtered() |>
      count(county) |>
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      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

We create the ui and server as functions that can be called from the main app.R file

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
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                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

ID serves as a unique identifier for each instance of the module within the application, allowing multiple instances of the same module to coexist and be independently controlled.

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Think of ID as a blind date identification

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

ID serves as a unique identifier for each instance of the module within the application, allowing multiple instances of the same module to coexist and be independently controlled.

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

ID is instantiated when the module function is called from the main app. Each ui and server call have the same unique id connecting the two.

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

A namespace is like a separate room that contains all the functions and variables specific to that module, preventing naming conflicts and keeping things organized

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 1: Module_input.R

A namespace is like a separate room that contains all the functions and variables specific to that module, preventing naming conflicts and keeping things organized

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Each input name is encapsulated in ns() to ensure that it is properly namespaced and avoid conflicts with input names from other module calls in the main application

Step 3: Test your module

Call the module function from the main app.R file

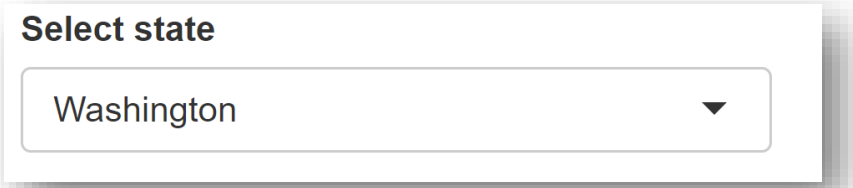
Test app.R

```r
source("./modules/module_input.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui_test <- fluidPage(
  # Call the ui module as a function
  module_input_ui("input_test", df=dataset))

server_test <- function(input, output, session) {
  # Call the server module as a function
  data_filtered <- module_input_server("input_test", df=dataset)
}

# Call the shiny app
shinyApp(ui=ui_test, server=server_test)
```

Module 1: Module_input.R

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Shiny App output



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https://deepshamenghani.quarto.pub/dmenghani/

Step 3: Test your module

Call the module function from the main app.R file

Test app.R

```r
source("./modules/module_input.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui_test <- fluidPage(
  # Call the ui module as a function
  module_input_ui("input_test", df=dataset))

server_test <- function(input, output, session) {
  # Call the server module as a function
  data_filtered <- module_input_server("input_test", df=dataset)
}

# Call the shiny app
shinyApp(ui=ui_test, server=server_test)
```

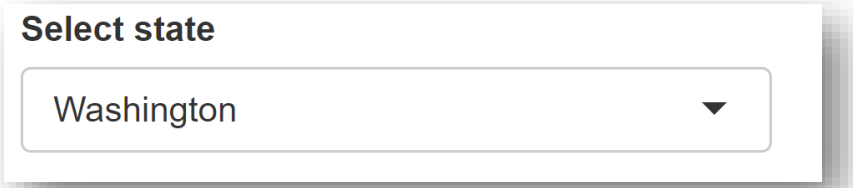
Source your module_input.R file

Module 1: Module_input.R

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Shiny App output



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Step 3: Test your module

Call the module function from the main app.R file

Test app.R

```
source("./modules/module_input.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui_test <- fluidPage(
  # Call the ui module as a function
  module_input_ui("input_test", df=dataset))

server_test <- function(input, output, session) {
  # Call the server module as a function
  data_filtered <- module_input_server("input_test", df=dataset)
}

# Call the shiny app
shinyApp(ui=ui_test, server=server_test)
```

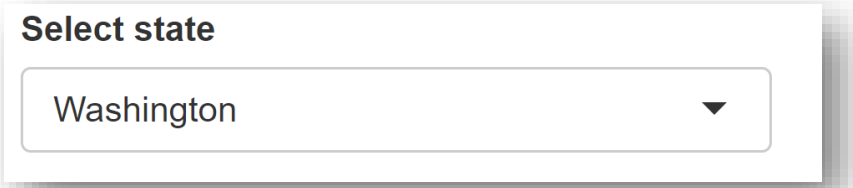
Call the ui module and server module functions from the main app ui and server

Module 1: Module_input.R

```
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}
```

```
module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Shiny App output



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Step 3: Test your module

Call the module function from the main app.R file

Test app.R

```r
source("./modules/module_input.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui_test <- fluidPage(
  # Call the ui module as a function
  module_input_ui("input_test", df=dataset))

server_test <- function(input, output, session) {
  # Call the server module as a function
  data_filtered <- module_input_server("input_test", df=dataset)
}

# Call the shiny app
shinyApp(ui=ui_test, server=server_test)
```

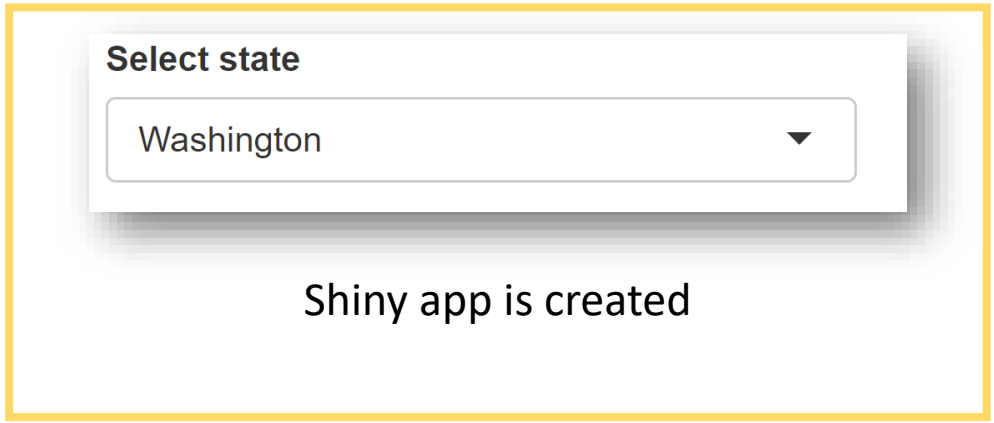
Call the shiny app command

Module 1: Module_input.R

```r
module_input_ui <- function(id, df, defaultstate = "Washington") {
  # Namespace
  ns <- NS(id)
  # Input UI command
  selectizeInput(inputId = ns("stateinput"), label = "Select state",
                 choices = unique(df$state),
                 selected = defaultstate, multiple = FALSE)
}

module_input_server <- function(id, df) {
  moduleServer(id,
               function(input, output, session) {
                 # Filter data set based on input
                 table <- reactive({df |> filter(state == input$stateinput)})
                 return(table)
               }
  )
}
```

Shiny App output



Shiny app is created

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Step 4: Replicate modularization for other decomposed components

- **COMPLETED** - **Module 1**: Module_input.R
  - Ui: Create state input ui
  - Server: Filter data based on state input
- **Module 2**: Module_countyplot.R
  - Ui: Create county plot ui
  - Server: Generate the county plot with ggplot code
- **Module 3**: Module_yearlyplot.R
  - Ui: Create yearly plot ui
  - Server: Generate the yearly plot with ggplot code

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 2: Module_countyplot.R

```r
module_county_ui <- function(id) {
  # Namespace
  ns <- NS(id)
  plotOutput(outputId = ns("plotcounty"))
}
```

```r
module_county_server <- function(id, df_filtered) {
  moduleServer(id,
               function(input, output, session) {
                 # County plot code
                 output$plotcounty <- renderPlot(
                   df_filtered() |>
                     count(county) |>
                     ggplot() +
                     geom_col(aes(county, n, fill = n),
                              colour = NA, width = 0.8)
                     # ... rest of the plot code
                     )
               }
  )
}
```

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Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Module 3: Module_yearlyplot.R

```r
module_yearly_ui <- function(id) {
  # Namespace
  ns <- NS(id)
  plotOutput(outputId = ns("plotyearly"))
}
```

```r
module_yearly_server <- function(id, df_filtered) {
  moduleServer(id,
               function(input, output, session) {
                 # Yearly plot code
                 output$plotyearly <- renderPlot(
                   df_filtered() |>
                     count(year) |>
                     ggplot(aes(year, n)) +
                     geom_point(aes(year, highest_count), alpha=1, size = 2)
                     # ... rest of the plot code
                     )
               }
  )
}
```

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Step 5: Call modules from the main app.R file

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Updated app.R file

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with single section

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

}

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

Source the module files

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Updated app.R file

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with single section

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

}

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

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Call state input ui and server modules with “same” id

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Updated app.R file

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with single section

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

}

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

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Similarly, call country plot ui and server modules

Updated app.R file

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with single section

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

}

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

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Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Similarly, call yearly plot ui and server modules

Updated app.R file

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with single section

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

}

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

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Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Run the shiny app

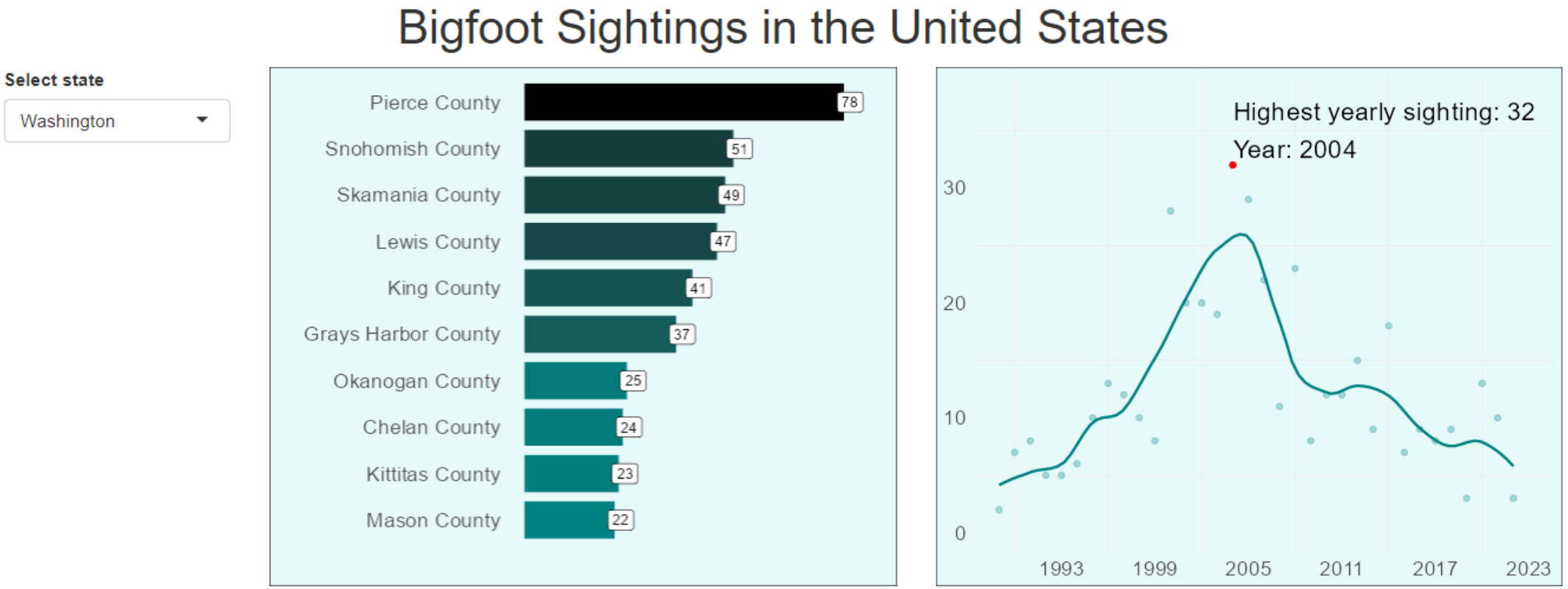
Updated app.R file

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with single section

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

}

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

app.R is so clean and simple to read!!!

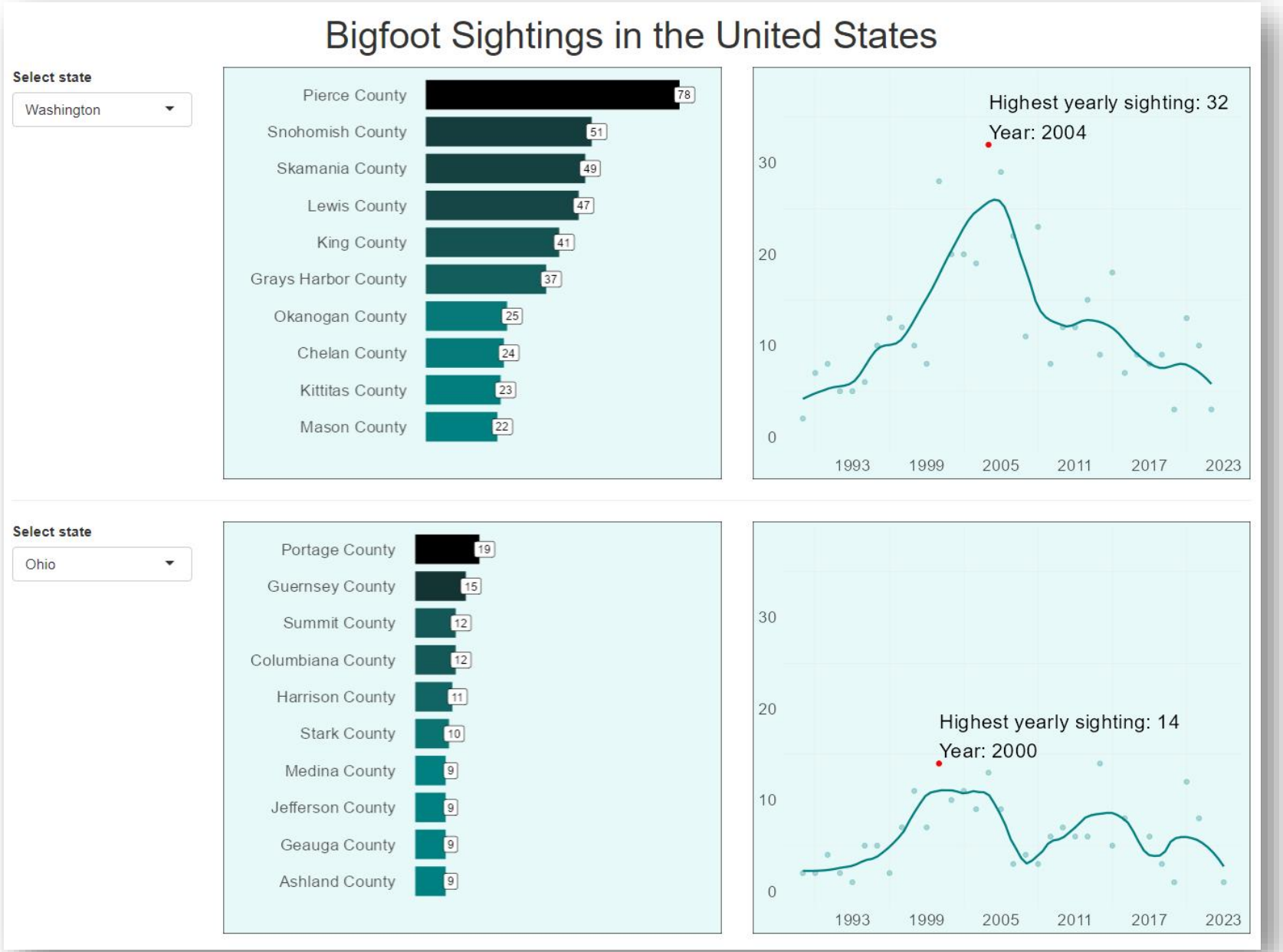
Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Shiny output



Now, let's replicate input and output plots for two state comparison

Like this ->



Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

Updated app.R file – single module, multiple calls

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with two sections

ui <- fluidPage(h1("Bigfoot Sightings in the United States",
                   align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ),
                fluidRow(
                  column(2,module_input_ui("inputs_2", dataset,
                                           defaultstate = "Ohio")),
                  column(5, module_county_ui("countyplot_2")),
                  column(5, module_yearly_ui("timeplot_2"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

  data_filtered_2 <- module_input_server("inputs_2", dataset)
  module_county_server("countyplot_2", df_filtered = data_filtered_2)
  module_yearly_server("timeplot_2", df_filtered = data_filtered_2)

}

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

Original app.R file

```r
dataset <- read.csv("./data/bfro_reports_geocoded.csv")

ui <- fluidPage(h1("Bigfoot Sightings in the United States", align="center"),
                fluidRow(
                  # Input state
                  column(2,selectizeInput(inputId = "state",
                                          label = "Select State",
                                          choices = unique(dataset$state),
                                          selected = "Washington",
                                          multiple = FALSE)),

                  # Show county plot
                  column(5, plotOutput(outputId = "plotcounty")),

                  # Show yearly plot
                  column(5, plotOutput(outputId = "plotyearly"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  # filter data based on user selection
  data_filtered <- reactive({dataset |> filter(state == input$state)})

  # County plot
  output$plotcounty <- renderPlot(
    data_filtered() |>
      count(county) |>
      ggplot() +
      geom_col(aes(county, n, fill = n), colour = NA, width = 0.8)
      # ... rest of the plot code
  )

  # Yearly plot
  output$plotyearly <- renderPlot(
    data_filtered() |>
      count(year) |>
      ggplot(aes(year, n)) +
      geom_point(aes(year, highest_count), alpha=1, size = 2)
      # ... rest of the plot code
  )
}

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

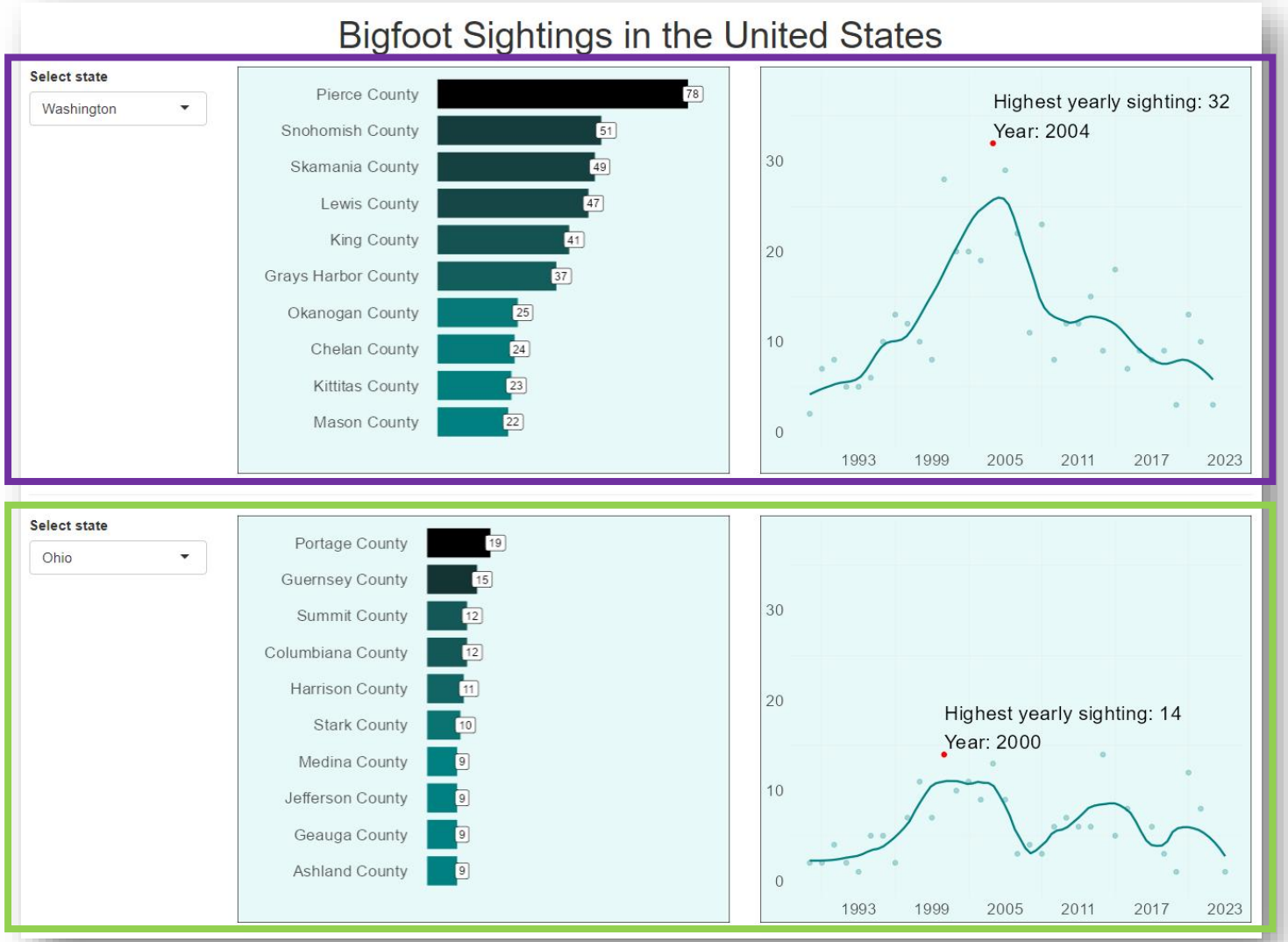
NOTE: Unique ids amongst each module calls

```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with two sections

ui <- fluidPage(h1("Bigfoot Sightings in the United States",
                   align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ),
                fluidRow(
                  column(2,module_input_ui("inputs_2", dataset,
                                           defaultstate = "Ohio")),
                  column(5, module_county_ui("countyplot_2")),
                  column(5, module_yearly_ui("timeplot_2"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

  data_filtered_2 <- module_input_server("inputs_2", dataset)
  module_county_server("countyplot_2", df_filtered = data_filtered_2)
  module_yearly_server("timeplot_2", df_filtered = data_filtered_2)

}

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

Updated app.R file – single module, multiple calls

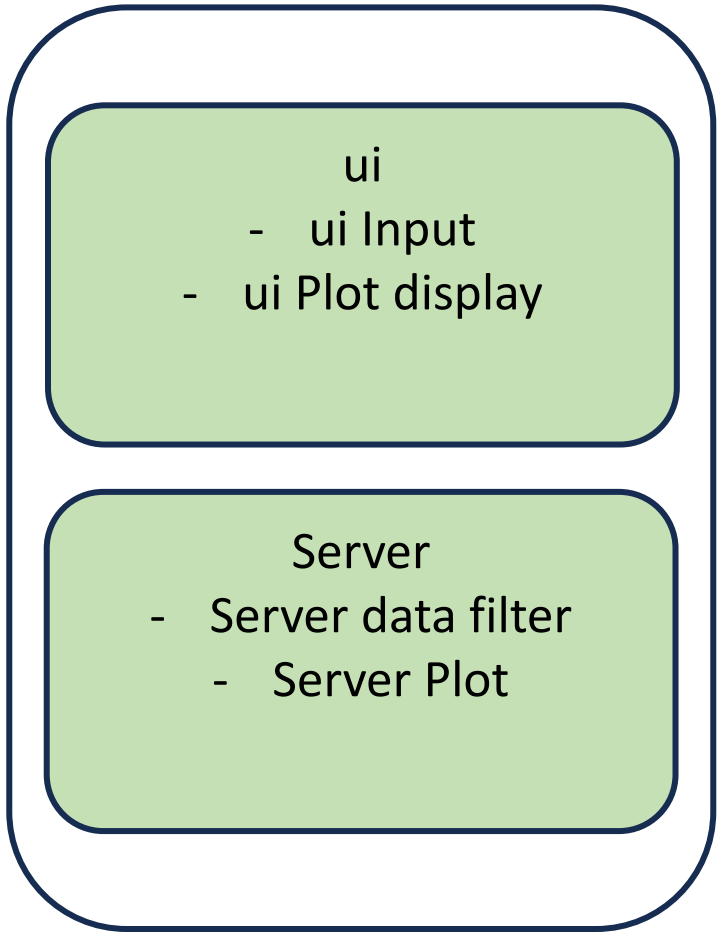
```r
source("./modules/module_input.R")
source("./modules/module_countyplot.R")
source("./modules/module_yearlyplot.R")

dataset <- read.csv("./data/bfro_reports_geocoded.csv")

# App with two sections

ui <- fluidPage(h1("Bigfoot Sightings in the United States",
                   align="center"),
                fluidRow(
                  # Input state
                  column(2,module_input_ui("inputs", dataset)),
                  # Show county plot
                  column(5, module_county_ui("countyplot")),
                  # Show yearly plot
                  column(5, module_yearly_ui("timeplot"))
                ), hr(),
                fluidRow(
                  column(2,module_input_ui("inputs_2", dataset,
                                           defaultstate = "Ohio")),
                  column(5, module_county_ui("countyplot_2")),
                  column(5, module_yearly_ui("timeplot_2"))
                ))

# Define server logic ----
server <- function(input, output, session) {

  data_filtered <- module_input_server("inputs", dataset)
  module_county_server("countyplot", df_filtered = data_filtered)
  module_yearly_server("timeplot", df_filtered = data_filtered)

  data_filtered_2 <- module_input_server("inputs_2", dataset)
  module_county_server("countyplot_2", df_filtered = data_filtered_2)
  module_yearly_server("timeplot_2", df_filtered = data_filtered_2)

}

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

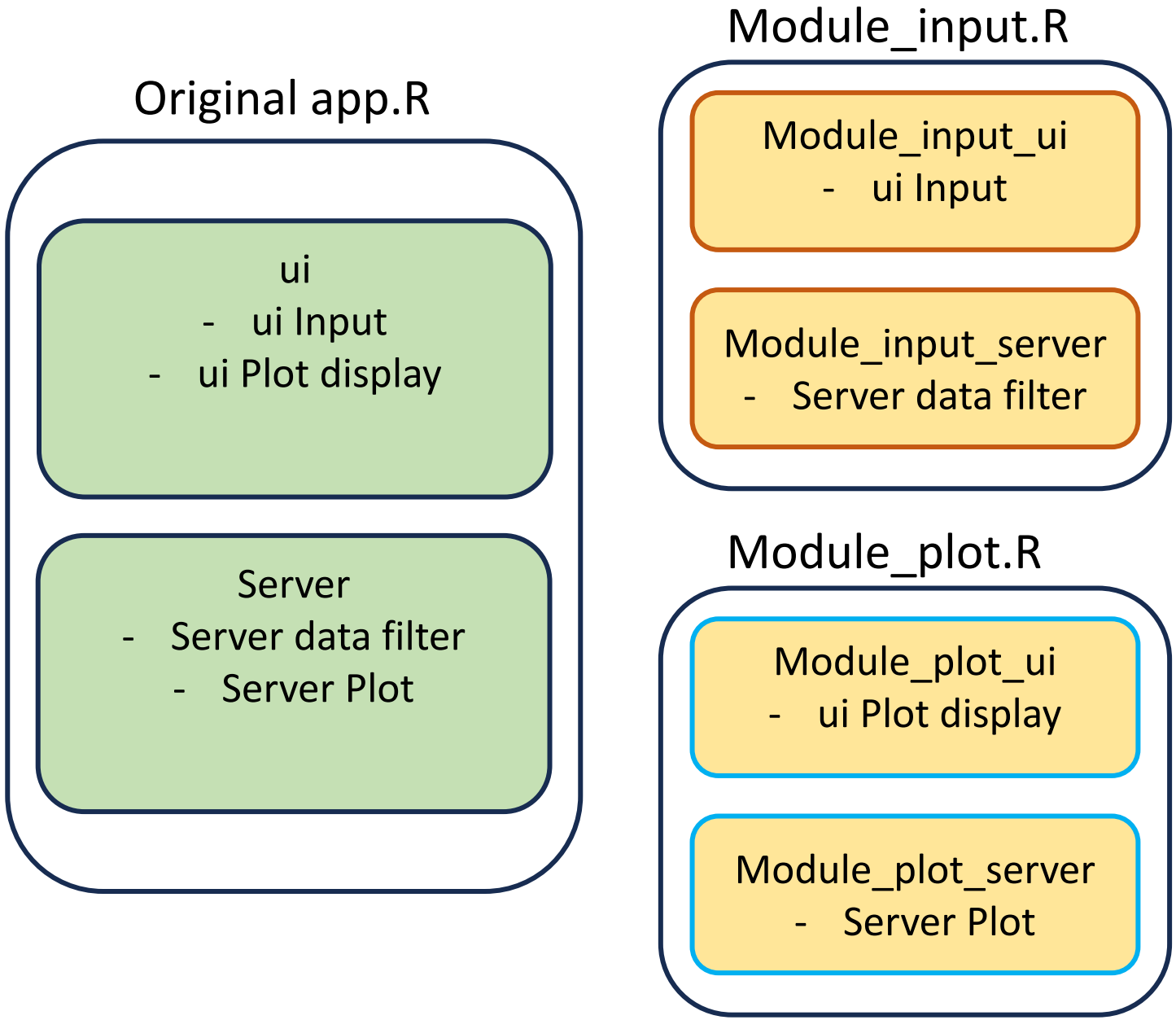
Shiny App output

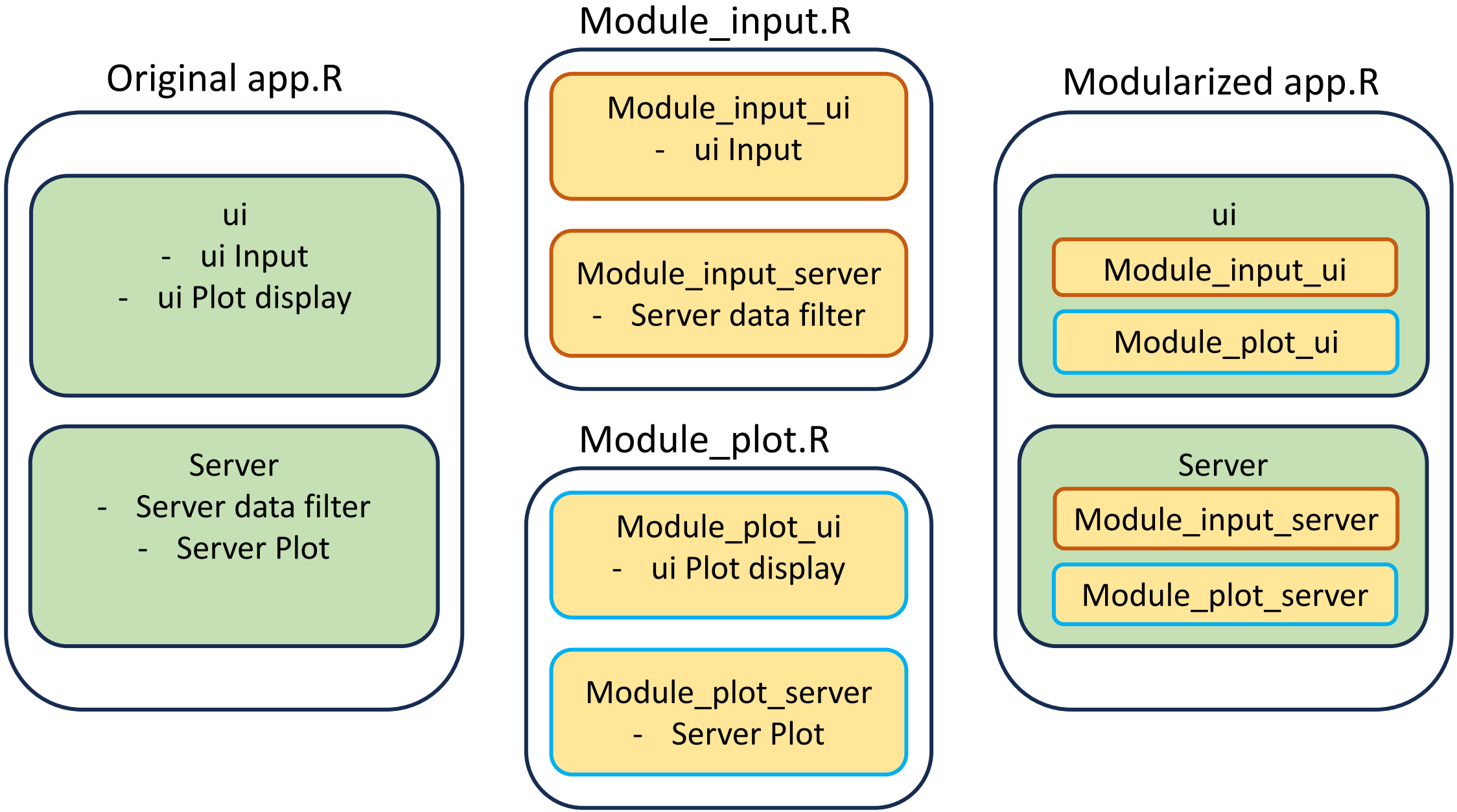


Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

Original app.R




Original app.R
ui
- ui Input
- ui Plot display
Server
- Server data filter
- Server Plot
Module_input.R
Module_input_ui
- ui Input
Module_input_server
- Server data filter
Module_plot.R
Module_plot_ui
- ui Plot display
Module_plot_server
- Server Plot



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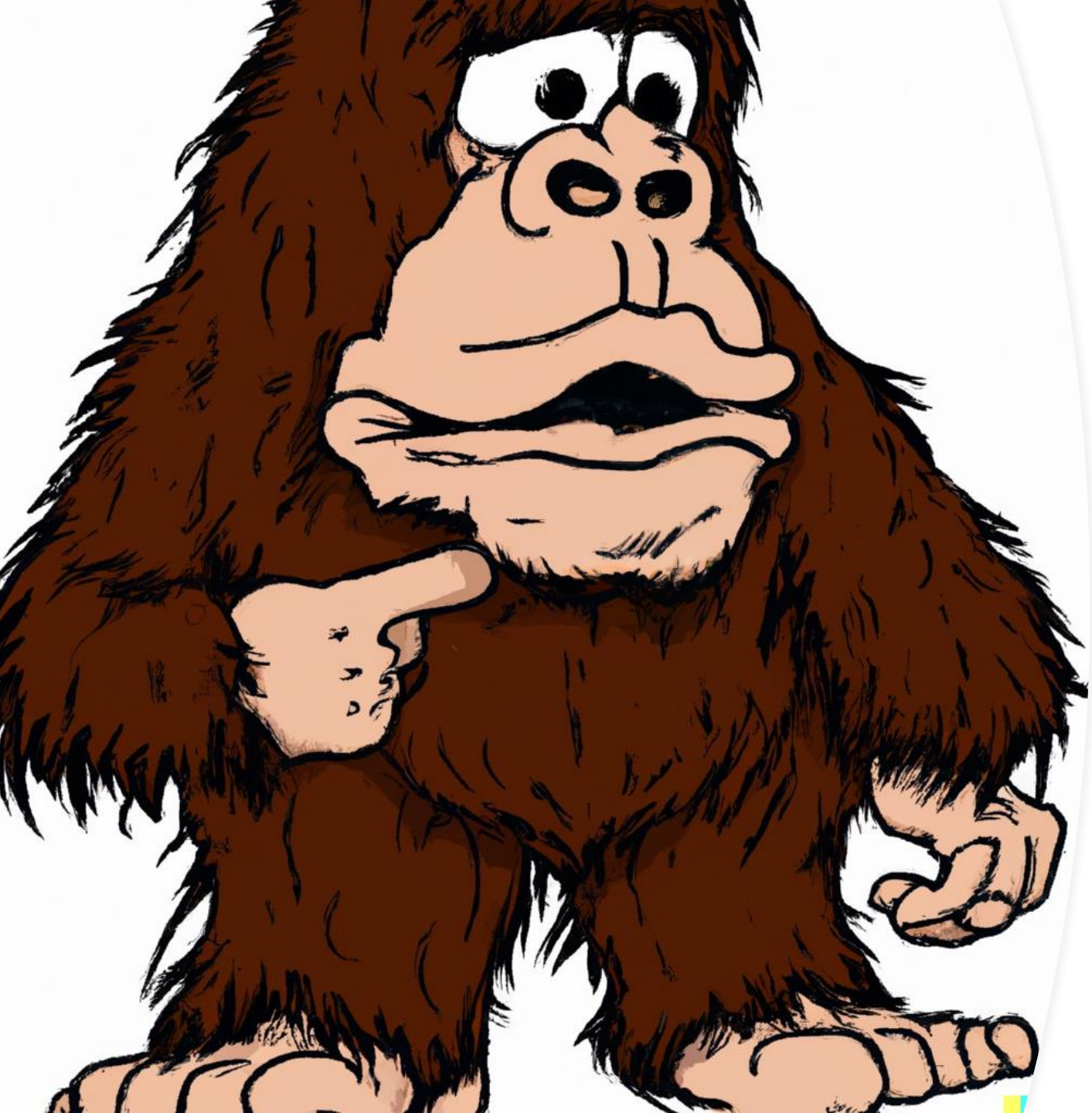
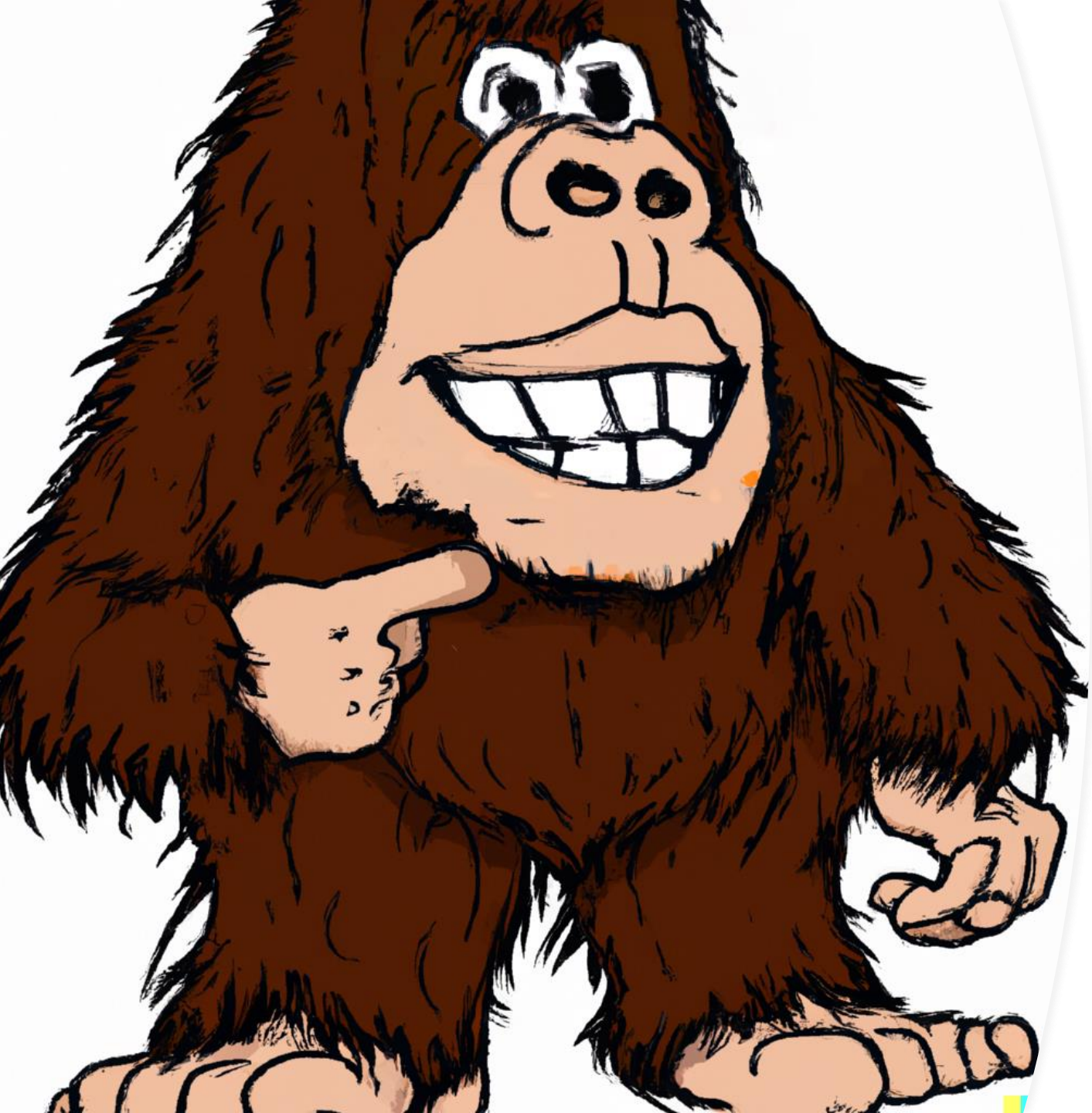


The challenges with a monolith app.R file

- Difficult to keep track of components
- Challenging to debug if something fails
- Harder for someone new to learn and contribute
- Tedious to reuse its elements within itself and other applications



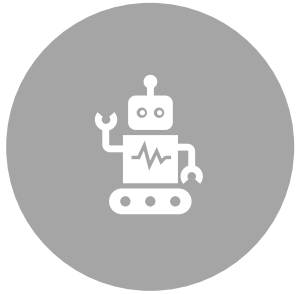
Benefits of modular approach

- Easy to keep track of components
- Single location to debug if something fails
- Structured cleanly for someone new to learn and contribute
- Element usability within itself and other applications

Deepsha Menghani
https://deepshamenghani.quarto.pub/dmenghani/

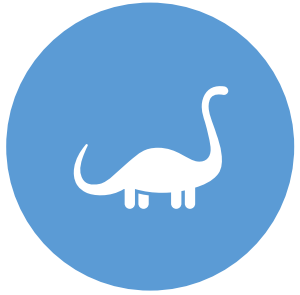
Next steps

New to Shiny? Start with modular approach



Learned the monolith way? Start with converting an existing app modular

Check out Mastering Shiny book by Hadley Wickham



Check out Github repo for modular and non-modular bigfoot app code

Deepsha Menghani: https://deepshamenghani.quarto.pub/dmenghani/