# Interactivity

#### **Session 10**

PMAP 8921: Data Visualization with R Andrew Young School of Policy Studies Summer 2021

## **Plan for today**

#### Making interactive graphics

#### **Sharing content**

# Making interactive graphics

### Three general methods

#### Single plots with **plotly**



#### Dashboards with **flexdashboard**

Slightly more complicated

Complete interactive apps with Shiny

Super complicated!

# Single plots with plotly

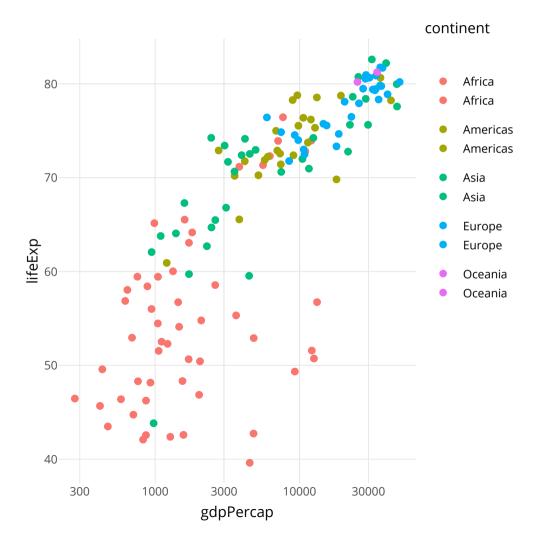
**Plotly** is special software for creating interactive plots with JavaScript

No knowledge of JavaScript needed!

ggplotly() in the plotly R package translates
 between R and Javascript for you!

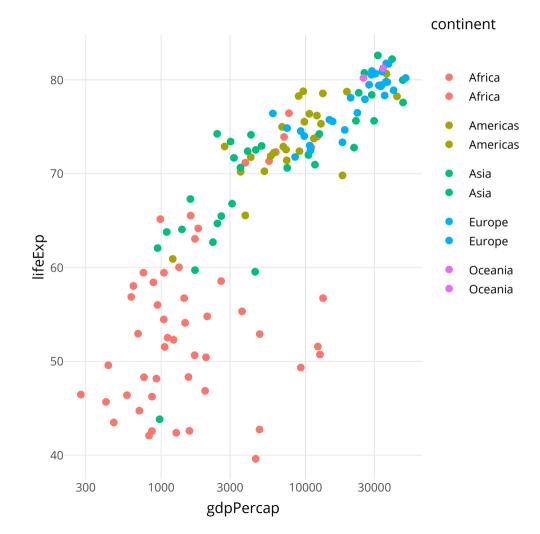


ggplotly(my\_plot)

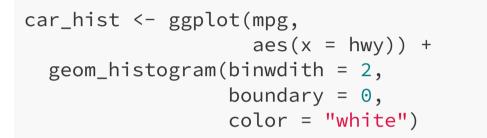


# **Plotly tooltips**

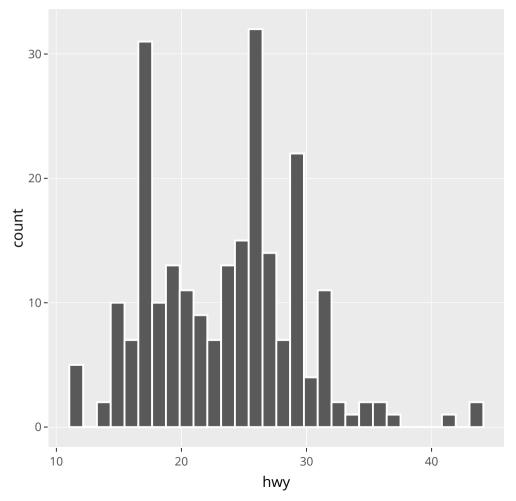
```
interactive_plot <- ggplotly(
   my_plot, tooltip = "text"
)
interactive_plot</pre>
```



### Works with most geoms!



ggplotly(car\_hist)





Save a self-contained HTML version of it with saveWidget() in the htmlwidgets R package

# This is like ggsave, but for interactive HTML plots
htmlwidgets::saveWidget(interactive\_plot, "fancy\_plot.html")

### **Fully documented**

The documentation for ggplot2 + plotly is full of examples of how to customize everything

Rely on that ↑ + Google to make really fancy (and easy!) interactive plots

### Three general methods

#### Single plots with **plotly**

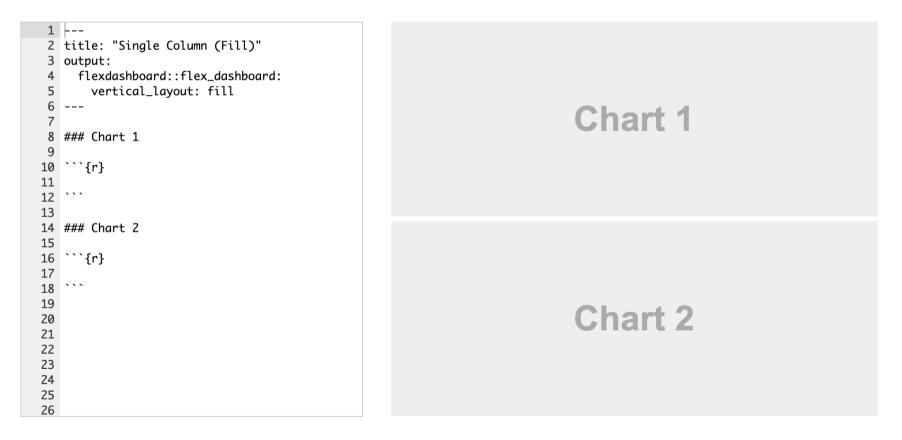


#### Dashboards with flexdashboard

Slightly more complicated

### Dashboards with flexdashboard

#### Use basic R Markdown to build a dashboard!



#### Dashboards with flexdashboard

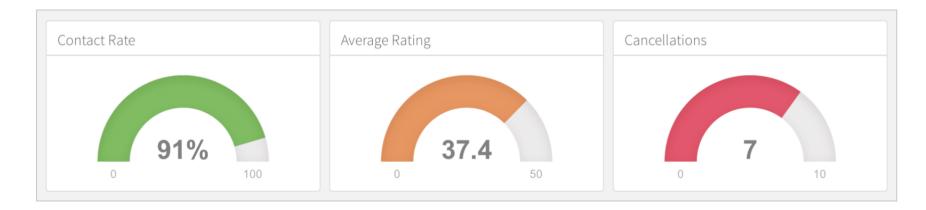
#### Make any kind of block arrangement

<pre>1 2 title: "Multiple Columns" 3 output: flexdashboard::flex_dashboard 4 5 6 Column {data-width=600} 7 8 9 ### Chart 1 10 11 ```{r} 12 13 ``` 14 15 Column [data width 400]</pre>	Chart 1	Chart 2
<pre>15 Column {data-width=400} 16 17 18 ### Chart 2 19 20 ```{r} 21 22 ``` 23 24 ### Chart 3 25 26 ```{r} 27 28 ``` 29</pre>		Chart 3

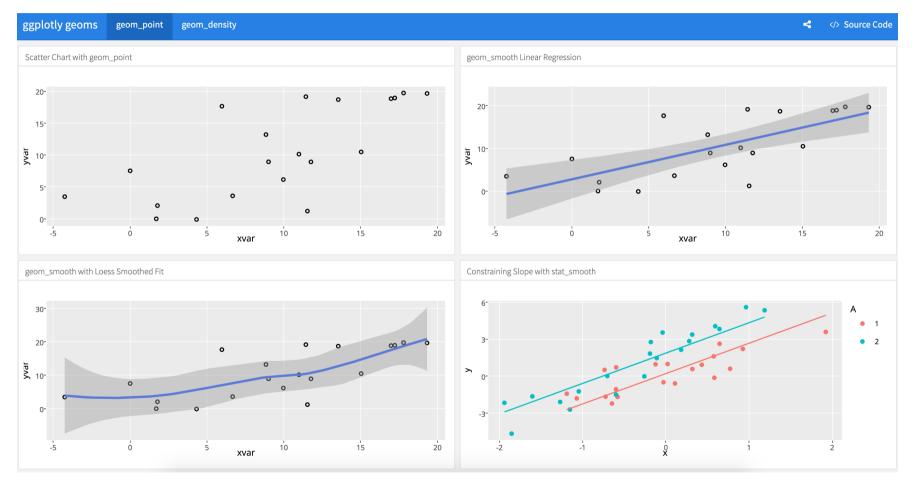
### Dashboards with flexdashboard

#### Add other elements like text and gauges





# Example dashboards



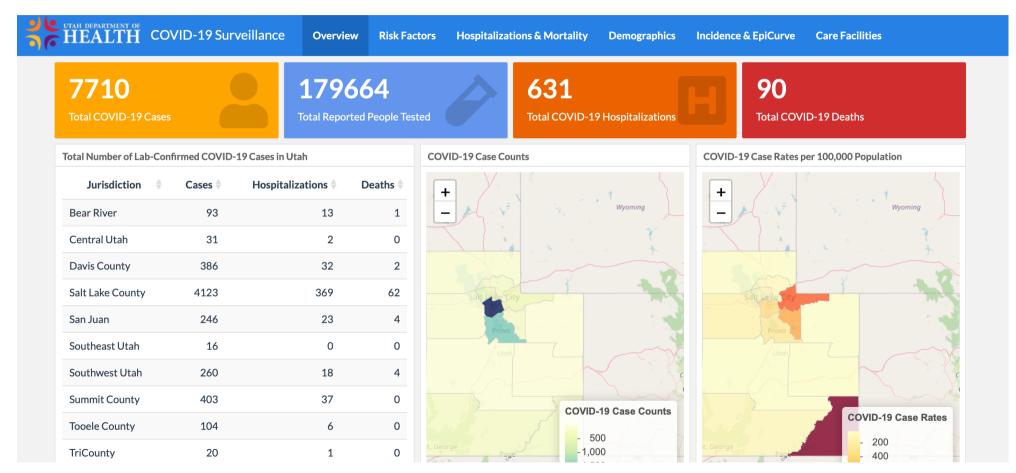
ggplot2 geoms

### **Example dashboards**

NBA Scoring (2008)		4	> Sou	rce Code
Stats by Player	Top Scorers			
		G	MIN	PTS
	Dwyane Wade	79	38.6	30.2
- Paul Pierce     - Richard Jefferson	LeBron James	81	37.7	28.4
Construction     C	Kobe Bryant	82	36.2	26.8
	Dirk Nowitzki	81	37.7	25.9
Row Andre Iguodala     - Vince Carter       Column FGP     - RayAllen       Value 0.473     - Charter Willings	Danny Granger	67	36.2	25.8
	Kevin Durant	74	39.0	25.3
- Al Harrington - Al Harringto	Kevin Martin	51	38.2	24.6
	Al Jefferson	50	36.6	23.1
- Carmelo Anthony - Carmelo Anthony - Carmelo Anthony - Danno Butler - Danny Granger	Chris Paul	78	38.5	22.8
- Chris Bosh - David West - Kevin Durant	Carmelo Anthony	66	34.5	22.8
- Antwarianison - LeBron James - Dwyare - Kobe Bryant - Chris Paul	Chris Bosh	77	38.1	22.7
- Yao Ming	Brandon Roy	78	37.2	22.6
- Tim Duncan - Shaquille O'neal - Pau Gasol - Lawrence Addridee	Antawn Jamison	81	38.2	22.2
- LiMarcus Adridge - Diviging and a second s	Tony Parker	72	34.1	22.0
<ul> <li>Amare Stoudemire</li> <li>Corey Magette</li> <li>Josh Howard</li> <li>Stouber Jackson</li> </ul>	Amare Stoudemire	53	36.8	21.4
L L L Allen Verson - Allen Verson - Kevin Martin - Kickel Red	Joe Johnson	79	39.5	21.4
- Monta Ellis	Devin Harris	69	36.1	21.3
$c t_{s_{q}} t_{y} t_{s_{q}} c_{s} $	Michael Redd	33	36.4	21.2
, , , , , , , , , , , , , , , , , , , ,	David West	76	39.3	21.0

NBA scoring

#### **Example dashboards**



Utah's COVID-19 dashboard

## **Outstanding documentation**

The documentation for **flexdashboard** is full of examples and details of everything you can do

Rely on that ↑ + Google to make really fancy (and easy!) dashboards!

### Three general methods

#### Single plots with **plotly**



#### Dashboards with **flexdashboard**

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Complete interactive apps with Shiny

Super complicated!



Shiny is a complete web application framework for interactive statistics

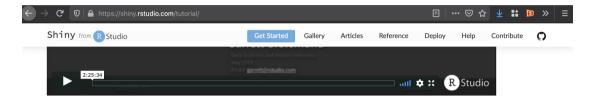
It's super complex and hard for beginners

I've never made a standalone Shiny app!

(And I don't plan on trying anytime soon)

### Lots of resources to help start

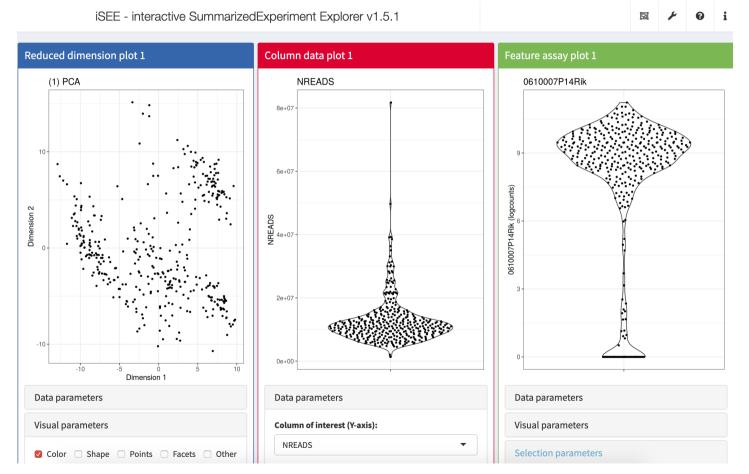
#### RStudio has a whole website for helping you get started



Part 1 - How to build a Shiny app	Part 2 - How to customize reactions	Part 3 - How to customize appearance
1. Introduction	11. Introduction	24. Introduction
2. R	12. Review of Part 1	25. Review of Parts 1 and 2
3. App architecture	13. Reactivity	26. HTML UI
4. App template	14. Reactive values	27. Adding static content
5. Inputs and outputs	15. Reactive functions	28. Building layouts
6. The server function	16. render*()	29. Panels and tabsets
7. Sharing apps	17. reactive()	30. Prepackaged layouts
8. Shinyapps.io	18. isolate()	31. CSS
9. Shiny servers	19. observeEvent()	32. Recap - Part 3
10. Recap - Part 1	20. eventReactive()	
	21. reactiveValues()	
	22. Recap - Part 2	
	23. Parting tips	

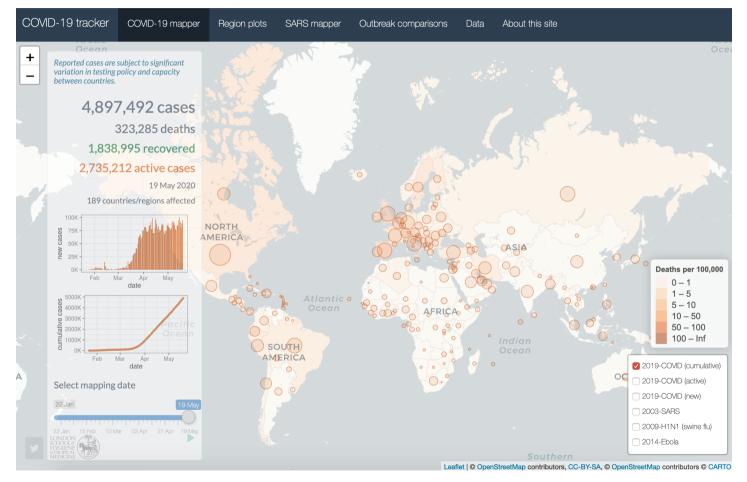
Getting started with Shiny

### **Really neat examples!**



iSEE (interactive SummarizedExperiment Explorer)

### **Really neat examples!**



COVID-19 tracker

### **Really neat examples!**

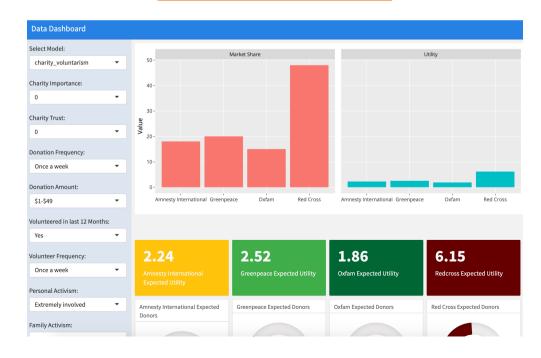
Living in the Lego World	Demographics	Fashion	Moods	Ecology	About
Ethnicity and gender Ethnic diversity and gene	der parity by theme	Find sets with	a specific eth	nicity or gende	r
Filter to one or more themes:					
Nothing selected -					
Filter to one or more genders:			<b>₩</b>		
Nothing selected -	8	Total pieces: 86 Minifig Head Skele	6 eton, Standard Sl	kull Print	
<ul> <li>Large graphs (e.g., of the full dataset) may take a few seconds to render. The first graph may take up to two minutes if the app is retrieving new data from Rebrickable.</li> <li>Hover to see the part name.</li> <li>Each circle represents a unique minifigure or minidoll head.</li> <li>Area is proportional to the number of pieces across all sets.</li> </ul>					
<b>"Ethnicity"</b> is the color of the piece. Yes, it's silly.					
<b>Gender</b> is inferred from keywords in the part name ("Male", "Female", etc., plus references to facial hair).					
Some heads are not labeled male/female but contain the name of a character of known gender (e.g., "Han Solo"). Incorporating this					

Living in the LEGO world

### flexdashboard + Shiny

#### You can use reactive Shiny things in flexdashboards without building a complete Shiny app!

#### I have done this



# Sharing content

# What do you do after you knit?

When knitting to PDF or Word, you make a standalone file

E-mail it, message it, Slack it, whatever

When knitting to HTML, you make a website

By default it's a standalone .html file with graphics embedded, so you can still e-mail it, etc., but it can get huge if there are lots of images

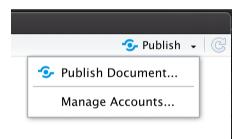
Standalone files won't work well if there's anything interactive

You can also post it online!

### **Places to put HTML documents**

#### **RPubs** for knitted HTML documents

#### Built in to RStudio; works with ggplotly!



#### **RPubs or shinyapps.io for flexdashboards**

#### Your own web server for anything, if you have one