Washington University in St. Louis

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Making Web Maps with R

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Learning Objectives

- To map points with the Leaflet for R package.

- To download a polygon using the tidycensus package.

- To map polygons with the Leaflet for R package.

- To have basic familiarity with R Markdown.

- To embed your map in R Markdown and share it using RPubs.

Getting Started

Open up R-Studio

For an RScript: `File -> New File -> RScript`

For a R Markdown document: `File -> New File -> R Markdown`

You don't have to change anything in the **New Markdown Document** options window.. Just click OK and we'll change some things later!

Installing Packages

Install and load these packages before we start!

```
install.packages("leaflet")
install.packages("tidycensus")
install.packages("tidyverse")
install.packages("rgdal")
install.packages("sf")
install.packages("rmarkdown")
install.packages("magrittr")

library(leaflet)
library(tidycensus)
library(tidyverse)
library(rgdal)
library(sf)
library(rmarkdown)
library(magrittr)
```

Important thing to note!

Make sure to not use absolute paths!!!

Example:

```
C:/Users/DataServices/Workshop/
Making_Web_Maps_With_R
/Data/shapefile.shp
```

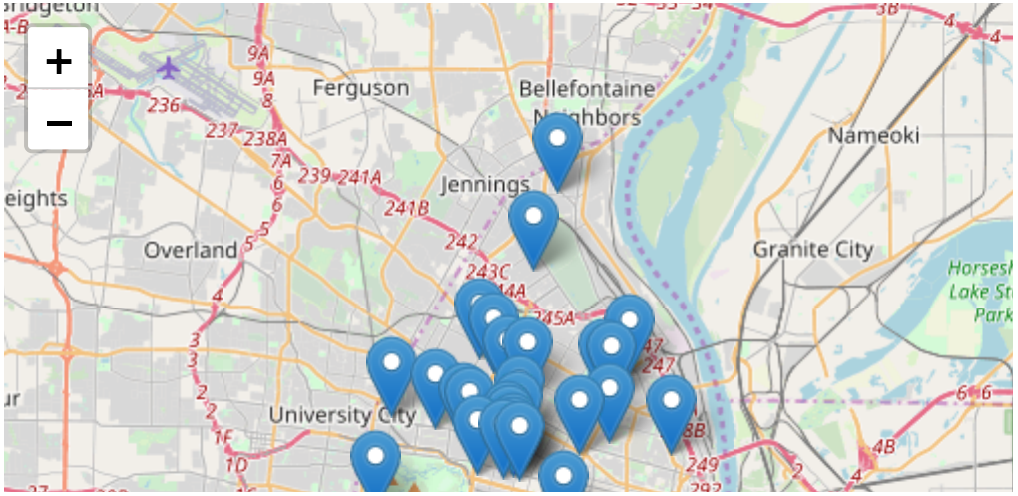
Use relative paths instead.

Example:

```
./Data/shapefile.shp
```

Mapping points with the Leaflet for R Package

```
ltc_facilities <- readOGR("./dataprep/SLC_LTC_Facilities/slc_ltc_
leaflet() %>%
  addTiles() %>%
  addMarkers(data = ltc_facilities, lng = ~LONGITUDE, lat = ~LATI'
             popup =  as.character(ltc_facilities$FACILITY),
             label = as.character(ltc_facilities$FACILITY))
```

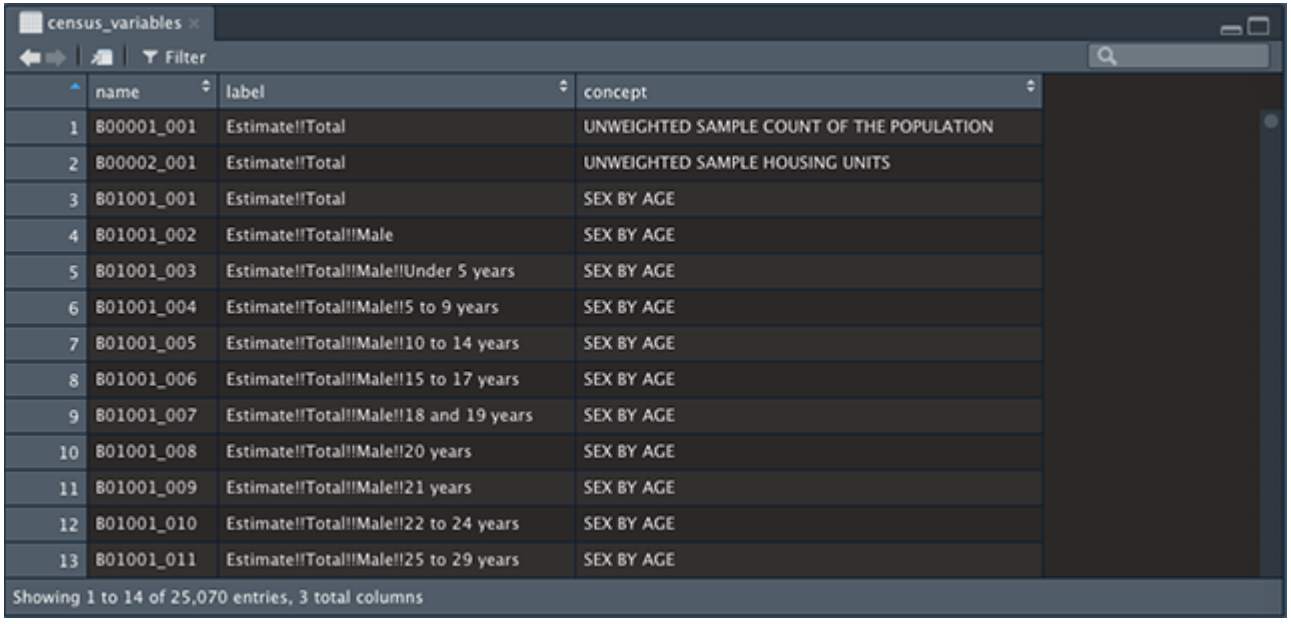


Another Important thing to note!

Make sure to set `verbose = FALSE` to suppress any warning messages. This doesn't fix everything though, for we will have to change another option later on.

Downloding a Polygon with the tidycensus package

```
census_api_key("ENTER API KEY HERE")
census_variables <- load_variables(2017, "acs5", cache = TRUE)
```



census_variables

Filter

	name	label	concept
1	B00001_001	Estimate!!Total	UNWEIGHTED SAMPLE COUNT OF THE POPULATION
2	B00002_001	Estimate!!Total	UNWEIGHTED SAMPLE HOUSING UNITS
3	B01001_001	Estimate!!Total	SEX BY AGE
4	B01001_002	Estimate!!Total!!Male	SEX BY AGE
5	B01001_003	Estimate!!Total!!Male!!Under 5 years	SEX BY AGE
6	B01001_004	Estimate!!Total!!Male!!5 to 9 years	SEX BY AGE
7	B01001_005	Estimate!!Total!!Male!!10 to 14 years	SEX BY AGE
8	B01001_006	Estimate!!Total!!Male!!15 to 17 years	SEX BY AGE
9	B01001_007	Estimate!!Total!!Male!!18 and 19 years	SEX BY AGE
10	B01001_008	Estimate!!Total!!Male!!20 years	SEX BY AGE
11	B01001_009	Estimate!!Total!!Male!!21 years	SEX BY AGE
12	B01001_010	Estimate!!Total!!Male!!22 to 24 years	SEX BY AGE
13	B01001_011	Estimate!!Total!!Male!!25 to 29 years	SEX BY AGE

Showing 1 to 14 of 25,070 entries, 3 total columns

Downloading a Polygon with the tidycensus package

Here are the variables we are interested in...

	name	label	concept
1	B18101_00	Total Population	Sex and Age by Disability Status
2	B18101_016	Estimate- Total Male 65 to 74 years old with a disability	Sex and Age by Disability Status
3	B18101_019	Estimate - Totale Male 75 years and older with a disability	Sex and Age by Disability Status
4	B18101_035	Estimate - Total Female 65 to 74 years with a disability	Sex and Age by Disability Status
5	B18101_038	Estimate - Total Female 75 years and over with a disability	Sex and Age by Disability Status

Downloading a Polygon with the tidycensus package

```
stlouis_disabled <- get_acs(geography = "tract",
                    variables = c("B18101_001", "B18101_016", "B1810
                                  "B18101_035", "B18101_038"), state
                              county = "510", geometry = TRUE, output
```

Downloading a Polygon with the tidycensus package

Creating a new variable with the mutate function

```
stlouis_disabled <- get_acs(geography = "tract",
                    variables = c("B18101_001", "B18101_016", "B1810
                                  "B18101_035", "B18101_038"), state
                              county = "510", geometry = TRUE, output
  mutate(totalpop = B18101_016E + B18101_019E+ B18101_035E  + B1810
         percent_disb = (totalpop/B18101_001E)*100)
```

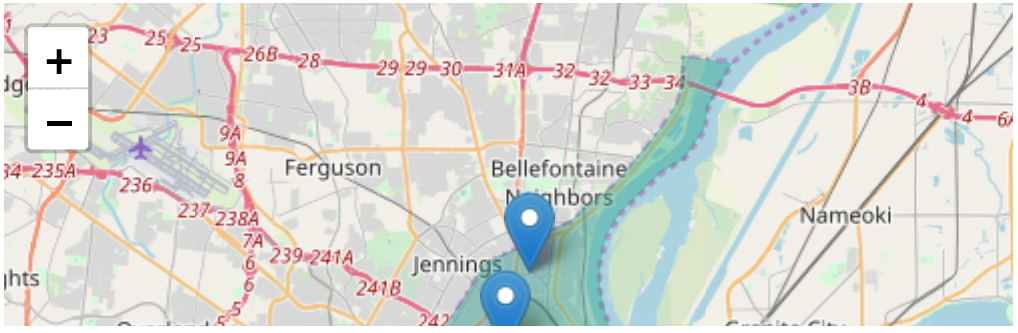
The pipe operation above (`%>%`) moves the variables from the previous operation to the next operation which is to sum up all of the total populations by sex.

Mapping points with the Leaflet for R Package

class: center

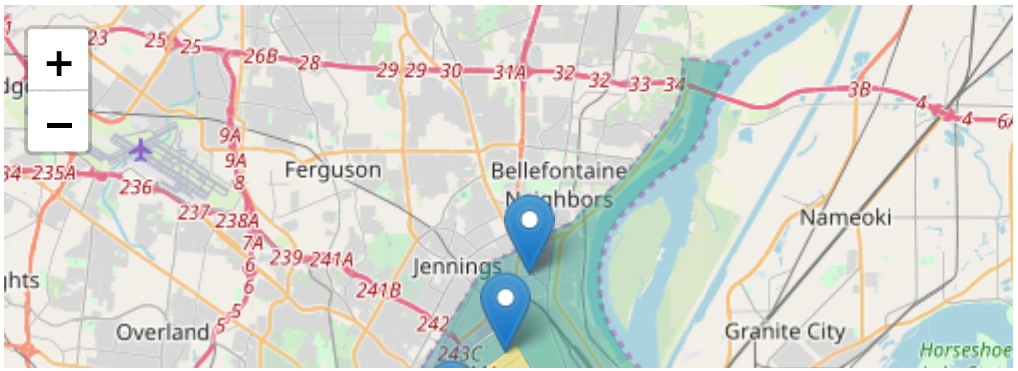
```
#setting the color palette for the polygon
pal = colorNumeric(palette = "viridis", domain = stlouis_disabled

map <- leaflet() %>%
  addTiles() %>%
  addMarkers(data = ltc_facilities, lng = ~LONGITUDE, lat = ~LATI
  addPolygons(data = stlouis_disabled, fillOpacity = 0.4, stroke
map
```



Adding a legend to your leaflet map

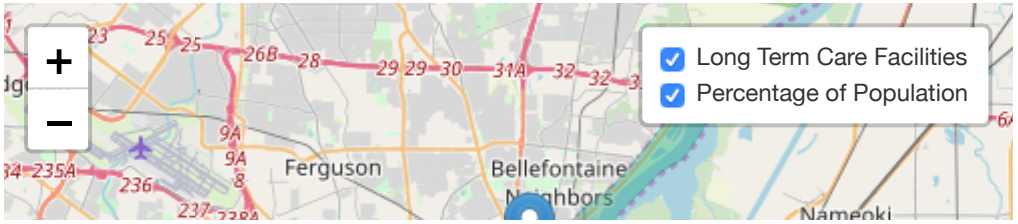
```
map <- leaflet() %>%
  addTiles() %>%
  addMarkers(data = ltc_facilities, lng = ~LONGITUDE, lat = ~LATI'
  addPolygons(data = stlouis_disabled, fillOpacity = 0.4, stroke =
              popup = stlouis_disabled$NAME) %>%
  addLegend(data = stlouis_disabled, pal = pal,  values = ~stloui:
            position = "bottomright", title = "Disabled Populatio:
            labFormat = labelFormat(suffix = "%"))
map
```



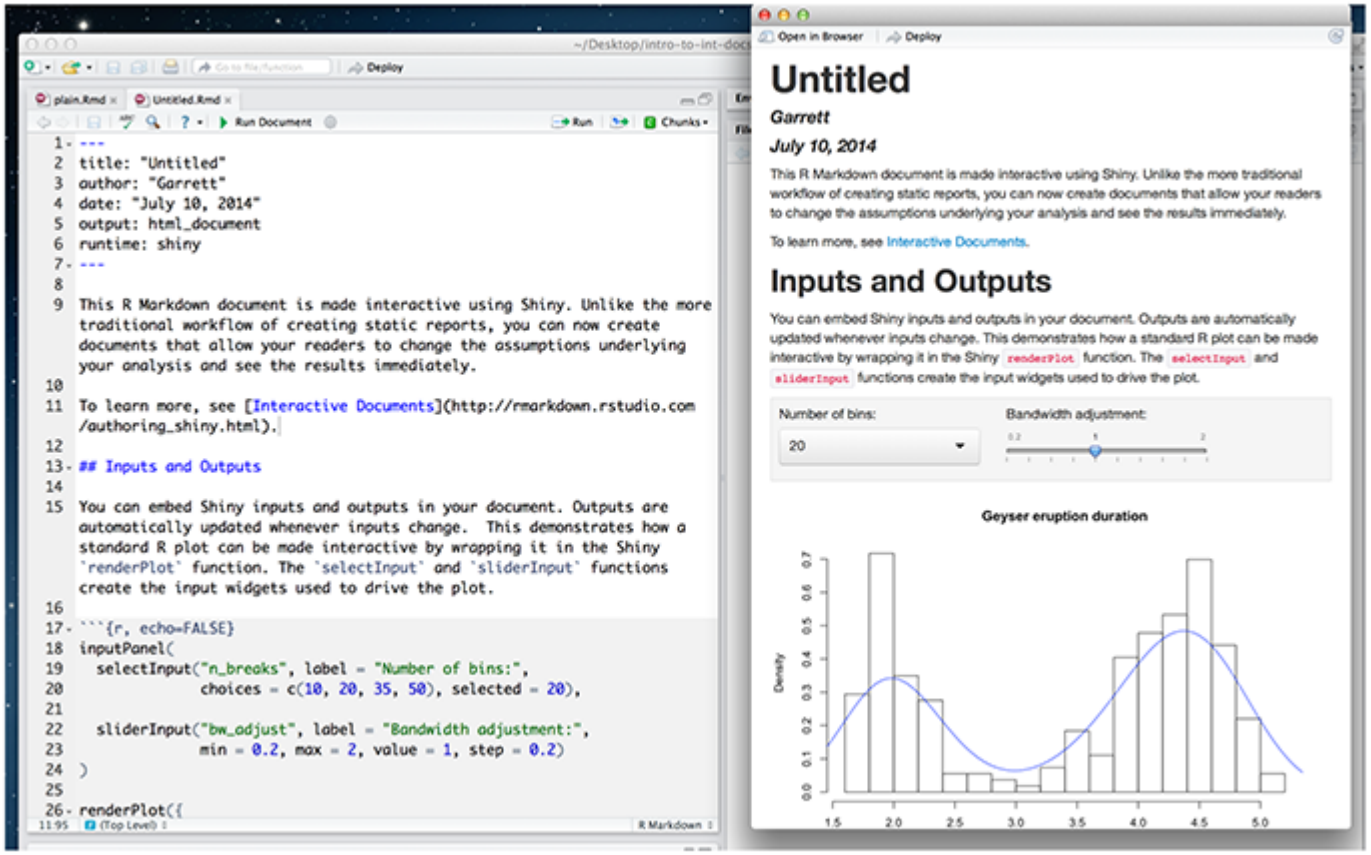
Adding interactivity to the map

```
map <- leaflet() %>%
  addTiles() %>%
  addMarkers(data = ltc_facilities, lng = ~LONGITUDE, lat = ~LATI
             group = "Long Term Care Facilities") %>%
  addPolygons(data = stlouis_disabled, fillOpacity = 0.4, stroke =
              group = "Percentage of Population", popup = stlouis_
  addLegend(data = stlouis_disabled, pal = pal,  values = ~stloui
            position = "bottomright", title = "Disabled Populatio
            labFormat = labelFormat(suffix = "%")) %>%
  #We will add the layer control here
  addLayersControl(
    overlayGroups = c("Long Term Care Facilities", "Percentage of
    options = layersControlOptions(collapsed = FALSE))

map
```



Introduction to R Markdown



Header 1 `# Header 1`

Header 2 `## Header 2`

header 3 `### Header 3`

This is italicized `*This is italicized*`

This is bold `**This is bold**`

Inserting R Code Chunks

Insert -> R

For today's workshop, we will create two code chunks.

Pre-processing code chunk

Mapping code chunk

Code chunk options

include = TRUE/FALSE

Prevents the code and results from appearing from the finished file. Other code chunks can use it though.

echo = TRUE/FALSE

Whether to display the code along with its results

message = TRUE/FALSE

Whether to display messages.

Code chunk options

The preprocessing code chunk will have the option of **include = FALSE**

- Loading packages

- Loading the points shapefile

- Downloading the polygon shapefile

- Setting the color palette for the polygon

Code chunk options

The second code chunk will have the options of **eval = TRUE, echo = FALSE, message = FALSE, warning = FALSE**

- Mapping of points and polygons

- Adding a legend

- Adding a layer control panel

Final touches!

- Adding a title and author above your code chunks

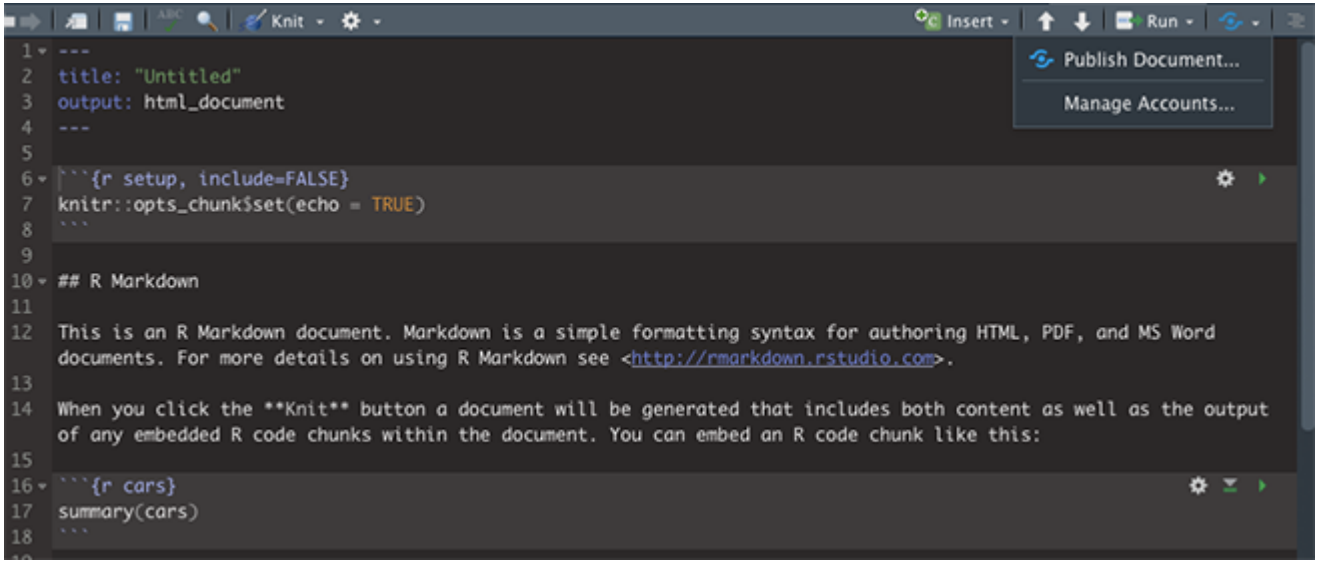
- Adding a brief description of your map

- Preview your map by clicking the **Knit** button

Uploading your map online

- Go to the R Pubs website and register for an account.

- Publish your document from R Studio



Now it's time to make your own leaflet map!