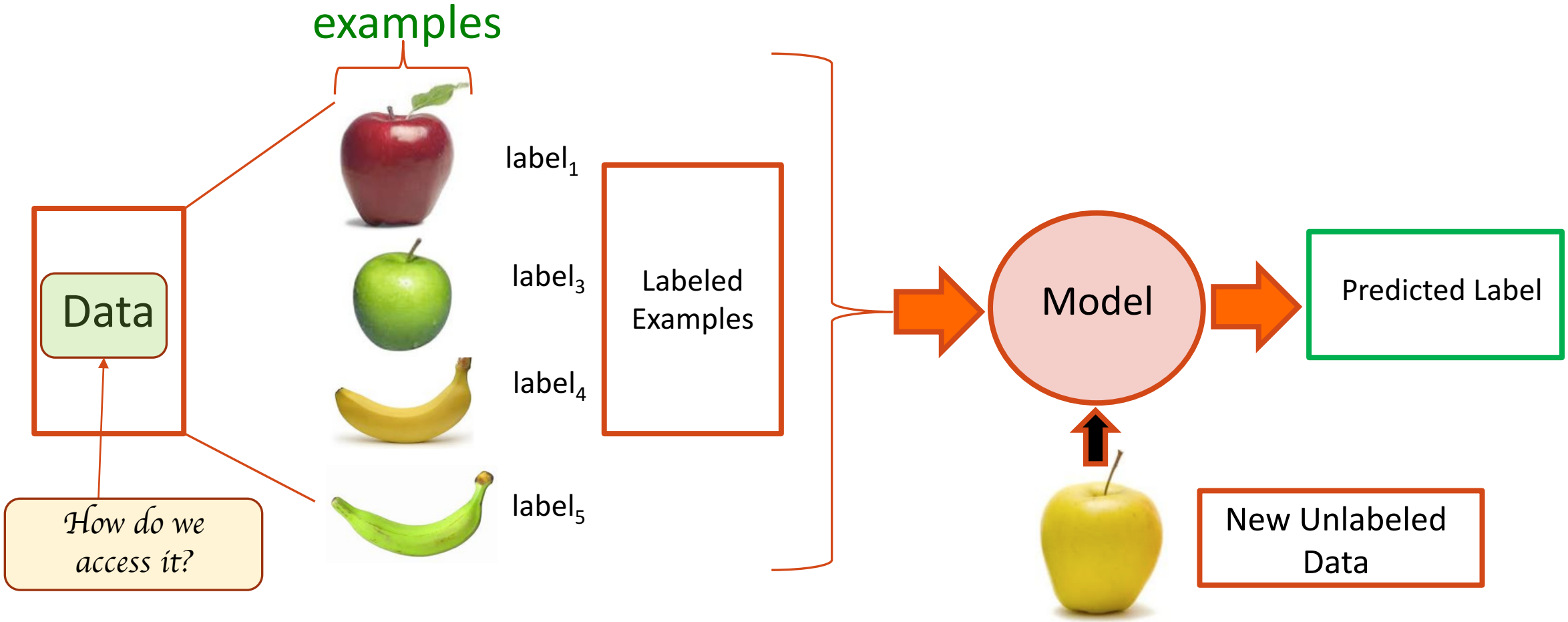
Introduction to Shiny

DSLA COURSE

ROHIT PADEBETTU

Machine Learning



Target Skill # 5

Persuasive Communication

Target Skill # 6

Translation

Analytics to Business

Target Skill # 7

Selling your Ideas

It's not about you.

Decision makers aren't interested in your pain.

THEY'RE INTERESTED IN *THEIR* PAIN.

They want to know how your idea will ease their pain. Solve their problem. Provide worry-free sleep.

Or maybe they want to know how the idea will make their lives fun and joyful. Make them prosperous. Make life easier.

The last thing they want to hear are your problems. The overtime you put into the idea. Your hassles along the way. Your sleepless nights and supreme sacrifices.

Don't whine or complain during your pitch. Keep it positive.

STAY OUT OF YOUR PROBLEMS.
STAY IN THEIR SOLUTIONS.

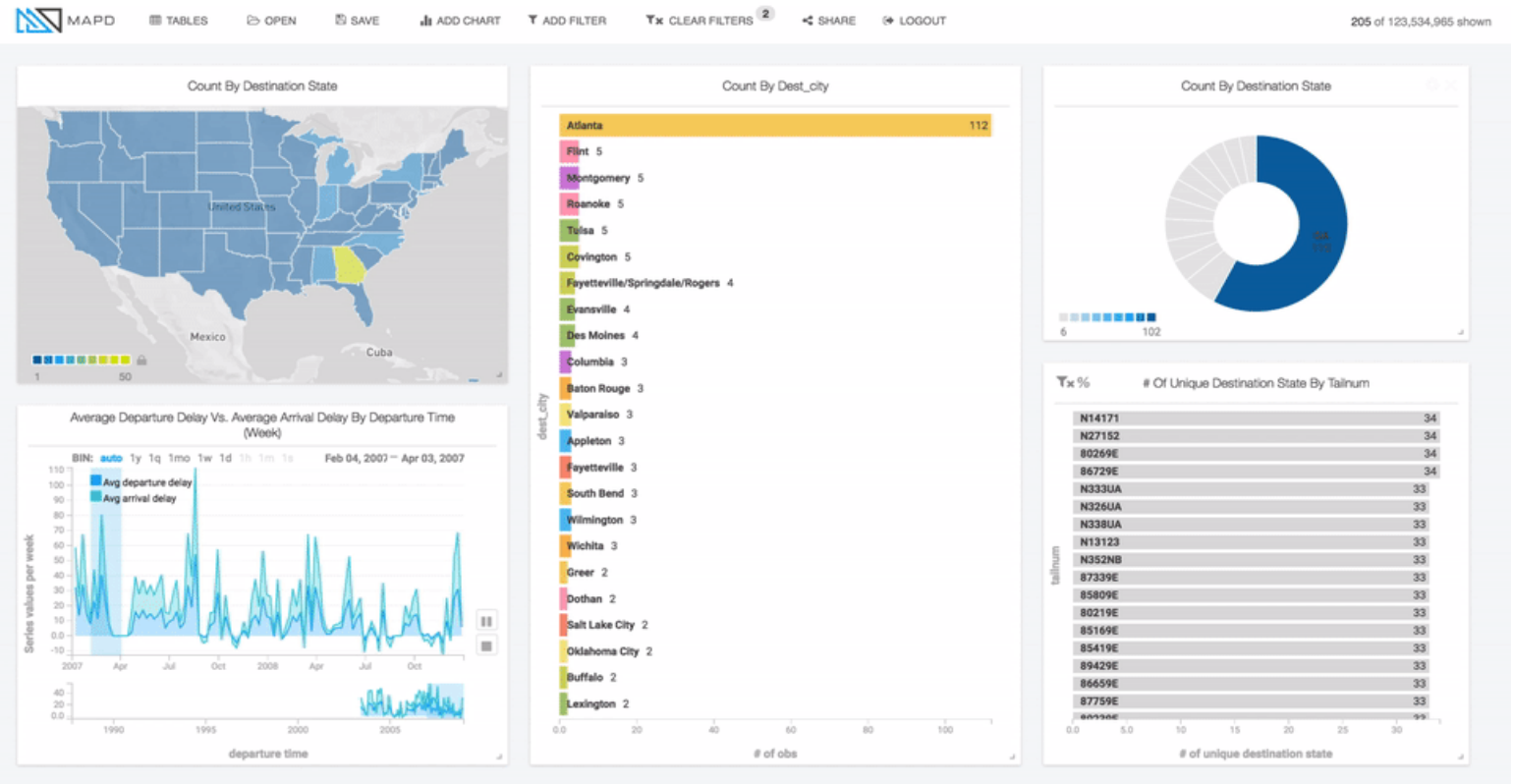
Target Skills

DSLA
DATA SCIENCE LEARNING ACADEMY

- Conceptualization
- Creative Problem Solving & Divergent Thinking
- Effective Collaboration
- Iterative Problem Solving
- Persuasive Communication
- Translation Analytics to Business
- Selling your Ideas

Data Visualization

It is super-duper important !

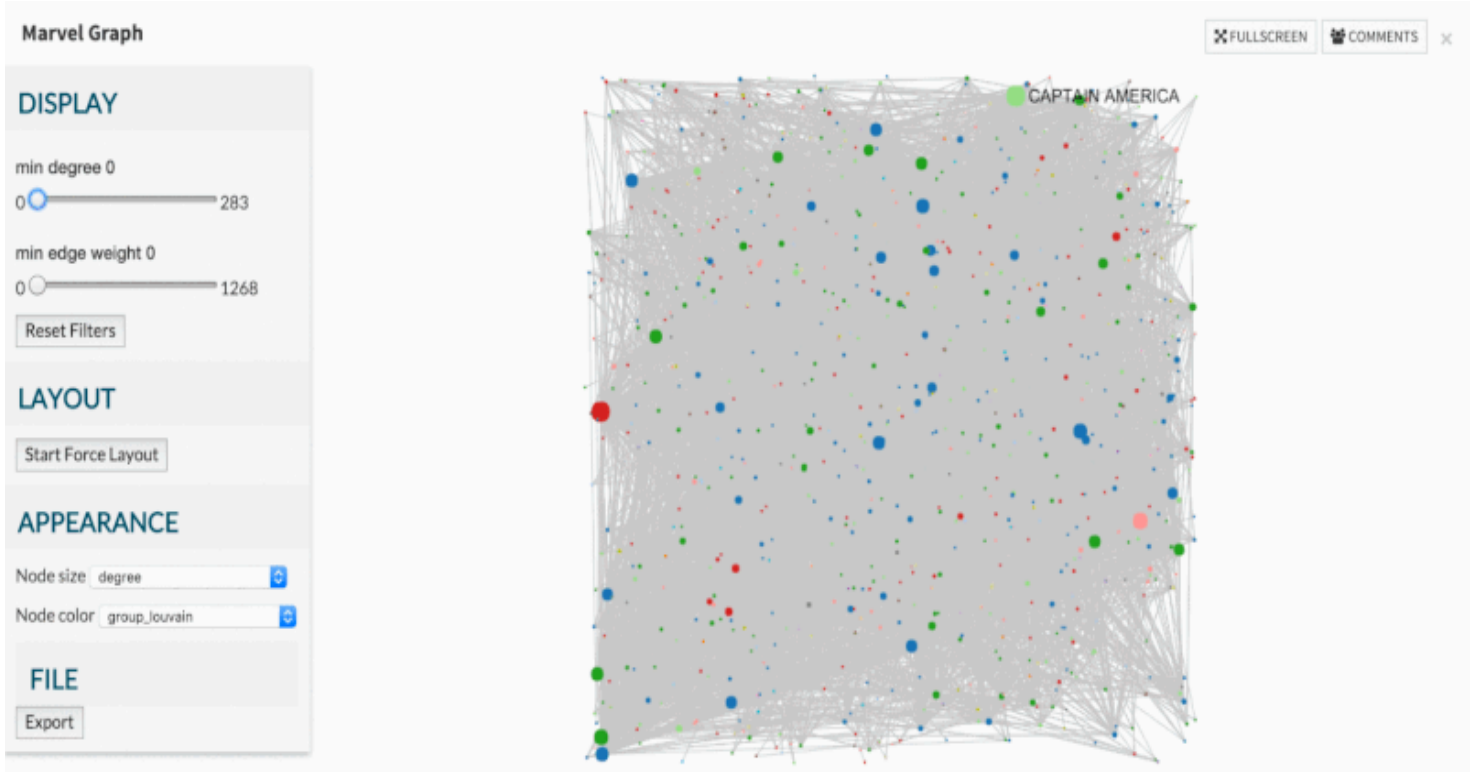


Data Visualization *is basically the* ***key deliverable***

It allows business people to understand data scientists' work AND what their final recommendations are

Data Product - Dashboards

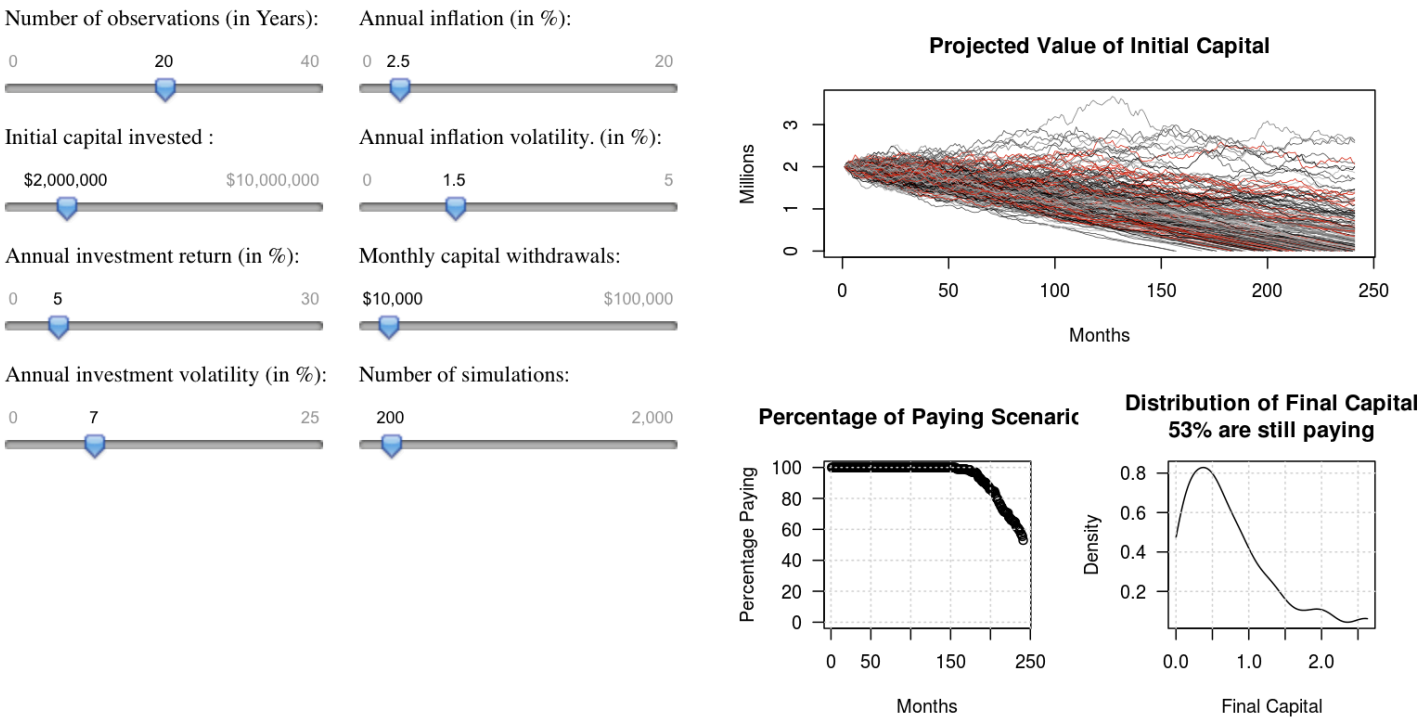
It is the only thing more important than Data Visualization



Dashboards
are
Extreme Data Visualization

They allow business people to understand AND play with data to extract information they need

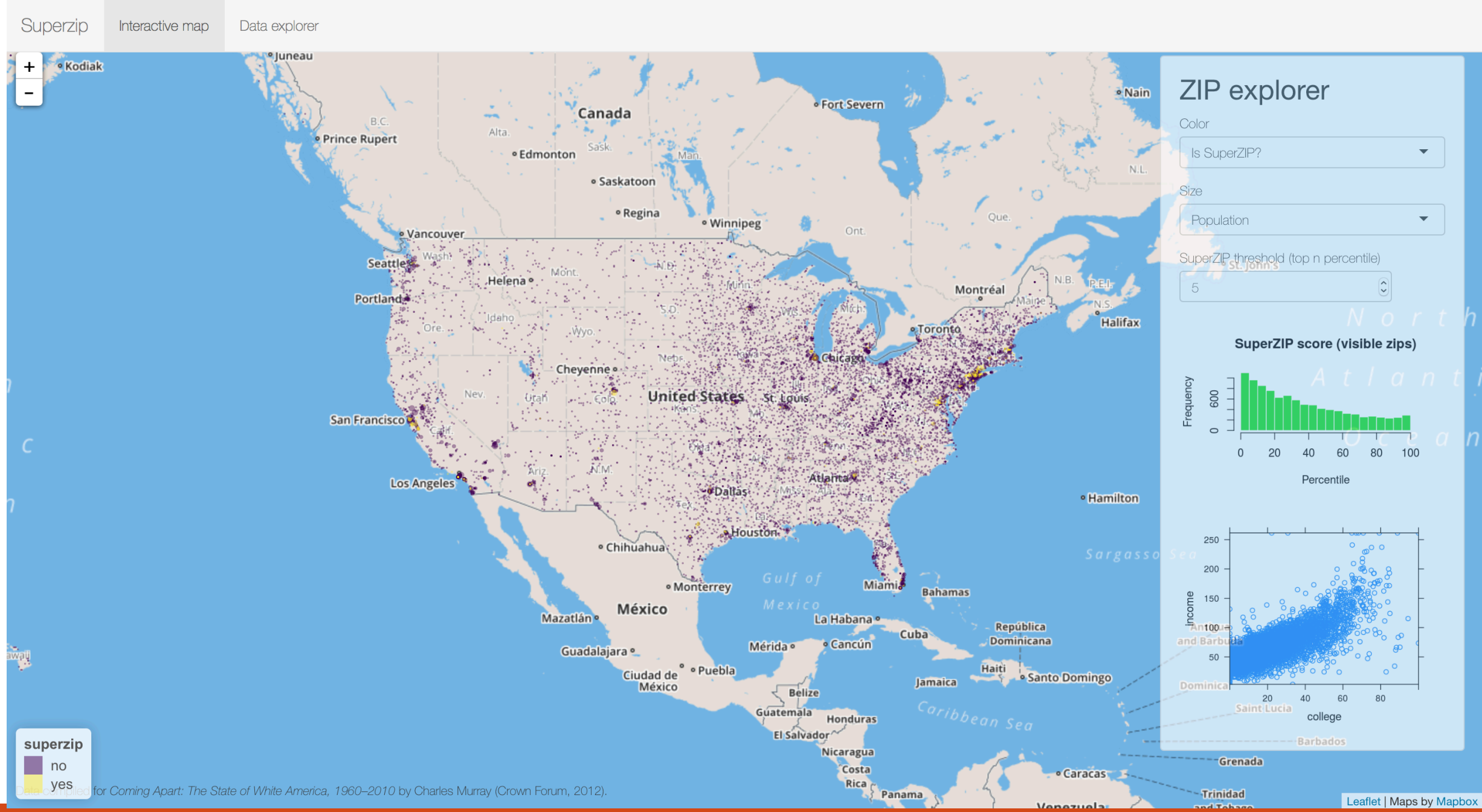
Enter Shiny



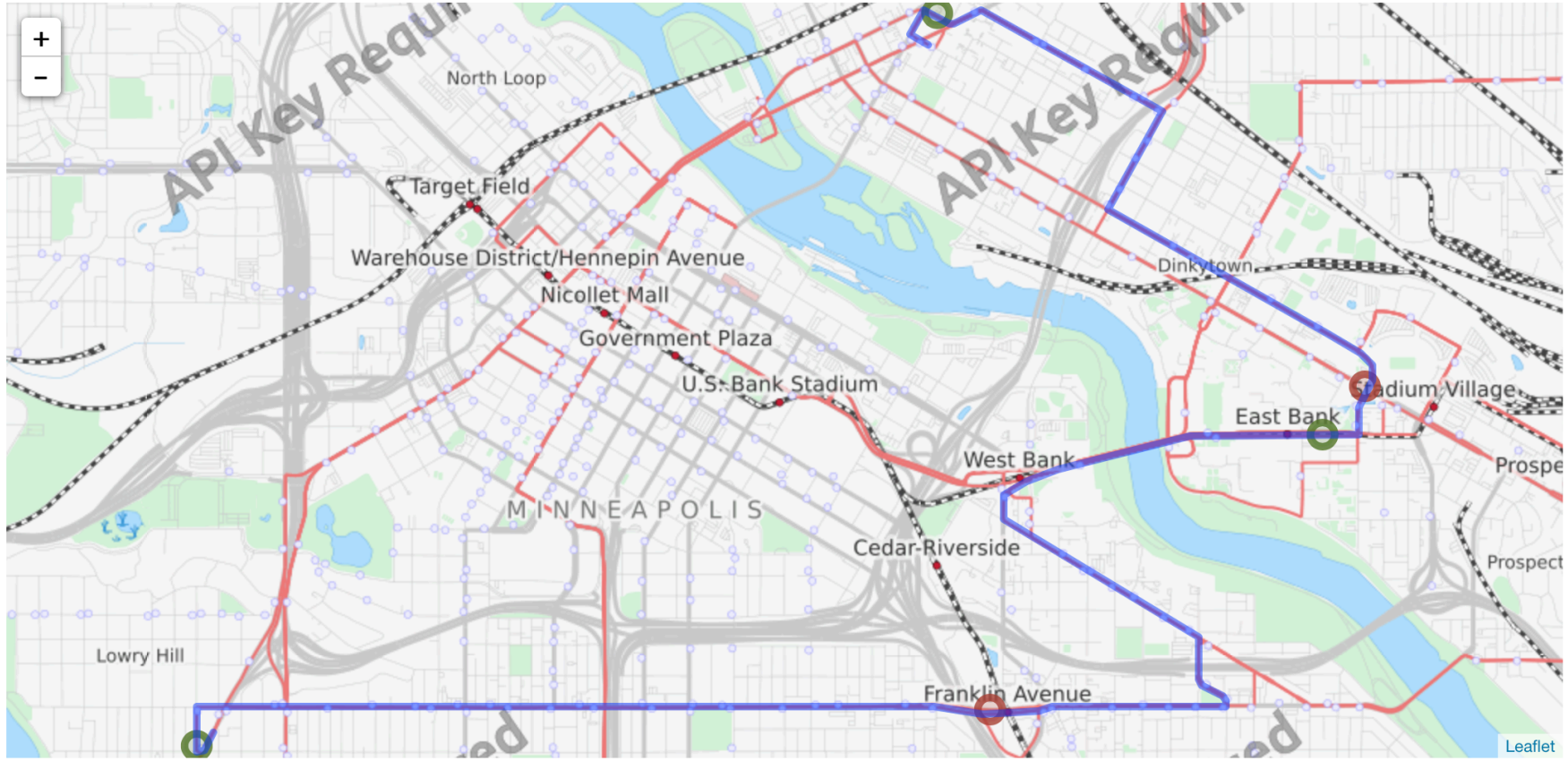
An adaptation of the retirement app from Systematic Investor .

Interactive Web Application Framework for R

Expects no knowledge of web technologies like HTML, CSS, or JavaScript (but you can leverage them, if you know them)


Superzip
Interactive map
Data explorer
ZIP explorer
Color
Is SuperZIP?
Size
Population
SuperZIP threshold (top n percentile)
5
SuperZIP score (visible zips)
Frequency
0
600
0
20
40
60
80
100
Percentile
income
250
200
150
100
50
20
40
60
80
college
superzip
no
yes
Canada
United States
México
Gulf of Mexico
Caribbean Sea
Sargasso Sea
Kodiak
Juneau
Prince Rupert
Edmonton
Saskatoon
Regina
Winnipeg
Fort Severn
Nain
Vancouver
Seattle
Portland
San Francisco
Los Angeles
Helena
Cheyenne
Chicago
Toronto
Montréal
Halifax
Hamilton
Atlanta
Dallas
Houston
St. Louis
Miami
Bahamas
La Habana
Cuba
República Dominicana
Haiti
Santo Domingo
Jamaica
Belize
Guatemala
Honduras
El Salvador
Nicaragua
Costa Rica
Panama
Caracas
Grenada
Trinidad and Tobago
Barbados
Saint Lucia
Dominica
Antigua and Barbuda
Chihuahua
Monterrey
Mazatlán
Guadalajara
Mérida
Cancún
Ciudad de México
Puebla
Data compiled for Coming Apart: The State of White America, 1960–2010 by Charles Murray (Crown Forum, 2012).
Leaflet | Maps by Mapbox

Twin Cities Buses



Route

2

Show

- [x] Northbound
- [x] Southbound
- [x] Eastbound
- [x] Westbound

Note: a route number can have several different trips, each with a different path. Only the most commonly-used path will be displayed on the map.

Zoom to fit buses

Refresh interval

1 minute

Data refreshed 20 seconds ago.

Refresh now

Source data updates every 30 seconds.

Color	Direction	Number of vehicles
	Northbound	0
	Southbound	0
	Eastbound	3
	Westbound	2

Ebola Model

Data Generation

Population:

1,000,000 | 10,000,000

10,000 1,010,000 2,010,000 4,010,000 6,010,000 8,010,000 10,000,000

Initially Infected:

0 | 100 | 1,000

0 100 200 300 400 500 600 700 800 900 1,000

Number of days:

30 | 180 | 360

30 70 110 150 190 230 270 310 350

Initial r0: 1.458

Transmition rate:

0.01 | 0.081 | 0.25

0.01 0.034 0.058 0.082 0.106 0.13 0.154 0.178 0.202 0.226 0.25

Contageous Period (Days):

0 | 18 | 40

0 4 8 12 16 20 24 28 32 36 40

Moralitity Rate:

0 | 0.6 | 1

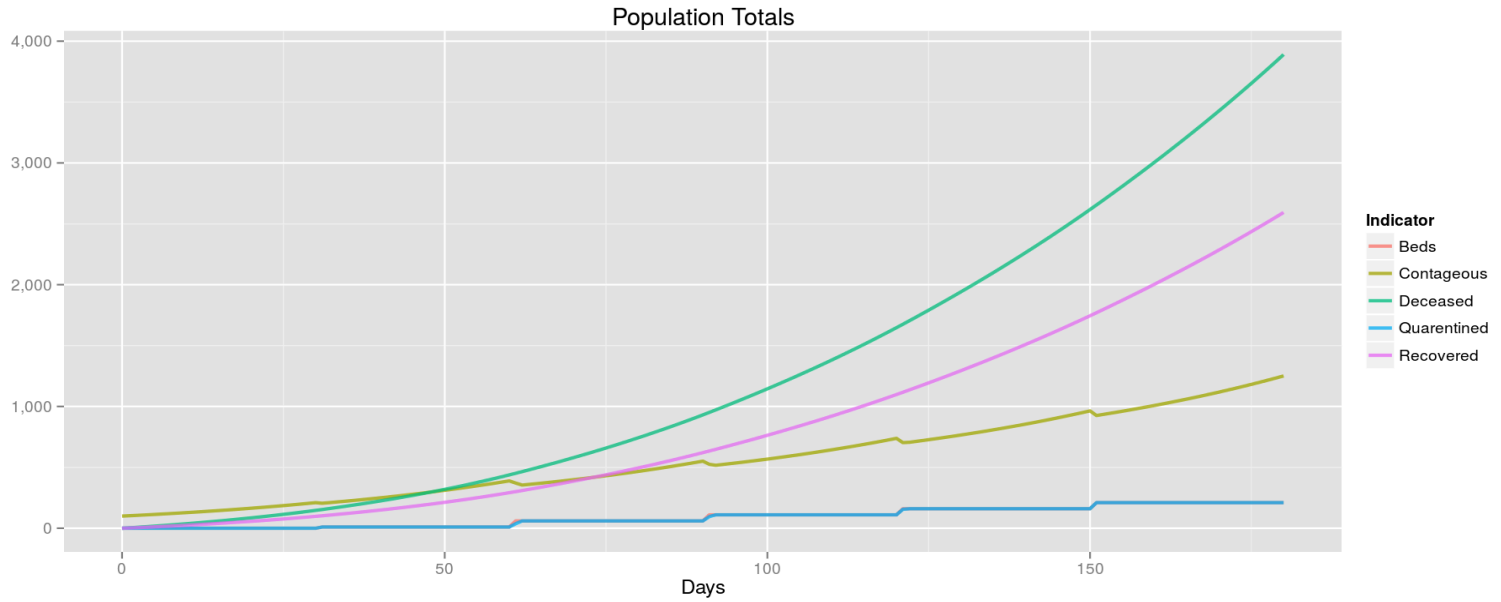
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

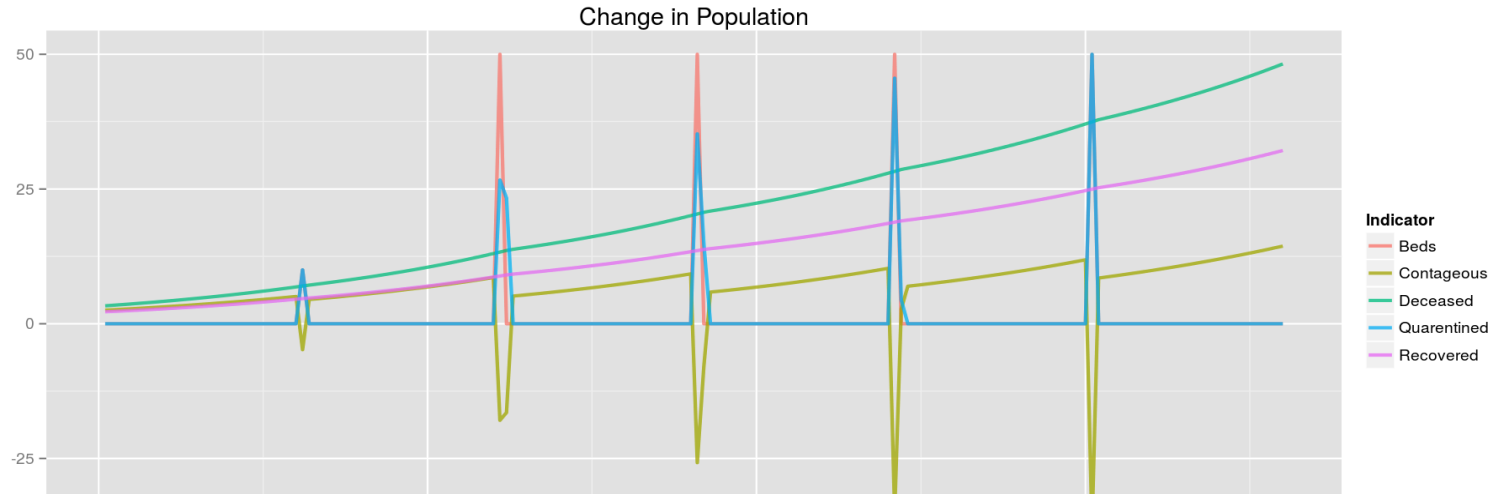
Social 'adaption' to reduce infection:

-0.0,012 | 0.0,003 | 0.0,012

-0.0,012 -0.0,009 -0.0,006 -0.0,003 0 0.0,003 0.0,006 0.0,009 0.0,012

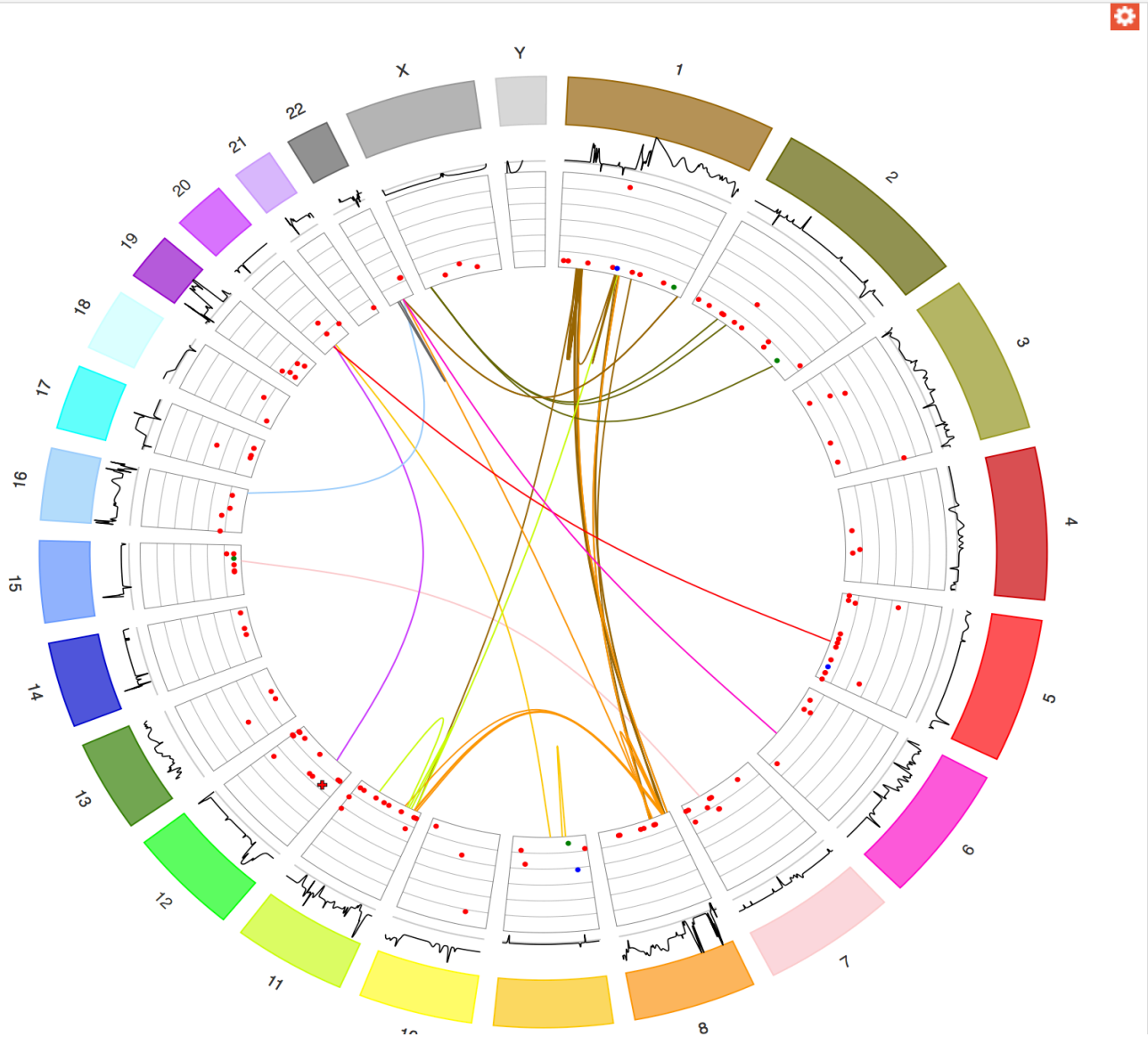
☐ Susceptible ☑ Contageous ☑ Recovered ☑ Deceased ☑ Quarentined ☑ Beds





ICGC PANCREATIC CANCER (DUCTAL ADENOCARCINOMA) - GENOME VIEWER

More Information



Cohort Top ClinVar Gene Summary:

HGNC	Chr	Start	From	To	Consequence	Count
SMARCA4	19	11144847	C	T	missense_variant	18
TP53	17	7578437	G	A	stop_gained	18
KRAS	12	25398284	C	T	missense_variant	12
TP53	17	7578437	G	A	exon_variant	10
SMARCA4	19	11144847	C	T	exon_variant	8
TP53	17	7577121	G	A	downstream_gene_variant	6
TP53	17	7577121	G	A	missense_variant	6
KRAS	12	25398285	C	G	missense_variant	4
SMARCA4	19	11144847	C	T	downstream_gene_variant	4
TP53	17	7578437	G	A	downstream_gene_variant	4

Please select a donor ID:

DO49184

SNP Consequences

Resize Factor:

1 5 15

1 3 5 7 9 11 13 15

Police Supply & Demand Tool

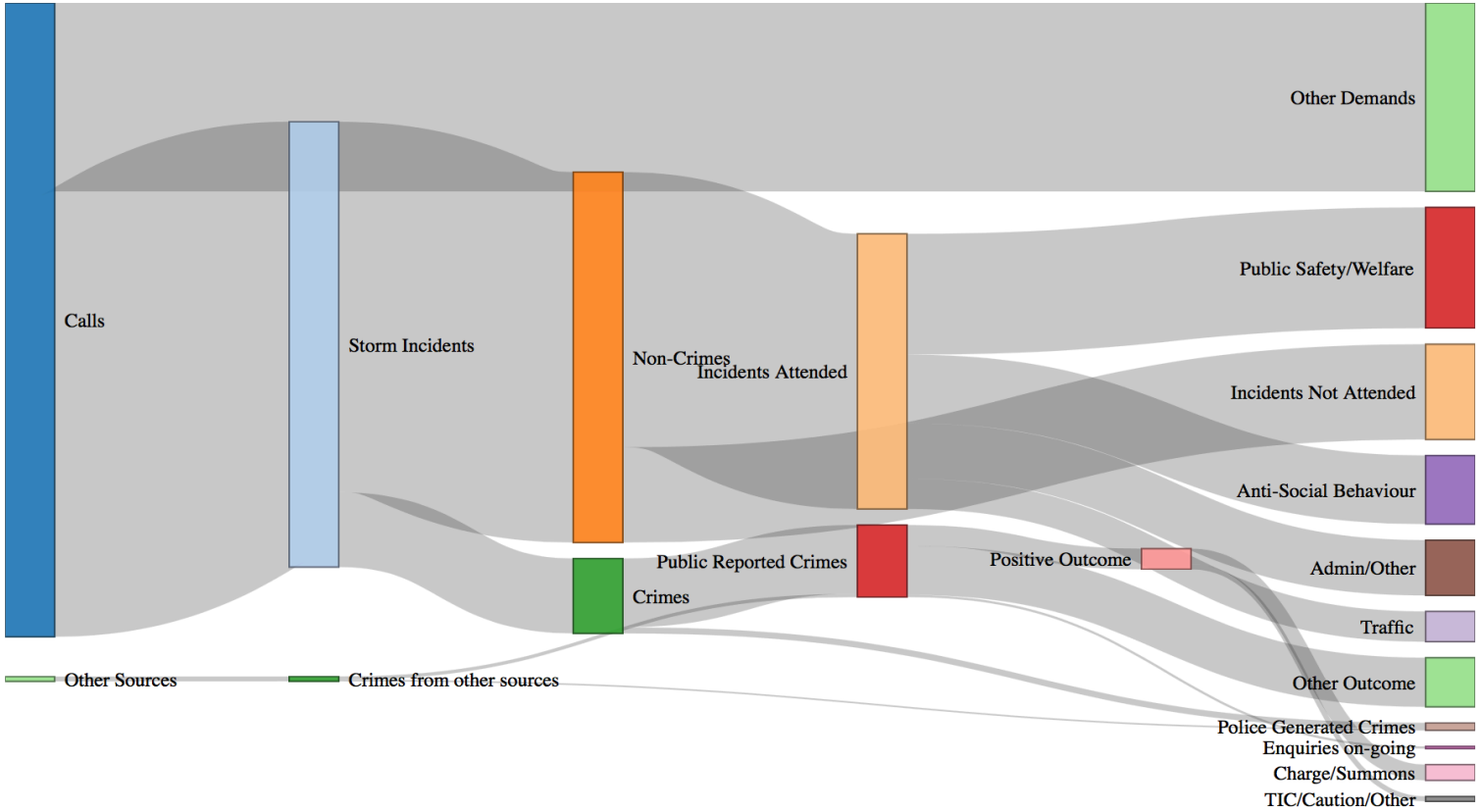
This is a Pilot version of the Police Supply & Demand simulation tool.

Please note: the data contained in this demo version is *either artificial data or data already publicly available* (e.g. through http://data.police.uk/)

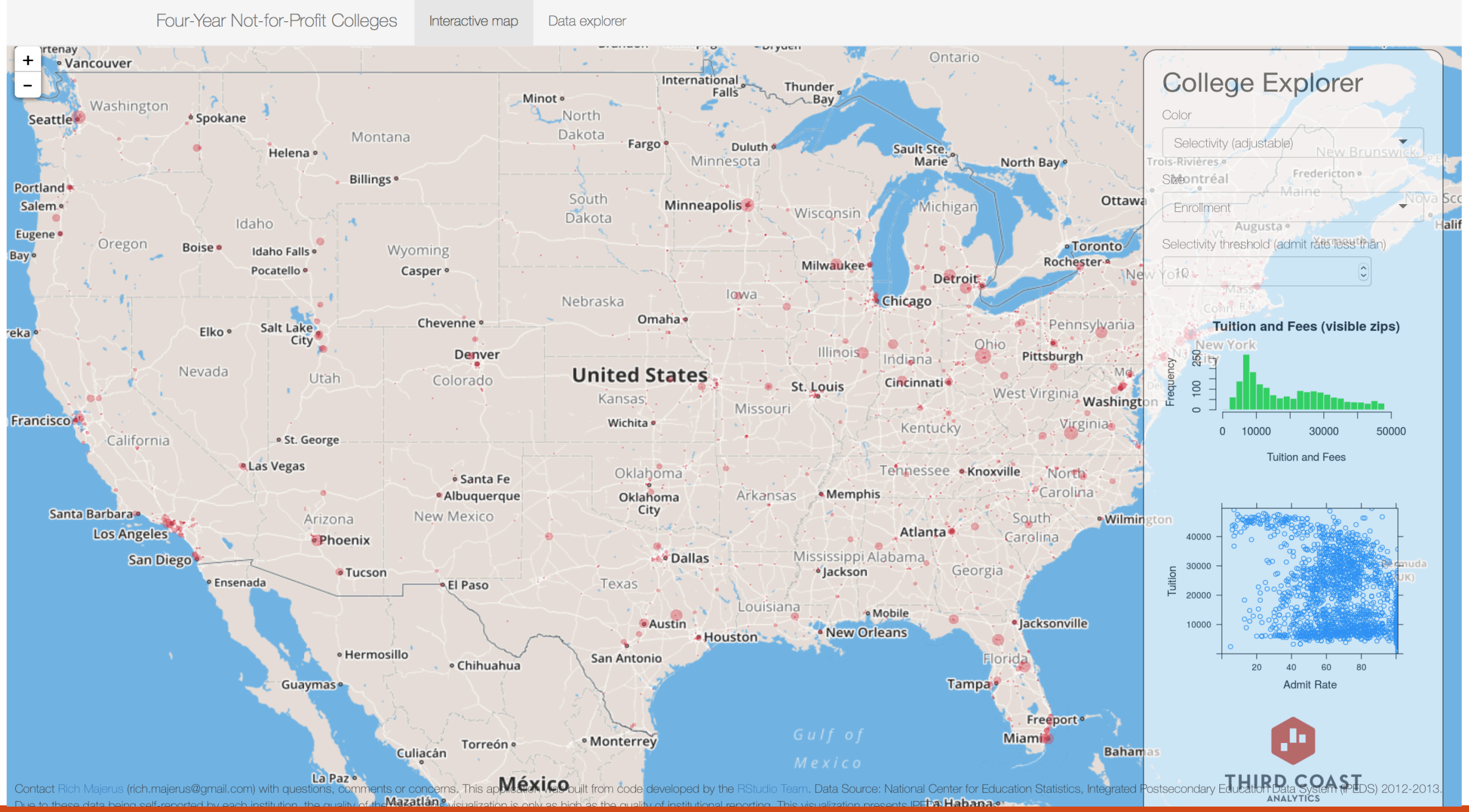
Methodology & Instructions

1. Analyse current crime patterns, detection & trends (including formal requests for specialist services):
    - Seasonality
    - Forecast
    - If needed for the current simulation run, adjust demand (forecast) to evaluate the impact of specific crime trends
2. Evaluate impact on resources
    - Historical analysis
    - Forecast-based
    - Adjusted forecast
3. Adjust Supply parameters to to fit Demand
    - Iterate
4. Analyse Outcomes
    - Identify potential shortages / surpluses in the areas of analysis
    - Determine the current rate of service per department
    - Potential impact on detected crime trends (sanctioned / non-sanctioned detection)

Police: Demand & Business Flow



Pilot developed by Enzo Martoglio
for soprasteria http://www.soprasteria.com/


Four-Year Not-for-Profit Colleges
Interactive map
Data explorer
College Explorer
Color
Selectivity (adjustable)
Size
Enrollment
Selectivity threshold (admit rate less than)
10
Tuition and Fees (visible zips)
Frequency
Tuition and Fees
Tuition
Admit Rate
United States
México
Gulf of Mexico
Vancouver
Seattle
Spokane
Portland
Salem
Eugene
Boise
Idaho Falls
Pocatello
Billings
Helena
Minot
Fargo
Duluth
Minneapolis
International Falls
Thunder Bay
Sault Ste. Marie
North Bay
Ottawa
Toronto
Rochester
Milwaukee
Detroit
Chicago
Omaha
Chevenne
Casper
Denver
Salt Lake City
Elko
Las Vegas
St. George
Francisco
Los Angeles
Santa Barbara
San Diego
Phoenix
Tucson
Ensenada
Santa Fe
Albuquerque
Wichita
Oklahoma City
St. Louis
Cincinnati
Pittsburgh
Washington
Knoxville
Memphis
Atlanta
Wilmington
Dallas
Jackson
Austin
Houston
New Orleans
Mobile
Jacksonville
San Antonio
Hermosillo
Chihuahua
Guaymas
Culiacán
Torreón
Monterrey
La Paz
Mazatlán
Tampa
Miami
Freeport
Bahamas
La Habana
THIRD COAST ANALYTICS
Contact Rich Majerus (rich.majerus@gmail.com) with questions, comments or concerns. This application was built from code developed by the RStudio Team. Data Source: National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) 2012-2013.
Due to these data being self-reported by each institution, the quality of the information this visualization is only as high as the quality of institutional reporting. This visualization presents IPEDS

Barclays Premier League

Front Page

Managers

Teams

Players

Standings

Specials

All Dashboards and Trelliscopes (14)

RPubs

Not Just Another Soccer site

Using the latest technology to bring you

- Unique Tables
- Interactive Charts
- Distinctive Analyses
- Trivia Tweets

Just select tabs to explore this site and connect to other dashboards from myTinyShinys

Based on data up to and including 2nd March 2016

Current Team Sequences

Category	Games	Teams
Wins	3	Chelsea, Stoke C
No Wins	11	Crystal P
Draws	1	Crystal P, Leicester C, Sunderland, West Brom
No Draws	8	Tottenham H
Losses	3	Aston Villa, Man. City
No Losses	12	Chelsea

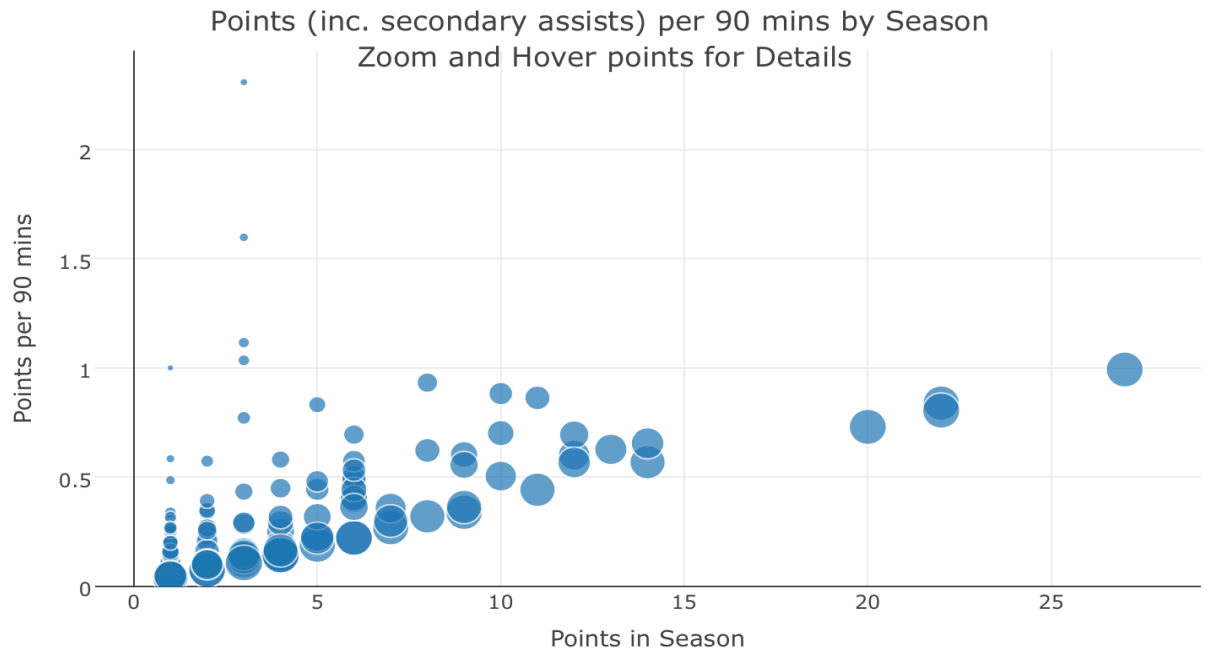
Player Milestones

	Category	Count
Peter Crouch	Apps	400
Ryan Bertrand	Apps	100
Jordan Mutch	Assists	10
Kenedy	Goals	1

Team Leaders (Ties not shown)

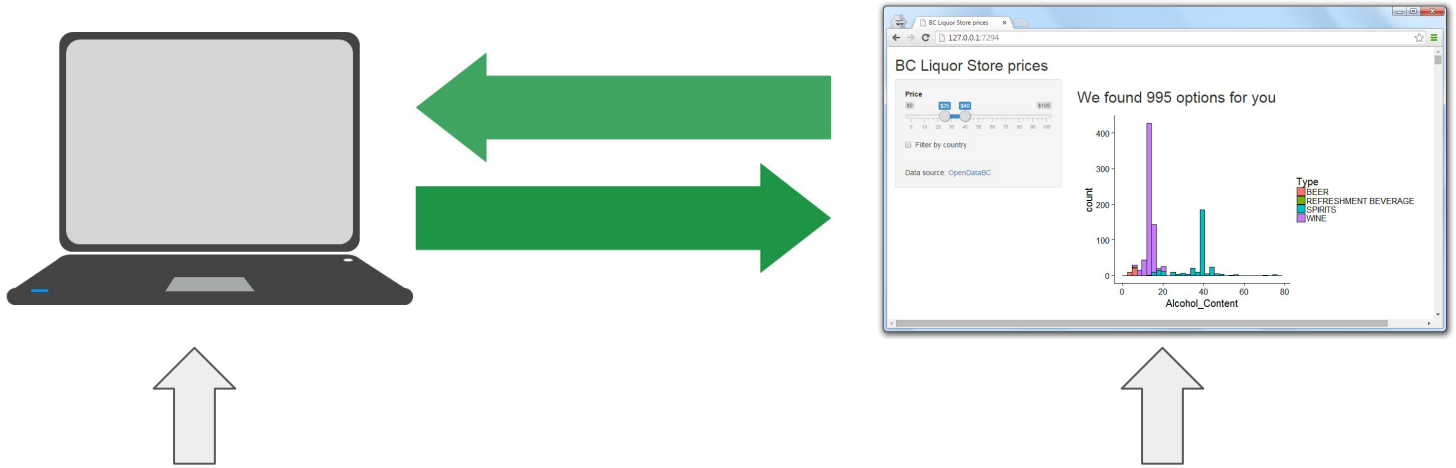
Latest App - PPG for Player by Country of Birth

England | 2015/16



Unlike official Statistics, up to two assists are allowed per goal

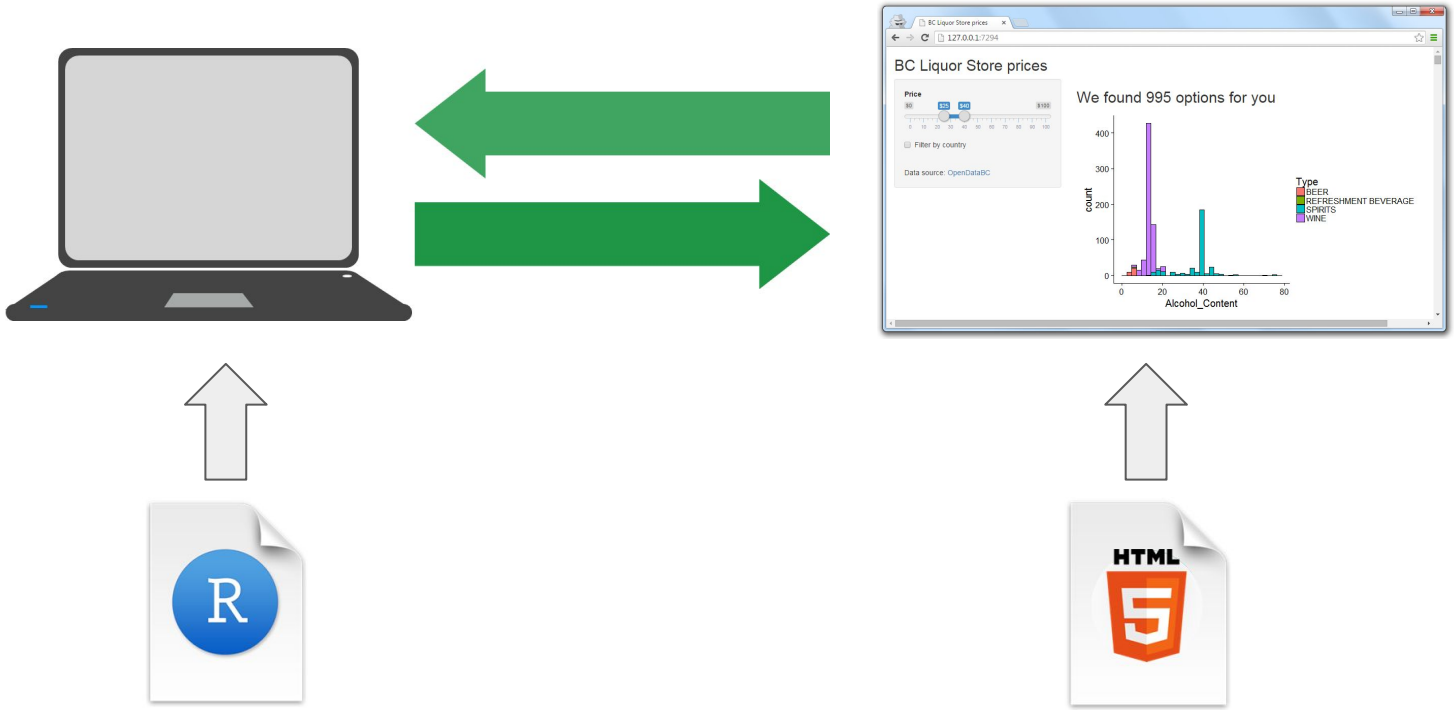
What is Shiny?



Computer running R

Web page

What is Shiny?



Create App: Method 1

```
library(shiny)

ui <- fluidPage()

server <- function(input, output) {}

shinyApp(ui = ui, server = server)
```

All the components in one file

"app.R"

Create App: Method 2

Single file

app.R

```
library(shiny)

ui <- fluidPage(
  sliderInput("num", "Choose a number",
              0, 100, 20),
  plotOutput("myplot")
)

server <- function(input, output) {
  output$myplot <- renderPlot({
    plot(seq(input$num))
  })
  x <- reactive({
    input$num + 1
  })
  observe({
    print(x())
  })
}

shinyApp(ui = ui, server = server)
```

Two files

ui.R

```
library(shiny)

fluidPage(
  sliderInput("num", "Choose a number",
              0, 100, 20),
  plotOutput("myplot")
)
```

server.R

```
library(shiny)

function(input, output) {
  output$myplot <- renderPlot({
    plot(seq(input$num))
  })
  x <- reactive({
    input$num + 1
  })
  observe({
    print(x())
  })
}
```

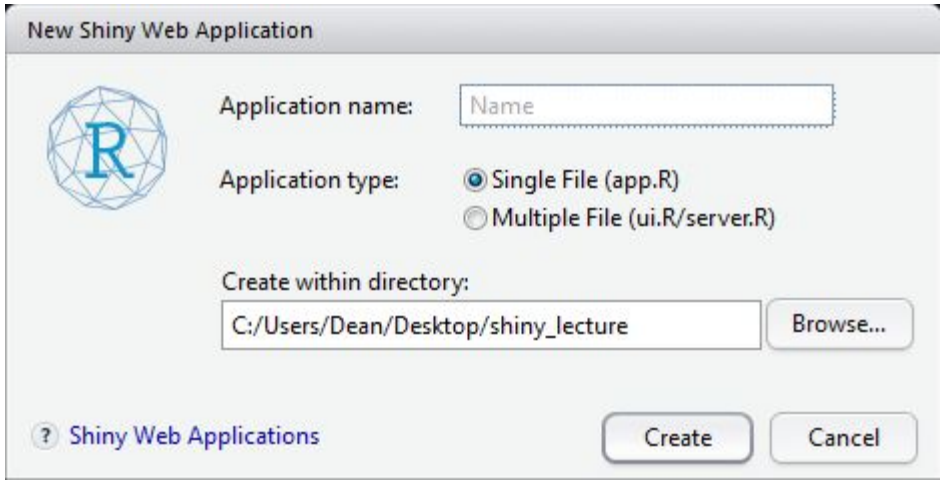
Two files "ui.R" & "server.R" in same directory

Good for complex apps

Separates View & Logic

Create App: Method 3

File > New File > Shiny Web App...



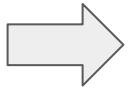
Generates the template for you

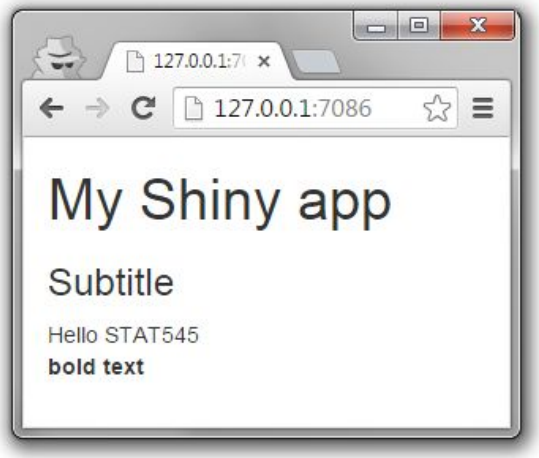
Adding Elements to UI

Add any HTML element

ui

```
fluidPage(
    h1("My Shiny app"),
    h3("Subtitle"),
    "Hello",
    "STAT545",
    br(),
    strong("bold text")
)
```





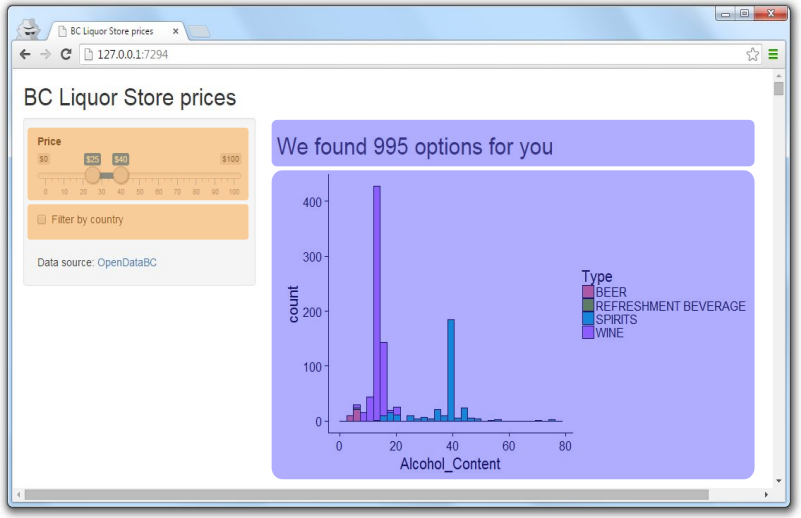
Using a layout in UI

This is a **sidebarLayout()**

Inputs & Outputs

ui

```
fluidPage(
    # *Input() functions,
    # *Output() functions
)
```



Interactivity needs Inputs & Outputs

Inputs

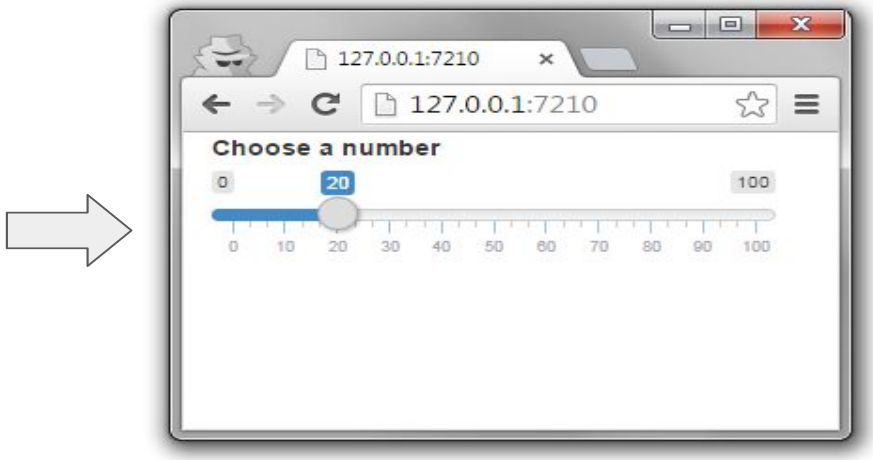
User can play with

Outputs

Users can observe and often depend on inputs

Inputs

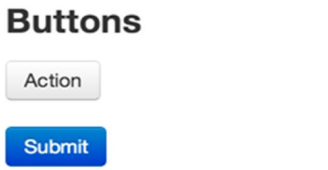
```
library(shiny)

ui <- fluidPage(
    sliderInput(
        "num", "Choose a number",
        min = 0, max = 100,
        value = 20)
)

server <- function(input, output) {}

shinyApp(ui = ui, server = server)
```



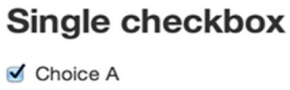
Input name — Label to display — Input-specific arguments

```
sliderInput("num", "Choose a number", min = 0, max = 100, value = 20)
*Input(      inputId,          label, ...                          )
```

Inputs



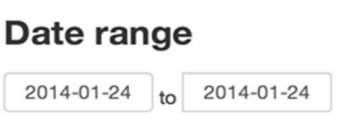
actionButton()
submitButton()



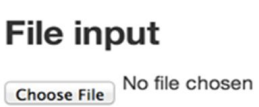
checkboxInput()

checkboxGroupInput()

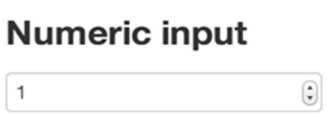
dateInput()



dateRangeInput()



fileInput()

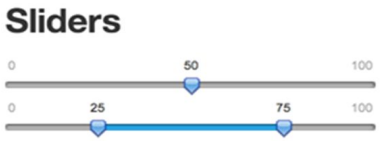


numericInput()

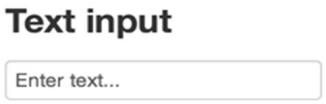
passwordInput()

radioButtons()

selectInput()



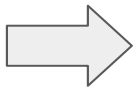
sliderInput()

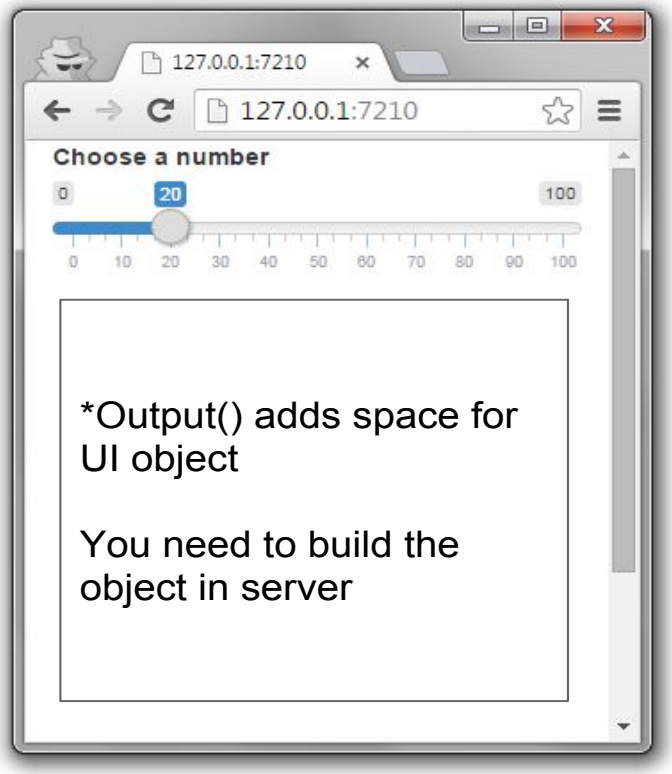


textInput()

Outputs

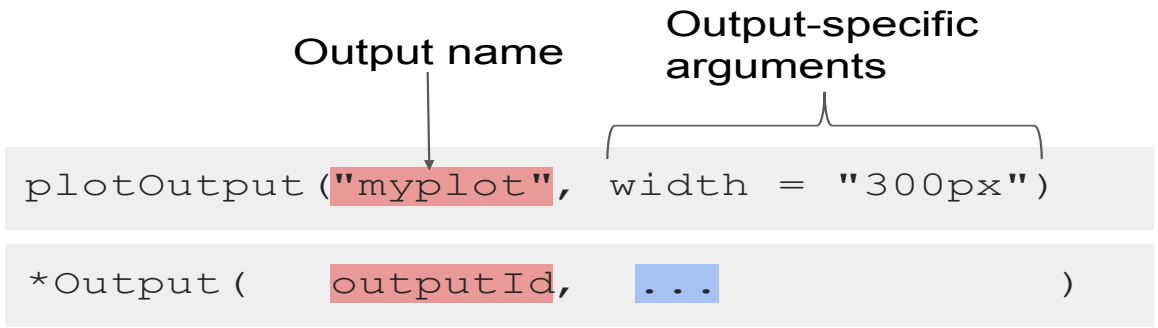
```
library(shiny)

ui <- fluidPage(
     sliderInput("num", "Choose a number",
                 0, 100, 20),
    plotOutput("myplot")
)

server <- function(input, output) {}

shinyApp(ui = ui, server = server)
```





Outputs

Function	Outputs
plotOutput()	plot
tableOutput()	table
uiOutput()	Shiny UI element
textOutput()	text



Server

Server **is the logic** which transforms Inputs into Outputs

Saves the object into output UI element *"myplot"*

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

    output$myplot <- renderPlot({
        plot(rnorm(input$num))
    })

}
```

Gets the value from input UI element *"num"*

render()* function *builds* the reactive output to display on UI

Render

Render Functions build reactive output to display in UI

Output function	Render function
plotOutput()	renderPlot({})
tableOutput()	renderTable({})
uiOutput()	renderUI({})
textOutput()	renderText({})

```
renderPlot({ plot(rnorm(100)) })
```

Type of object to build

Code to build the object

Shiny – Lots more to explore

Shiny official tutorial http://shiny.rstudio.com/tutorial

Shiny cheatsheet http://shiny.rstudio.com/images/shiny-cheatsheet.pdf

Lots of short useful topics http://shiny.rstudio.com/articles

Shiny in Rmarkdown http://rmarkdown.rstudio.com/authoring_shiny.html

Publish your app free with RStudio http://www.shinyapps.io

Explore and learn from other Apps https://www.rstudio.com/products/shiny/shiny-user-showcase/

Shiny

DSLA
DATA SCIENCE LEARNING ACADEMY

Flights Demo

Shiny

DSLA
DATA SCIENCE LEARNING ACADEMY

Lunch Break