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# Applied Statistics Seminar Series: R Shiny

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- An R package that makes it easy to turn your analyses into interactive web apps using R
- Needs no knowledge of HTML, CSS, or Javscript

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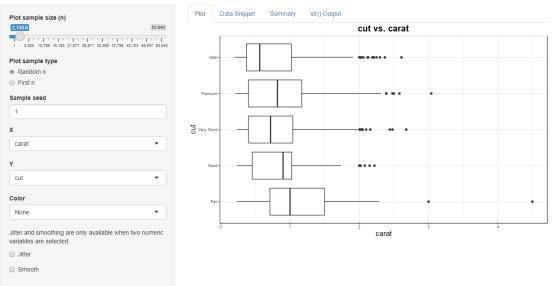
## Why use Shiny?

#### • Exploratory Data Analysis

U:/Presentations/RShiny 2022/rshiny_presentation_example1 - Shiny	-		$\times$
http://127.0.0.117222   🔊 Open in Browser   📀	S- Publish 🔸		

#### Dataset Explorer

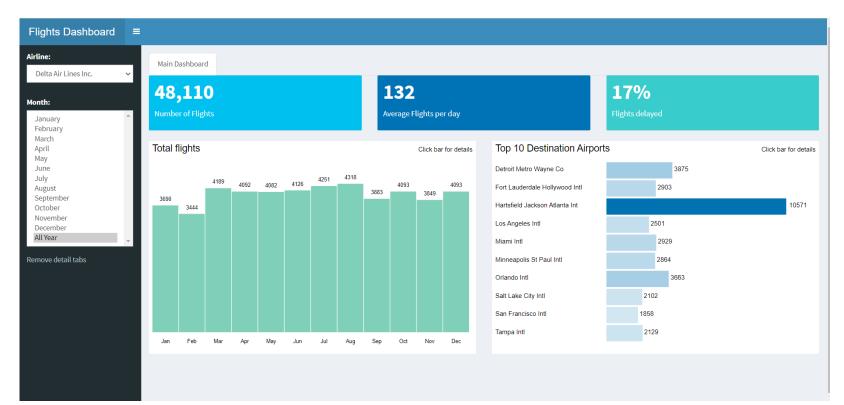
A simple Shiny app for exploratory data analysis. The output in the 'Summary' and 'str() Output tabs is based on the full dataset. The controls in the sidebar are for the 'Plot' and 'Data snippet' tabs. The 'Data snippet' tabs is based on the full dataset.



https://www.r-bloggers.com/2020/12/a-shiny-app-for-exploratory-data-analysis/



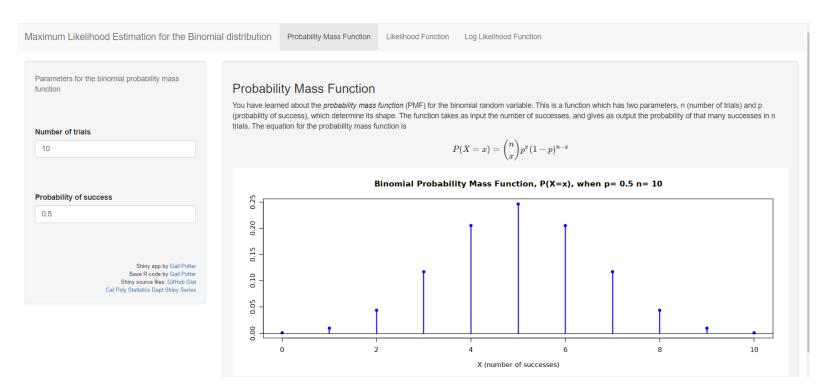
#### • Dashboards



https://edgarruiz.shinyapps.io/db-dashboard/

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#### • Teaching statistics



#### http://shiny.calpoly.sh/MLE\_Binomial/

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• Apps for your collaborators

A9999	
In Vitro Fertilization:	
No	
Yes	
Is a date for the first date of the potential participant's LMP known?	
Yes	
No	
LMP Date:	
01/01/2021	
Input gestational age from ultrasound	
Weeks	Days
10	0
Ultrasound Date:	Todays Date:
Ultrasound Date:	Todays Date: 03/13/2022
03/13/2022	03/13/2022
03/13/2022 Gestational Age Today	03/13/2022

GO MOMs - Estimated Study Visits



#### • Fun!

· Created b	Lights Out y Dean Attali • Package available on GitHub • More apps by Dean	19 2 Qili
Board size 5x5 • Game mode Classic • New Game Lights Out is a puzzle game consisting of a grid of lights that are either on (light green) or off (dark green). In <i>classic</i> mode, pressing any light will toggle it and its adjacent lights. In <i>variant</i> mode, pressing a light will toggle all the lights in its row and column. The goal of the game is to switch all the lights off.	Image: state stat	

NERD!

https://daattali.com/shiny/lightsout/

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## Create your first Shiny app

#### RStudio

File Edit Code View Plots		bug Profile Tools Help
New File New Project	•	
Open File	Ctrl+O	R Notebook ⊡ R Markdown ⊡ List - ℃ -
Open File in New Column Recent Files		Shiny Web App Plumber API
Open Project Open Project in New Session Recent Projects		C File C++ File Header File
Import Dataset		Markdown File
Save Save As		HTML File CSS File
Save All	Ctrl+Alt+S	JavaScript File
Publish		D3 Script
Print		Python Script
<b>Close</b> Close All Close All Except Current	<b>Ctrl+W</b> Ctrl+Shift+W Ctrl+Alt+Shift+W	Shell Script SQL Script Stan File Text File
Close Project		R Sweave
Quit Session	Ctrl+Q	R HTML R Presentation R Documentation

New Shiny Web Application	
R	Application name: My_First_Shiny_App Application type:
③ Shiny Web Applications	Create Cancel

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## Structure of a Shiny App

- 4 main parts to creating a Shiny app:
  - library(shiny)
  - ui <- fluidPage()</pre>
  - server <- function(input, output) {}</pre>
  - shinyApp(ui = ui, server = server)



• library(shiny)

This loads the shiny package





• ui <- fluidPage()

This defines the user interface, which is the HTML webpage that you will create and interact with





• server <- function(input, output) {}</pre>

This specifies the behavior of the app.

This is where all of the behind the scenes machinery of the app lives that will get calculated, plotted, analyzed, etc.



• shinyApp(ui = ui, server = server)

This creates a shinyApp object that can then be run and output as an HTML webpage.



- Shiny Cheat Sheet
  - <u>https://shiny.rstudio.com/images/shiny-cheatsheet.pdf</u>
- Mastering Shiny
  - <u>https://mastering-shiny.org/index.html</u>

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#### GO MOMs



- Glycemic Observation and Metabolic Outcomes in Mothers and Offspring
- Prospective, observational study involving an anticipated 2150 participants across 9 study sites
- 4 study visits plus additional data collected at delivery and post partum



- Study visit windows based on gestational age
  - 10-14 weeks
  - 16-20 weeks
  - -24-28
  - 32 36 weeks gestation
- RAs across 9 study sites need to quickly calculate gestational age, estimated delivery date, and study visit widows for recruitment and scheduling of participants
- We created a Shiny app for this

## GO MOMs Shiny App

- Inputs
  - Participant ID
  - In vitro fertilization
  - LMP date (if available)
  - Gestational age from ultrasound
  - Ultrasound date
  - Today's Date

#### Outputs

- Gestational age today
- Estimated delivery date
- Date ranges for each study visit window
- Save output as .csv (optional)

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### GO MOMs - UI

## GO MOMs Shiny App - ui

• Title

h1("GO MOMs - Estimated Study Visits",
 style = "color:DarkMagenta")

- Typically you would use titlePanel() for the title of your app.
- This allowed for more customization

## GO MOMs Shiny App - ui

• Input ID

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• In vitro fertilization

```
radioButtons("in_vitro",
   "In Vitro Fertilization:",
        c("No", "Yes"))
```

## GO MOMs Shiny App - ui

- Conditional Panels
- We want additional inputs to appear, conditional on the answer of the In Vitro Fertilization radio button

•

•

•

```
conditionalPanel(
    condition = "input.in_vitro == `No'",
```

```
GO MOMs Shiny App - ui
```

• Input gestational age from ultrasound in terms of weeks and days

```
splitLayout(
   numericInput("gestage_wks",
        "Weeks",
        value=1, min=0, max=40),
   numericInput("gestage_days",
        "Days",
        value=0, min=0, max=6))
   ),
```

## GO MOMs Shiny App - ui

```
• Input Dates
```

```
splitLayout(
    dateInput("ultrasound_dt",
        "Ultrasound Date:",
        value = "2021-01-01",
        format="mm/dd/yyyy"),
    dateInput("todays_dt",
        "Todays Date:",
        value = Sys.Date(),
        format="mm/dd/yyyy")
```



• Output text for gestational age based on today's date

verbatimTextOutput("gest\_age\_today\_text")





#### • Output table (data frame)

```
fluidRow(
    column(12, tableOutput('table')
)
```



#### • Download button for saving results from the app

downloadButton("downloadData",

"Download study visit date ranges")

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#### GO MOMs - Server

```
GO MOMs Shiny App - server
```

Takes inputs from ui as arguments into the output function below

})

```
GO MOMs Shiny App - server
```

Output a data frame of study visit windows

```
df.visits = reactive({
```

```
data.frame(ID, Visit, Earliest_Date, Latest_Date, EDD)
})
```

•

```
output$table <- renderTable(df.visits())</pre>
```

## GO MOMs Shiny App - server

Save a data frame of study visit windows as a .csv file

```
output$downloadData <- downloadHandler(
    filename = function() {
        paste("study_visits_id_",
            input$id, ".csv", sep = "")
    },
    content = function(file) {
        write.csv(df.visits(), file, row.names = FALSE)
    }
)</pre>
```

## Share your app: One possible approach

- Upload to Gist
  - Gist is a product of Github
  - A way to anonymously post and share files online
- To share your app as a gist:
  - Copy and paste your app.R files to the Gist web page.
  - Copy the URL that GitHub gives the Gist.
  - Once you have made a gist, your users can launch the app with shiny::runGist("12345ABCDEF", launch.browser=T)
  - Where "12345ABCDEF" is the unique number that appears at the end of your Gist address

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# Thank you!