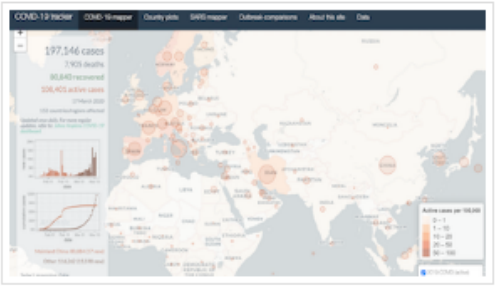
Introduction to R Shiny

Workshop on Data Visualization in R

Lokesh Mano • 17-Oct-2022
NBIS, SciLifeLab

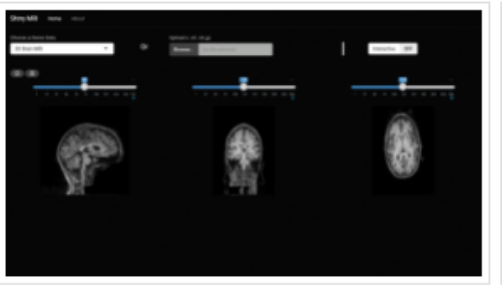
Contents

Life sciences



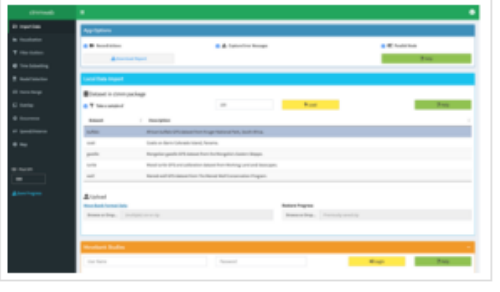
COVID-19 tracker

Exploring large hospital data for better use of antimicrobials

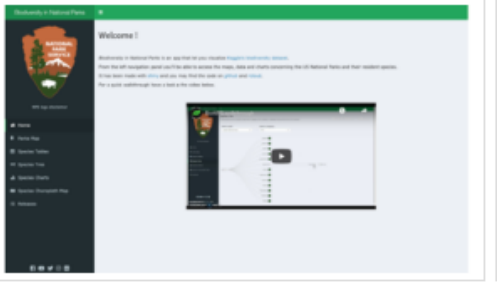


ShinyMRI - View MRI images in Shiny

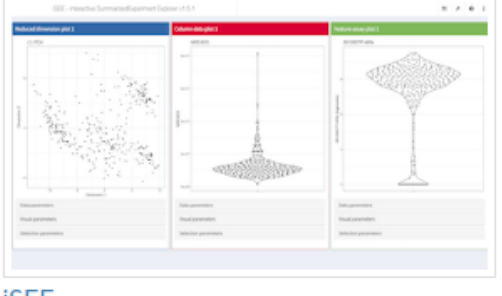
A/B Testing Sample Size Calculator



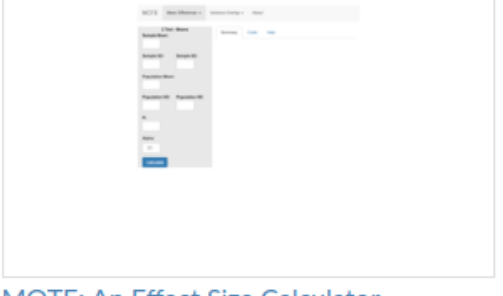
ctmmweb, a web app to analysis Animal tracking data



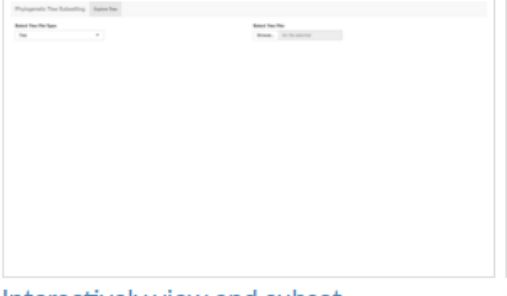
Visualizing Biodiversity in National Parks data



iSEE



MOTE: An Effect Size Calculator



Interactively view and subset phylogenetic trees

What is shiny?

- Interactive documents & web applications
- Completely created using R
- Needs a live environment

Usage

- Standalone web applications
- Dashboard/Flexboard
- Interactive RMarkdown
- Gadgets/RStudio extensions

App structure

- UI Layout
- UI Inputs (Widgets)
- UI Outputs
- Renderer
- Builder

Code structure

One file format

app.R

```
ui <- fluidPage()
server <- function(input,output) {}
shinyApp(ui=ui,server=server)
```

Two file format

ui.R

```
ui <- fluidPage()
```

server.R

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

App execution

- Change to app directory, then run `runApp()`
- Use `shinyApp()`

```
shinyApp(
ui=fluidPage(),
server=function(input,output) {}
)
```

- From Rmd file using `rmarkdown::run()`
- Running as a separate process from terminal

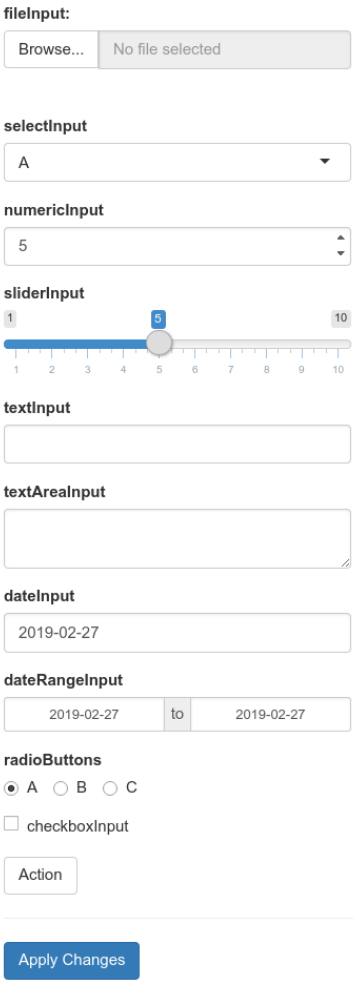
```
R -e "shiny::runApp('~/shinyapp')"
```

UI • Layout

```
shinyApp(
ui=fluidPage(
  titlePanel("Title Panel"),
  sidebarLayout(
    sidebarPanel(
      helpText("Sidebar Panel")
    ),
    mainPanel(tabsetPanel(
                tabPanel("tab1",
                         fluidRow(
                           column(6,helpText("Col1")),
                           column(6,
                                  helpText("Col2"),
                                  fluidRow(
```

UI • Widgets • Input

```
shinyApp(
ui=fluidPage(
  fluidRow(
    column(4,
           fileInput("file-input","fileInput:"),
           selectInput("select-input",label="selectI
           numericInput("numeric-input",label="numer
           sliderInput("slider-input",label="sliderI
           textInput("text-input",label="textInput")
           textAreaInput("text-area-input",label="te
           dateInput("date-input",label="dateInput")
           dateRangeInput("date-range-input",label="
           radioButtons("radio-button",label="radioB
           checkboxInput("checkbox","checkboxInput",
           actionButton("action-button","Action"),
           hr(),
           submitButton()
    )
  )
),
server=function(input,output) {
})
```



Widgets gallery

UI • Widgets • Outputs

```
shinyApp(
ui=fluidPage(fluidRow(column(5,
           textInput("text_input",label="textInput",
           hr(),
           htmlOutput("html_output"),
           textOutput("text_output"),
           verbatimTextOutput("verbatim_text_output"
           tableOutput("table_output"),
           plotOutput("plot_output",width="300px",he
    ))),
server=function(input, output) {
  output$html_output <- renderText({input$text_input
  output$text_output <- renderText({input$text_input
  output$verbatim_text_output <- renderText({input$t
  output$table_output <- renderTable({iris[1:3,1:3]}
  output$plot_output <- renderPlot({
    plot(iris[,1],iris[,2])
  })
})
```

textInput

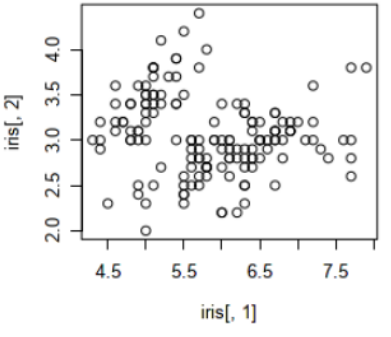
<h3 style='color:red'>Red text</h3>

Red text

<h3 style='color:red'>Red text</h3>

```
<h3 style='color:red'>Red text</h3>
```

Sepal.Length	Sepal.Width	Petal.Length
5.10	3.50	1.40
4.90	3.00	1.40
4.70	3.20	1.30



Dynamic UI

- UI elements are created conditionally using `uiOutput()` / `renderUI()`

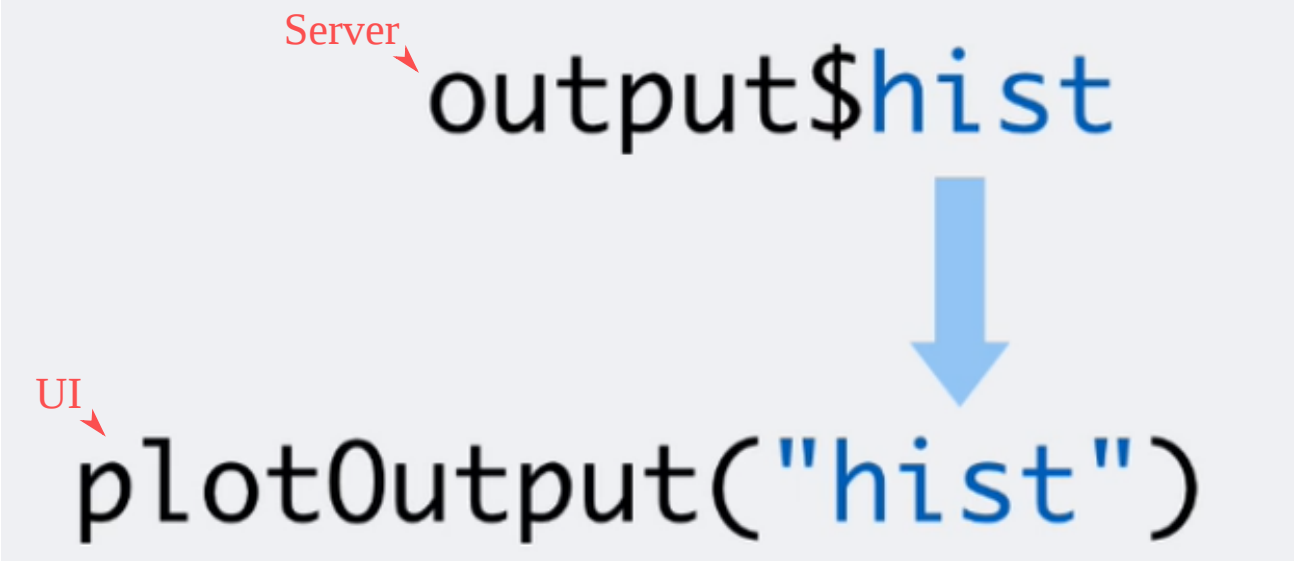
```
shinyApp(
ui=fluidPage(
  selectInput("data",label="Select data",
              choices=c("mtcars","faithful","iris")),
  tableOutput("table"),
 uiOutput("ui")
),
server=function(input, output) {

  data <- reactive({ get(input$data, 'package:datasets') })

 output$ui <- renderUI({
  if(input$data=="iris") plotOutput("plot",width="400px")
  })

  output$plot <- renderPlot({hist(data()[, 1])})
  output$table <- renderTable({head(data())})
})
```

- Other options include `conditionalPanel()`, `insertUI()` and `removeUI()`

Server

- `Server` is a function that assembles your `input` into `output` using R based code.
- Three rules to be followed to write a server function:

Rule 1: Save objects to display to `output$`



Server

Rule 2: Build objects to display with `render*()`

- R-Code block (can even be an entire R script) between the braces `{}` inside the `render*()` function.

```
output$hist <- renderPlot({
                  title <- "histogram of 100 random numbers"
                  hist(rnorm(100), main = title)
              })
```

Different Render functions

Thank you. Questions?

Slide courtesy: Roy Francis (NBIS, RaukR2021)

R version 4.1.3 (2022-03-10)

Platform: x86_64-pc-linux-gnu (64-bit)

OS: Ubuntu 18.04.6 LTS

Built on : 17-Oct-2022 at 15:35:39