RBAR & NDEV34

INTERACTIVE WEB APPS WITH RSHINY

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ABOUT ME

PhD Candidate (Biology)
based at Ocean Sciences Center

"How can computational tools be used to solve marine conservation problems?"

I'm not a computer scientist, programmer, software developer, or data scientist.

WHAT IS SHINY?

Shiny is a package for the open source programming language and software environment R that provides users with a framework for building applications.

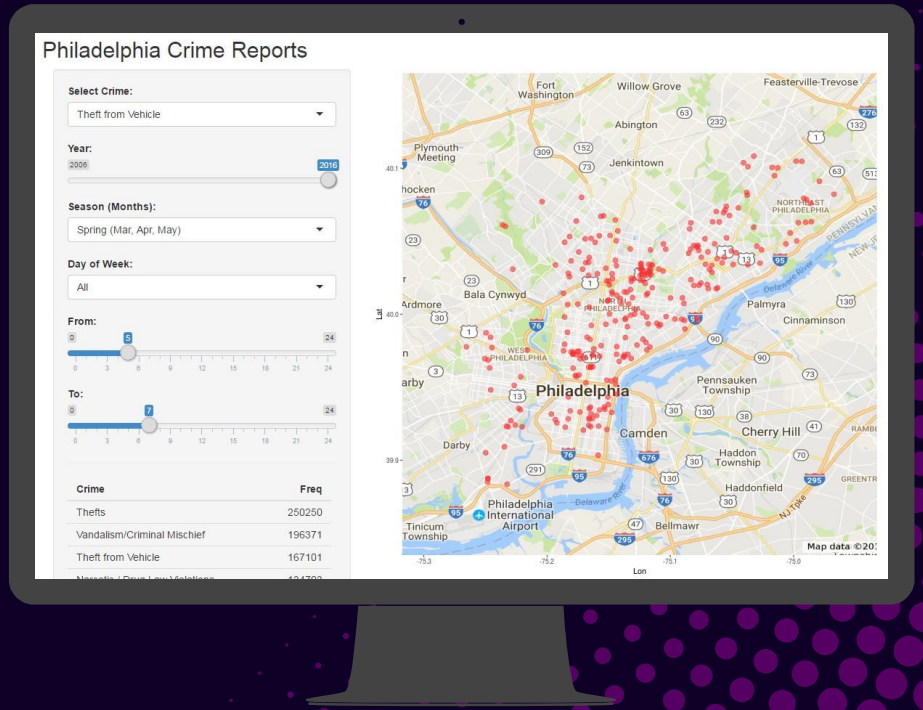

```
// step i
var binding = new Shiny.InputBinding();

// step ii
$.extend(binding, {

  find: function(scope) {
    ...
  },

  initialize: function(el){
    ...
  },

  getValue: function(el) {
    ...
  },

  subscribe: function(el, callback) {
    ...
  }

});

// step iii
Shiny.inputBindings.register(binding);
```


Google Analytics

OVERVIEW

- Shiny structure
- Live coding: creating a Shiny app
- Deployment
- Demo: practical application of Shiny

Creating Something Shiny

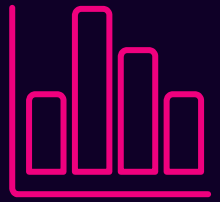


SHINY IN FOUR STEPS

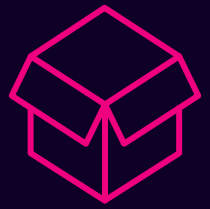
- Load packages
- Define user interface
- Define server function
- Run application with `shinyApp(...)`

LOAD PACKAGES

{shiny}

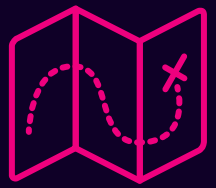


{ggplot2}
graphics



{dplyr} & {tidyr}
data wrangling

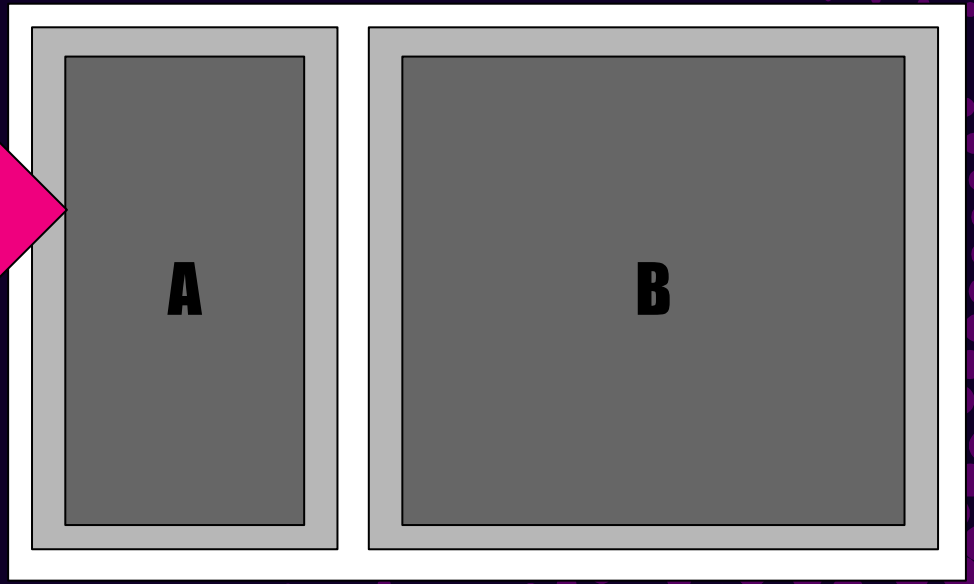
{lubridate}
dates & times



{leaflet}
maps

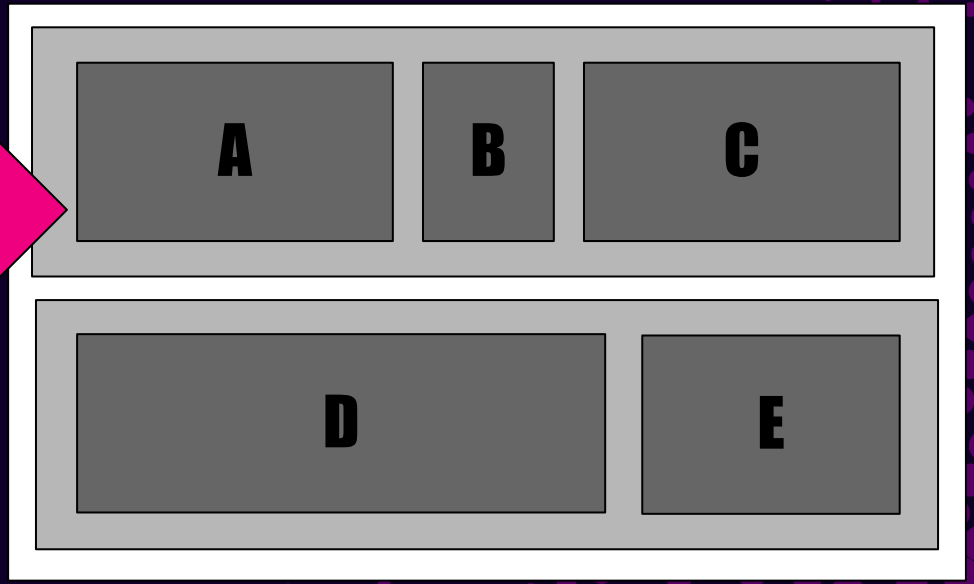
DEFINE USER INTERFACE

```
ui <- fluidPage(
  sidebarLayout(
    sidebarPanel(A),
    mainPanel(B))
)
```



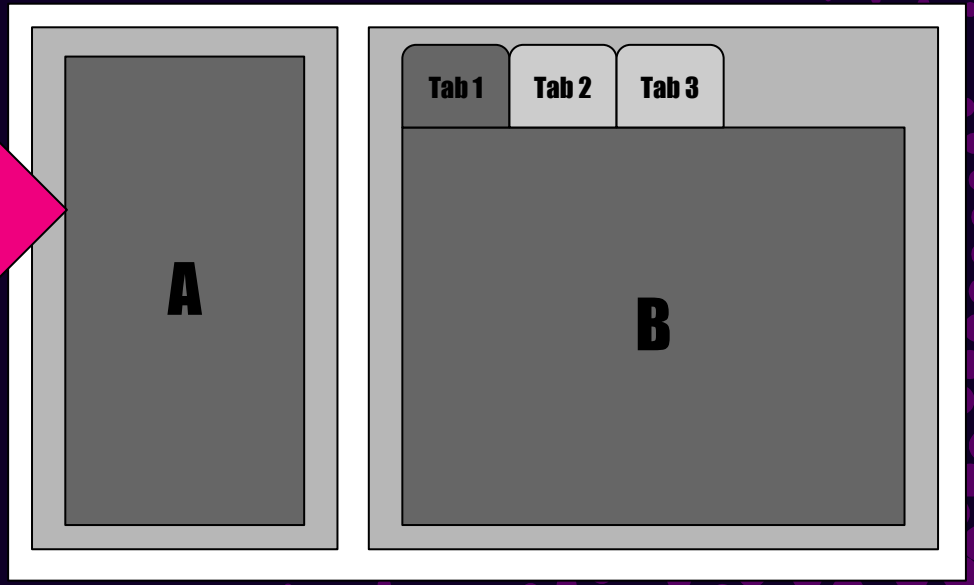
DEFINE USER INTERFACE

```
ui <- fluidPage(
  fluidRow(column(5, A),
           column(2, B),
           column(5, C)),
  fluidRow(column(8, D),
           column(4, E))
)
```



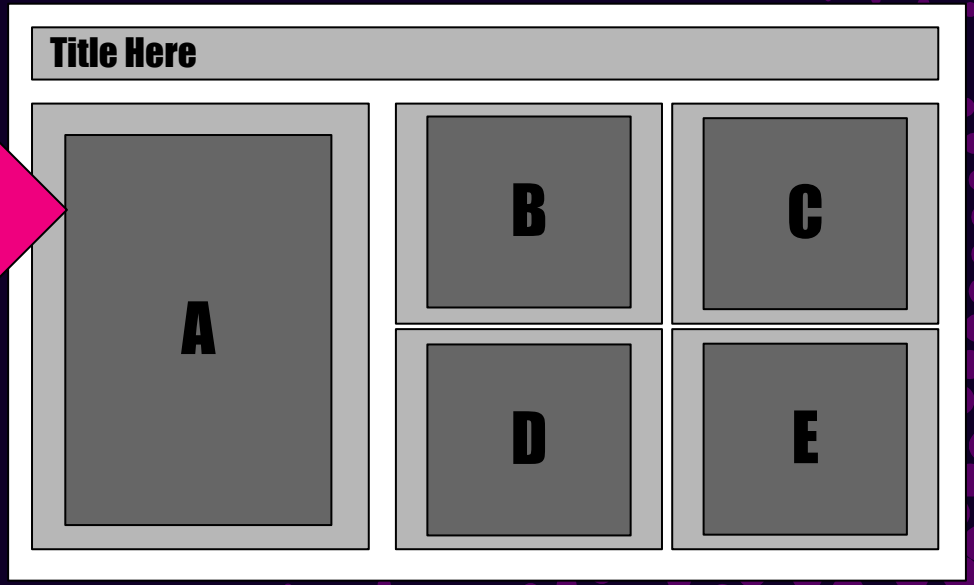
DEFINE USER INTERFACE

```
ui <- fluidPage(
  sidebarLayout(
    sidebarPanel(A),
    mainPanel(
      tabsetPanel(
        tabPanel("Tab 1", B),
        tabPanel("Tab 2", C),
        tabPanel("Tab 3", D))))
)
```



DEFINE USER INTERFACE

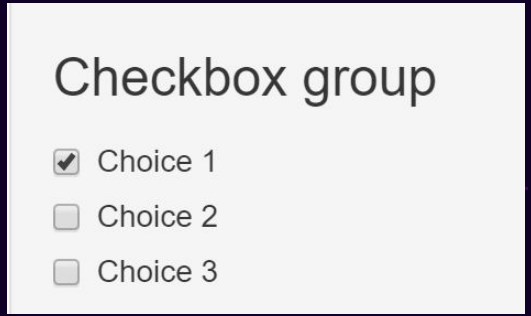
```
ui <- dashboardPage(
  dashboardHeader(title = "Title Here"),
  dashboardSidebar(A),
  dashboardBody(
    fluidRow(
      box(width = 6, B),
      box(width = 6, C)),
    fluidRow(
      box(width = 6, D),
      box(width = 6, E)))
)
```



DEFINE USER INTERFACE

- Text / Images (static)

DEFINE USER INTERFACE

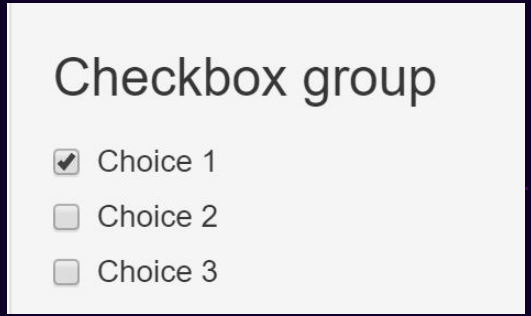


- Text / Images (static)
- Input Widgets (interactive and / or reactive)
  - Free Text
  - Slider
  - Checkbox
  - Dropdown Menu
  - Radio Buttons
  - ...others!

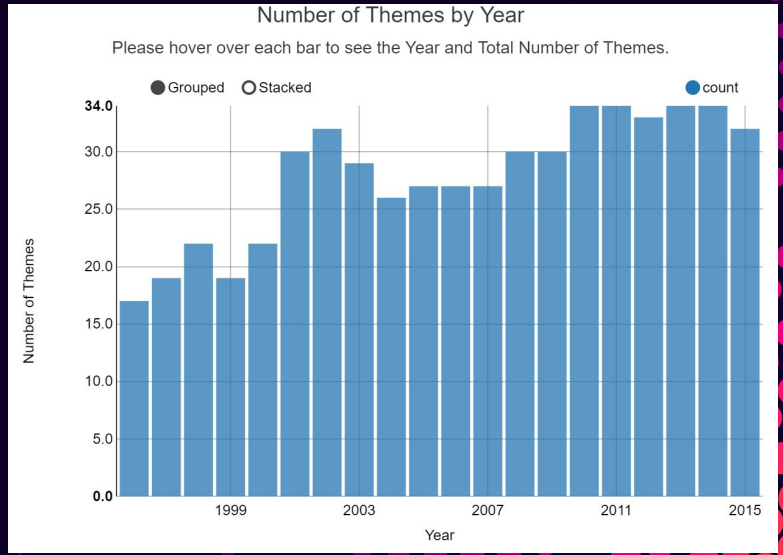
```
checkboxGroupInput(...)
```

DEFINE USER INTERFACE

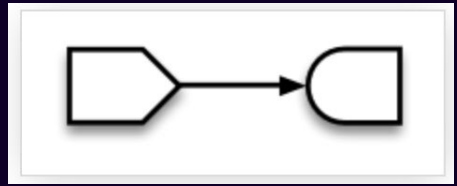
- Text / Images (static)
- Input Widgets (interactive and / or reactive)
  - Free Text
  - Slider
  - Checkbox
  - Dropdown Menu
  - Radio Buttons
  - ...others!
- Action Buttons (event)
- Figures (interactive and / or reactive)
- Tables (interactive and / or reactive)



`checkboxGroupInput(...)`

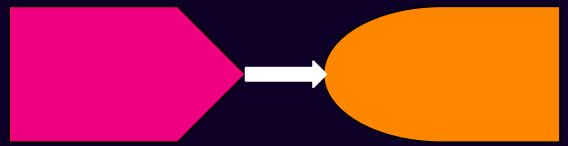


DEFINE SERVER FUNCTION

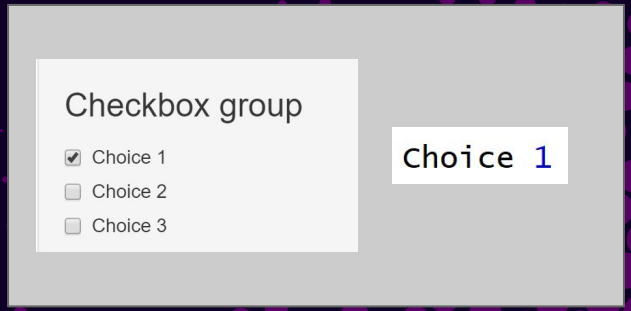


```
ui <- fluidPage(
  fluidRow(column(9, checkboxGroupInput(inputId = "my_choice")),
           column(3, uiOutput("print_me")))
  )
```

```
server <- function(input, output) {
  output$print_me <- renderText(input$my_choice)
}
```



input$my_choice output$print_me



Deployment

SHARING APPS TO RUN LOCALLY

Gist

Easy to run from RStudio

Easy to post and update

Source code can be made available

Code published to third party server

GitHub

Easy to run from RStudio

Others can download and run your app directly

Source code available

Git users can clone and fork your repository

GitHub learning curve for developer

Package

Easy to run from RStudio

Publishable on CRAN

Source code available

More work to set up

DEPLOYING APPS TO THE WEB

Shinyapps.io

Easy to use

Secure

Scalable

No need to run your own server

Data and code copied to servers

Free and paid options available

Shiny Server

Centralized computing resources

Requires a Linux server that you will need to set up and maintain

Pro version has additional features like authentication schemes and centralized management console

RStudio Connect

Flexible security policies

RStudio publishing platform

Scheduled report execution

PERSISTENT DATA STORAGE

Method	Data type	Local storage	Remote storage	R package
Local file system	Arbitrary data	YES		-
Dropbox	Arbitrary data		YES	rdrop2
Amazon S3	Arbitrary data		YES	aws.s3
SQLite	Structured data	YES		RSQLite
MySQL	Structured data	YES	YES	RMySQL
Google Sheets	Structured data		YES	googlesheets
MongoDB	Semi-structured data	YES	YES	mongolite

Database QAQC for Non-Coders

Job Specifications: The data scientist will provide support for Dr. Daniel Fuller, Canada Research Chair in Population Physical Activity's, research program. Dr. Fuller's research program includes studies in the following areas:

1. Algorithm development for physical activity data using cell phones and smart watches
2. Analysis of Global Positioning System (GPS) data
3. Application of machine learning models to physical activity and GPS data
4. R package development

Job Title: Data Scientist

Nature of Work:

- Organizing and cleaning physical activity and GPS
- Develop and application of machine learning models
- R package development

Illustrative Examples of Work: The candidate will be expected to apply machine learning methods to predict physical activity and develop metrics for analyzing GPS data. The data scientist will also be required to assist with device management and organization in the lab.

Requirements of Work: The ideal candidate will have significant experience with R and R package development. Experience with Python is an asset. The candidate will be required to have experience in the application of machine learning methods and working with physical activity and GPS data. The ideal candidate will have strong written communication and organizational skills. The candidate should be conducting or have completed a Masters of Science degree.

Interested candidates should send a resume, cover letter, and examples of work to Dr. Daniel Fuller (dfuller@mun.ca).

Contact: Dr. Daniel Fuller
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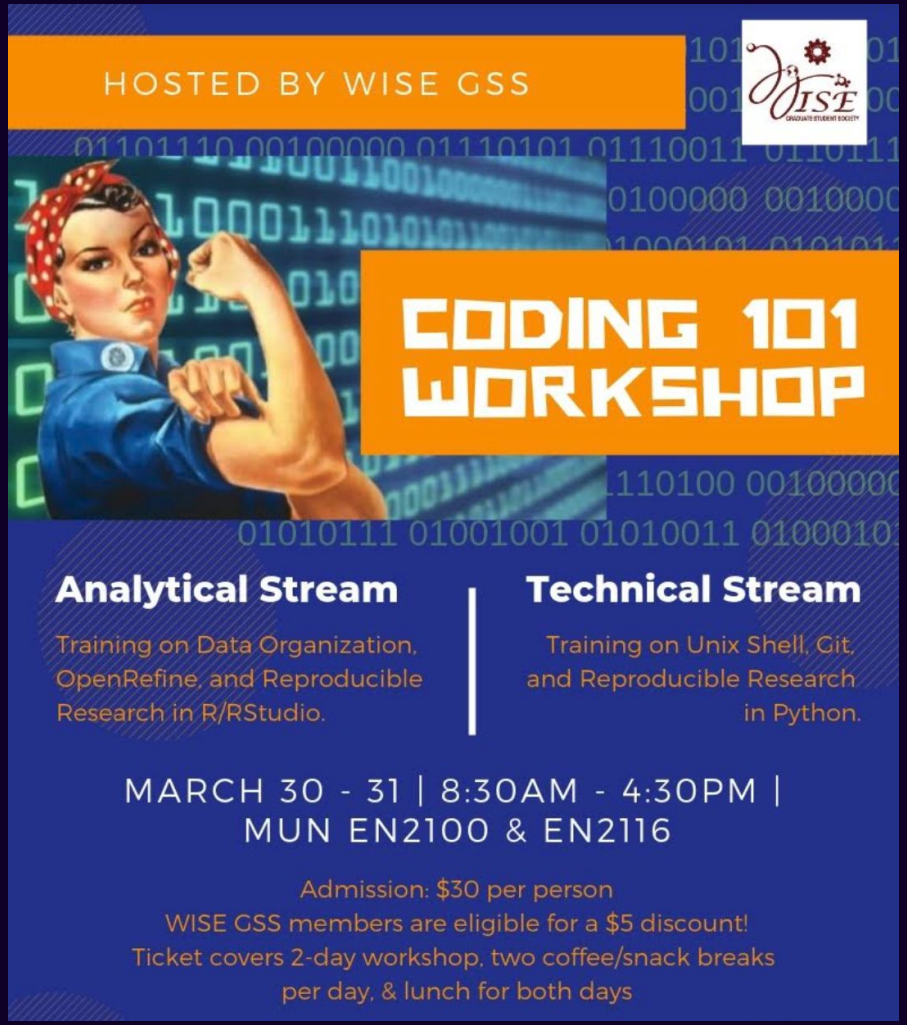

http://tinyurl.com/y312uqp6