

Chapter 2 Overview

INTERACTIVE MAPS WITH LEAFLET IN R



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Where We Left Off

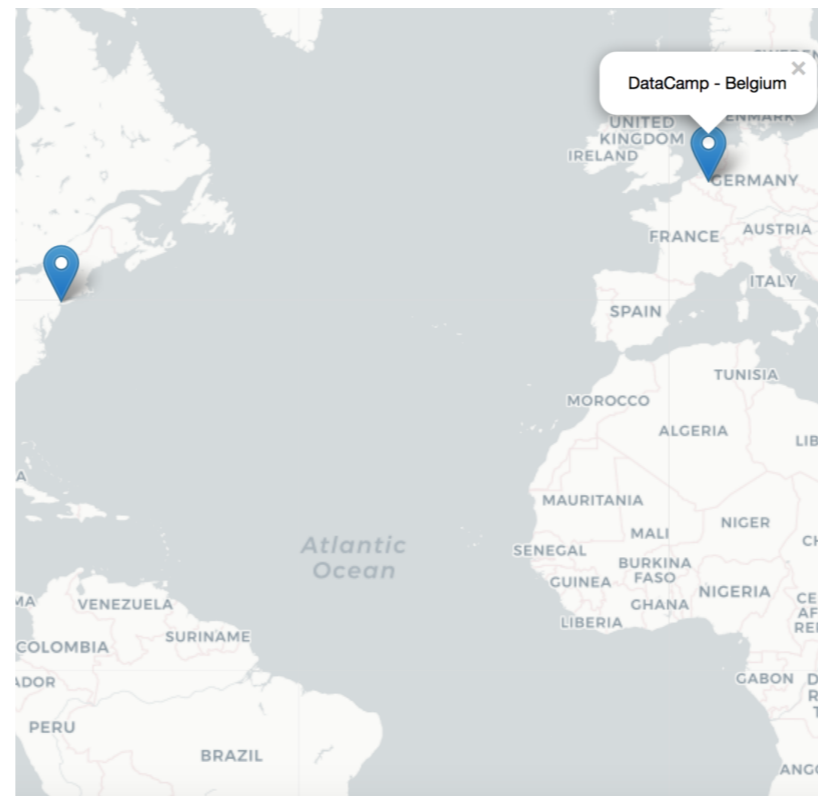
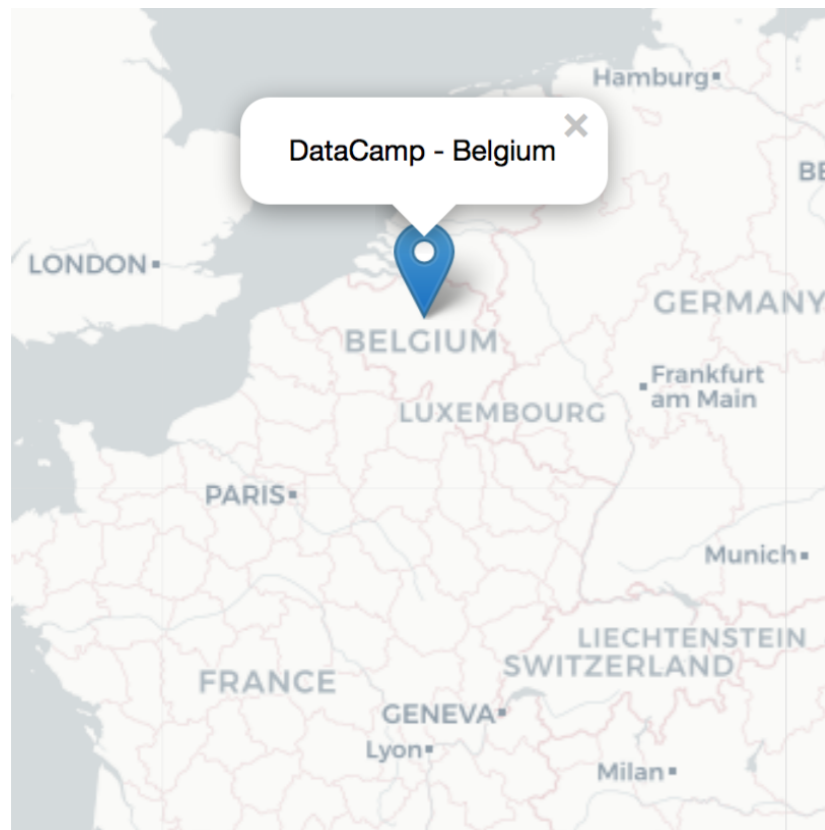
```
leaflet() %>%  
  addProviderTiles("CartoDB") %>%  
  addMarkers(lng = dc_hq$lon, lat = dc_hq$lat, popup = dc_hq$hq)
```



Cleaning up the Base Map

```
m <- m %>%  
  setView(lat = 50.881363,  
          lng = 4.717863,  
          zoom = 5)
```

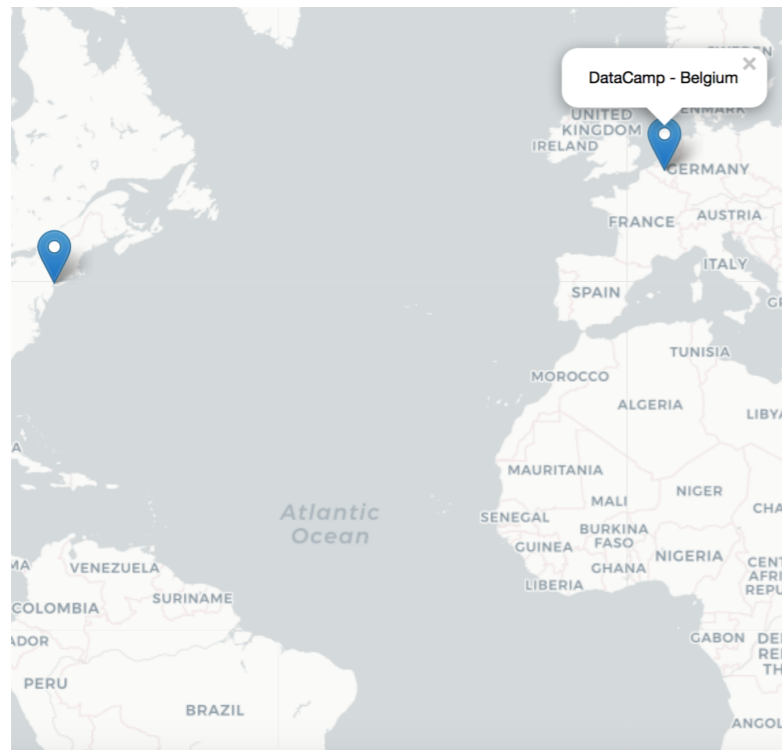
```
# Restore view based on  
# data displayed on map  
m %>%  
  clearBounds()
```



Cleaning up the Base Map

```
# Restore view based on  
# data displayed on map  
m %>%  
  clearBounds()
```

```
# Remove markers  
m %>%  
  clearBounds() %>%  
  clearMarkers()
```



IPEDS

- Integrated Postsecondary Education Data System (IPEDS)
- Administered by National Center for Education Statistics (NCES)
- Data from all institutions participating in federal student financial aid programs
 - colleges
 - universities
 - technical and vocational institutions

Our IPEDS Dataset

```
> glimpse(ipeds)
```

```
Observations: 3,146
Variables: 5
$ name      <chr> "A T Still University of Health Sciences",...
$ lng       <dbl> -92.58918, -99.70954, -83.52828, -93.29968, ...
$ lat       <dbl> 40.19365, 32.46915, 31.48189, 44.85621, 29.65008, .
$ state     <chr> "MO", "TX", "GA", "MN", "FL", "CA", "CA", "CA",...
$ sector_label <chr> "Private", "Private", "Public", "For-Profit", ...
```

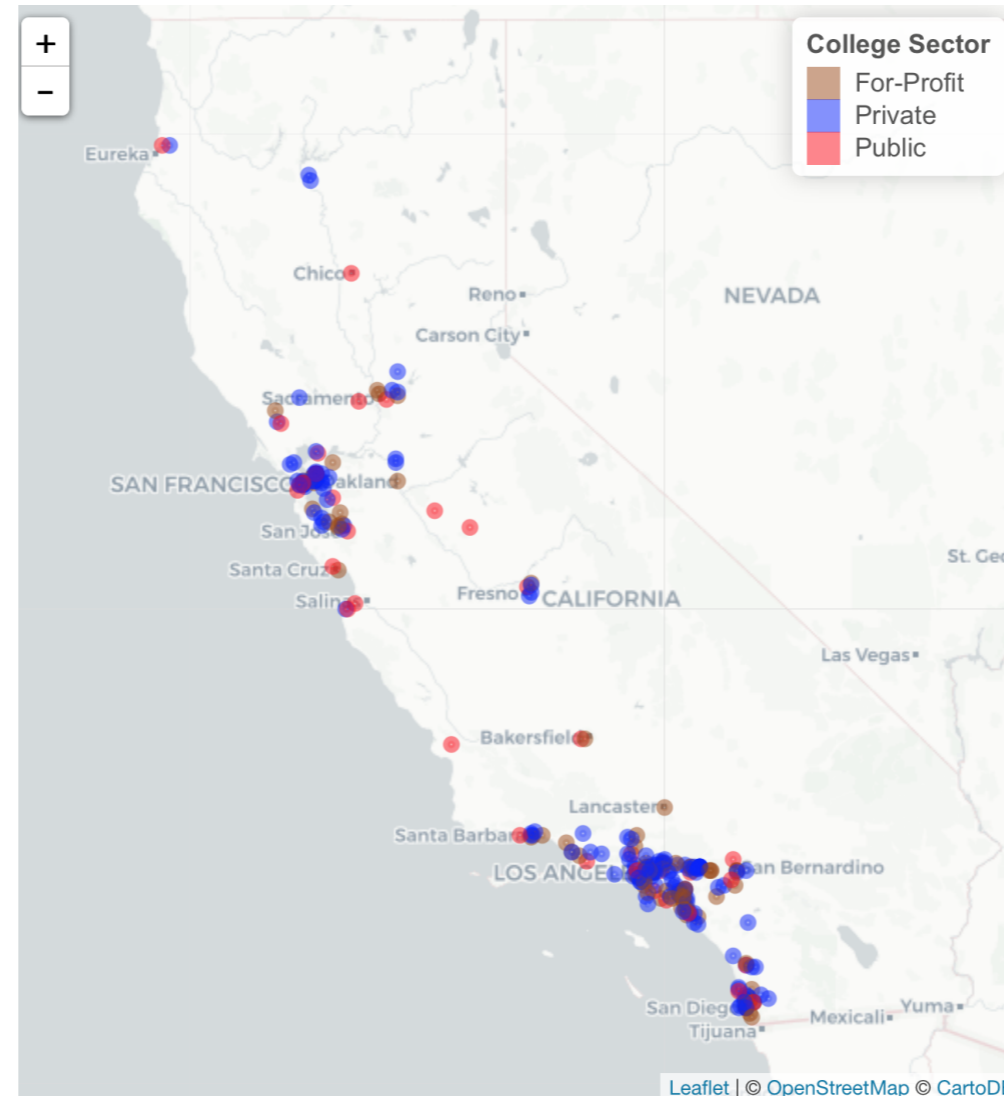
Our IPEDS Dataset

```
ipeds %>% group_by(state) %>% count %>% arrange(desc(n))
```

```
# A tibble: 56 x 2  
# Groups:   state [56]  
  state      n  
  <chr> <int>  
1    CA    286  
2    NY    239  
3    PA    164  
4    FL    160  
5    TX    157
```

Where We are Going in Chapter 2

- Filter the data to California colleges
- Map all of the colleges in California
- Use circle markers instead of pins
- Color our markers by sector



Let's practice!

INTERACTIVE MAPS WITH LEAFLET IN R

Mapping a State's Colleges

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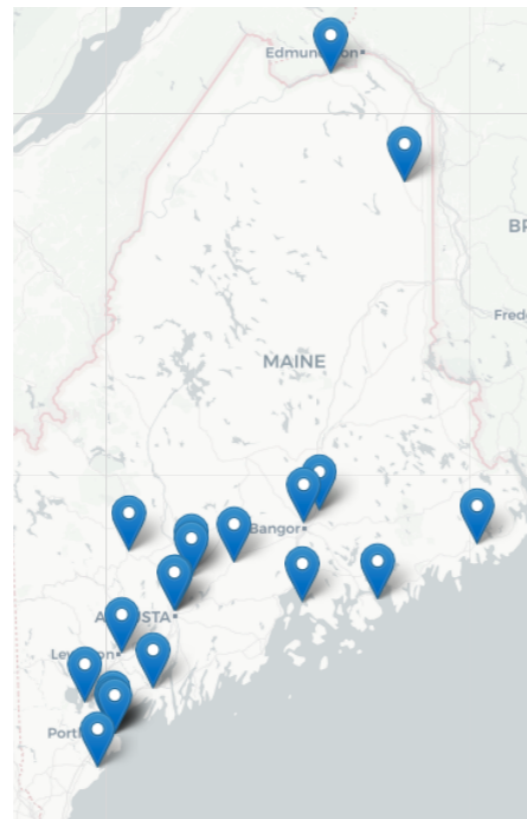
How many 4-year colleges are there in Maine?

```
ipeds %>%  
  filter(state == "ME")
```

```
# A tibble: 21 x 5  
  name          lng      lat state sector_label  
  <chr>      <dbl>  <dbl> <chr>      <chr>  
1 Bates College -70.20333 44.10530 ME Private  
2 Bowdoin College -69.96524 43.90690 ME Private  
3 Colby College -69.66337 44.56421 ME Private  
4 College of the Atlantic -68.22885 44.39958 ME Private  
...
```

Mapping a State's Colleges

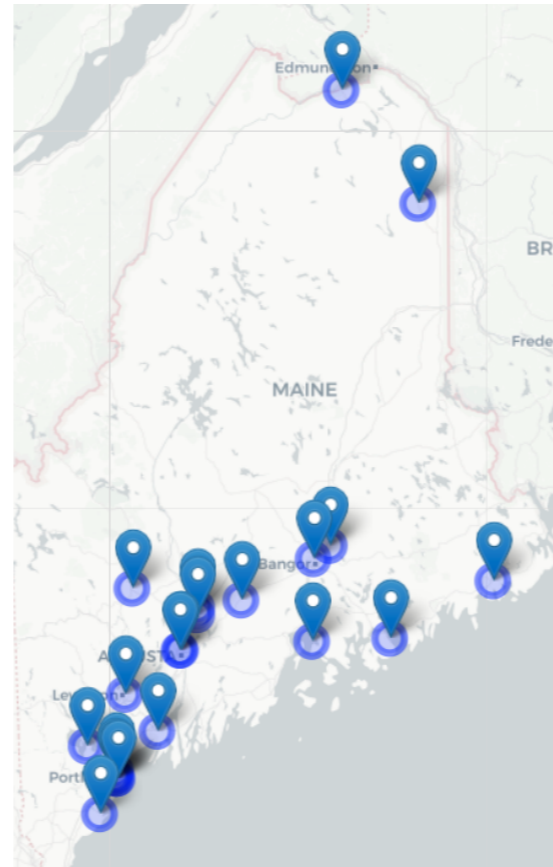
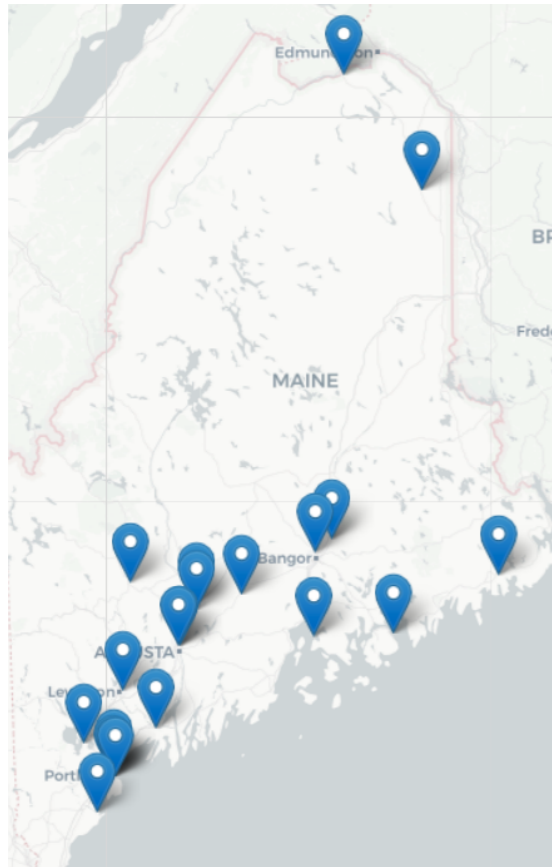
```
# Assuming 'lng' and 'lat' are longitude and latitude, respectively
maine_colleges_map <-
  leaflet() %>%
  addProviderTiles("CartoDB") %>%
  addMarkers(data = maine_colleges)
```



Mapping a State's Colleges

```
maine_colleges_map <-  
  leaflet() %>%  
  addProviderTiles("CartoDB")%>%  
  addMarkers(data = maine)
```

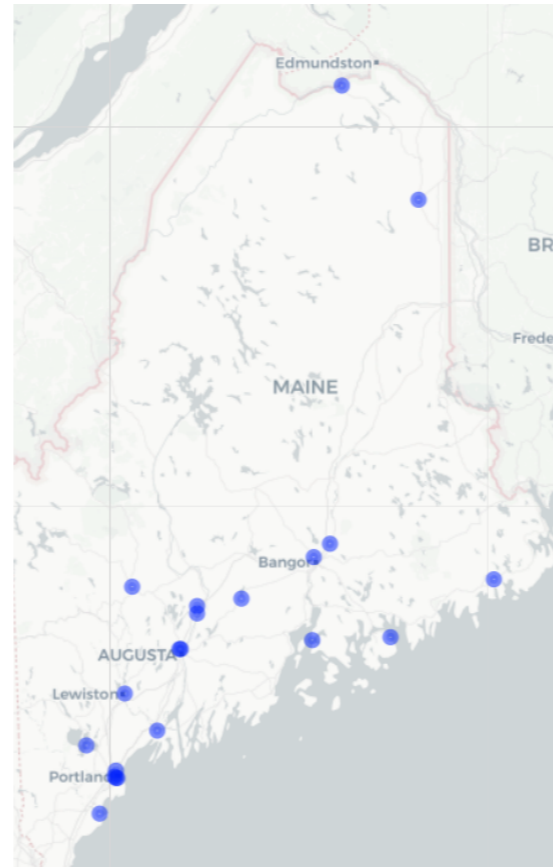
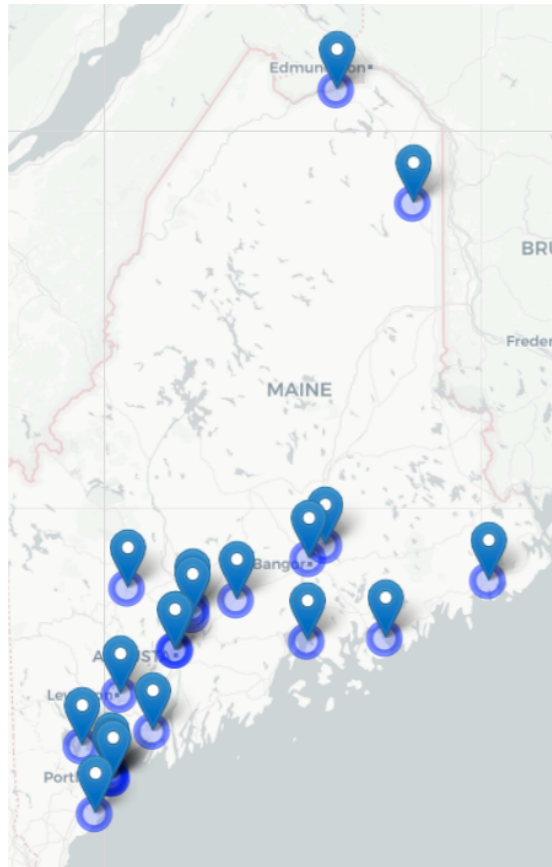
```
# adding more markers will  
# not remove existing markers  
maine_colleges_map %>%  
  addCircleMarkers(data = maine)
```



Mapping a State's Colleges

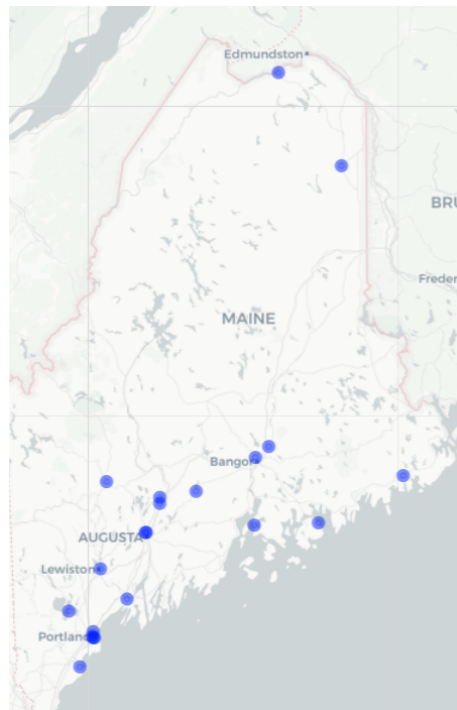
```
# adding more markers will  
# not remove existing markers  
maine_colleges_map %>%  
  addCircleMarkers(data = maine)
```

```
maine_colleges_map %>%  
  clearMarkers() %>%  
  addCircleMarkers(data = maine,  
                  radius = 3)
```



Mapping a State's Colleges

```
maine_colleges_map <-  
  maine_colleges_map %>%  
  clearMarkers %>%  
  addCircleMarkers(  
    data = maine_colleges,  
    radius = 3)
```



```
maine_colleges_map %>%  
  addCircleMarkers(  
    data = maine_colleges,  
    radius = 4,  
    color = "red",  
    popup = ~name)
```



Let's practice!

INTERACTIVE MAPS WITH LEAFLET IN R

Labels and Pop-ups

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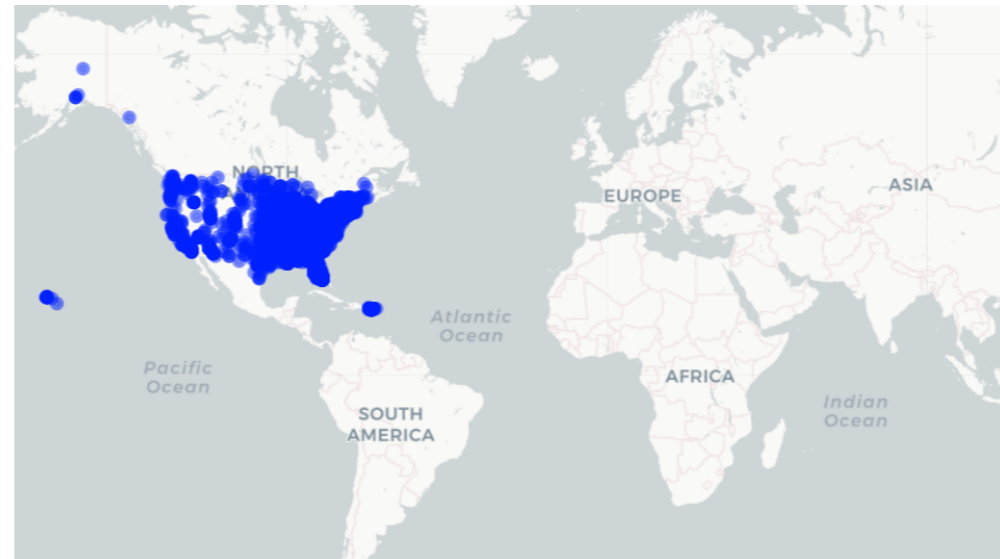
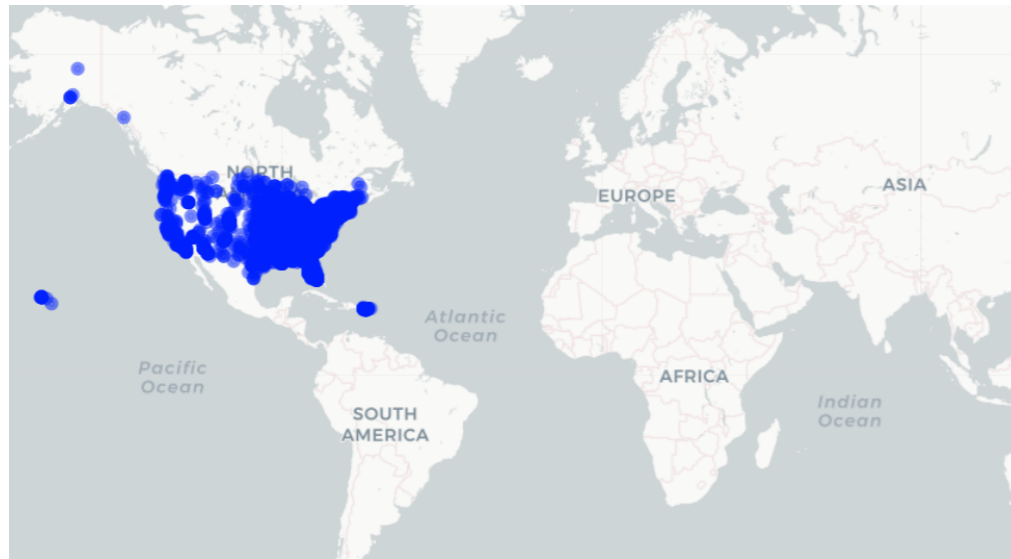
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Piping and the ~ Operator

```
ipeds %>%  
  leaflet() %>%  
  addProviderTiles("CartoDB") %>%  
  addCircleMarkers(  
    lng = ~lng,  
    lat = ~lat,  
    popup = ~name,  
    color = "#FF0000")
```

```
# ipeds is specified 3 times  
leaflet() %>%  
  addProviderTiles("CartoDB") %>%  
  addCircleMarkers(  
    lng = ipeds$lng,  
    lat = ipeds$lat,  
    popup = ipeds$name,  
    color = "red")
```



All the Colors

```
ipeds %>%  
  leaflet() %>%  
  addProviderTiles("CartoDB")%>%  
  addCircleMarkers(  
    lng = ~lng, lat = ~lat,  
    popup = ~name, color = "#FF0000")
```

| Hex | Decimal | RGB Color |
|-----|---------|-----------|
| FF | 255 | Red |
| 00 | 0 | Green |
| 00 | 0 | Blue |

 #ff0000

 rgb(255, 0, 0)

$$= 16^1 * 15 + 16^0 * 15$$

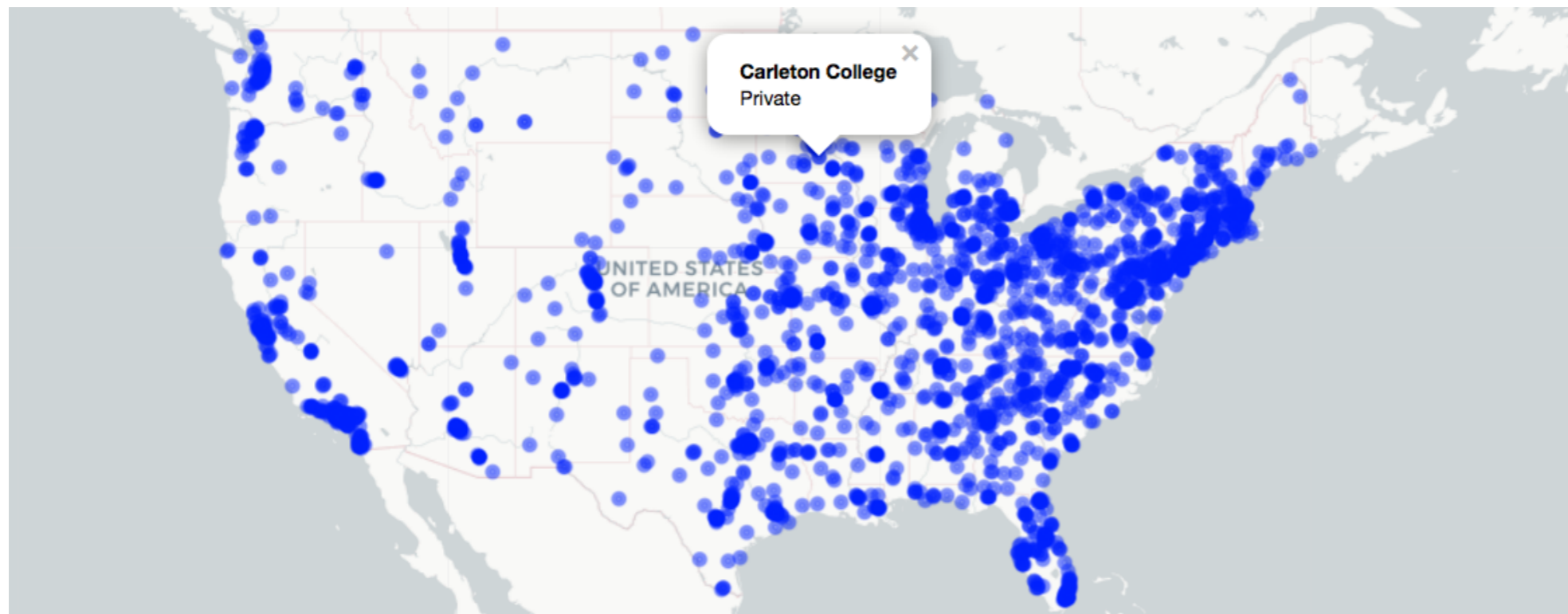
$$= 16 * 15 + 1 * 15$$

$$= 240 + 15$$

$$= 255$$

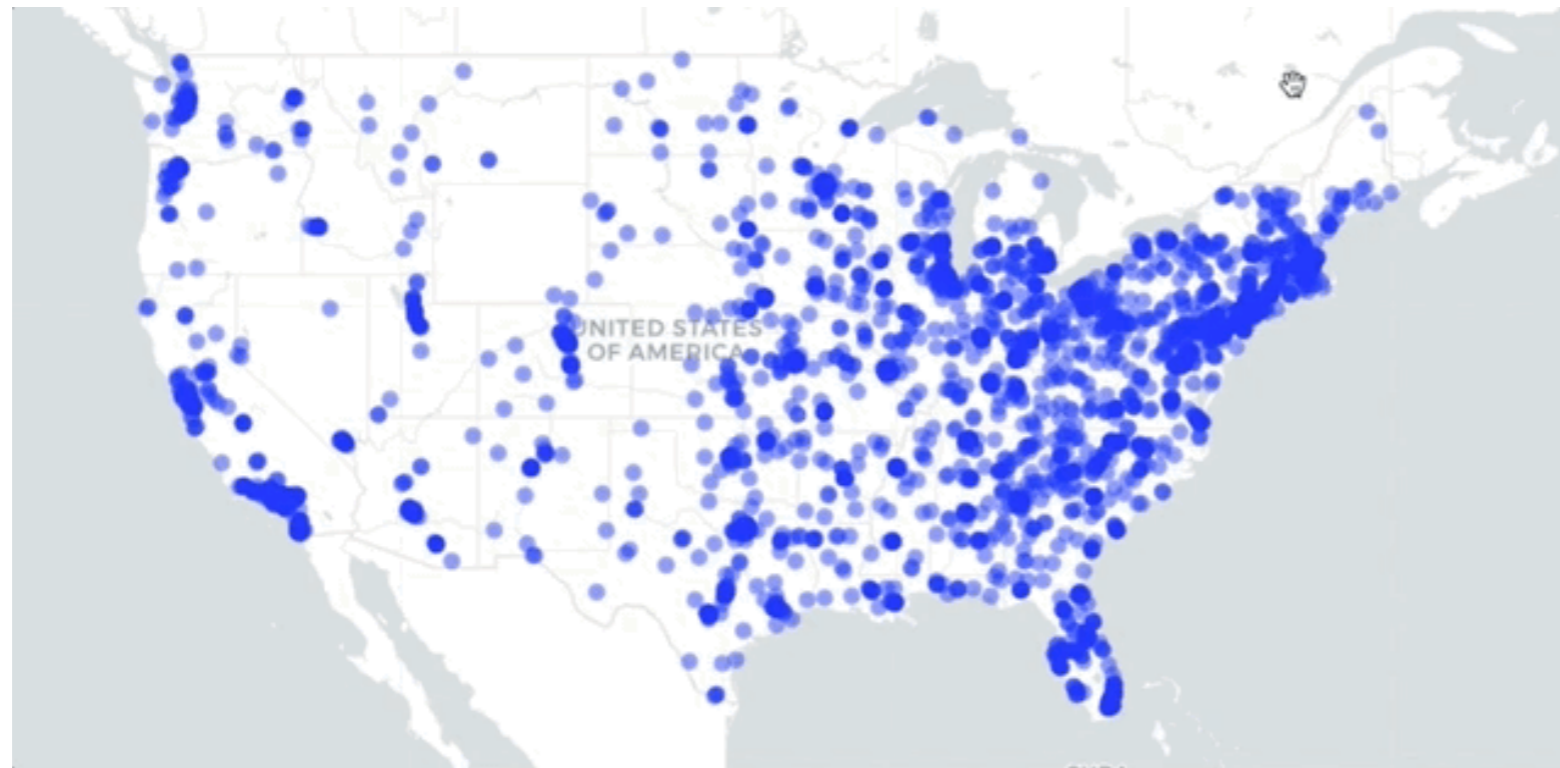
Building a Better Pop-up

```
addCircleMarkers(popup = ~name)  
addCircleMarkers(popup = ~paste0(name, "-", sector_label))  
addCircleMarkers(popup = ~paste0("<b>", name, "</b>", "  
  <br/>", sector_label))
```



Labels

```
ipeds %>%  
  leaflet() %>%  
  addProviderTiles("CartoDB") %>%  
  addCircleMarkers(label = ~name, radius = 2)
```



Let's practice!

INTERACTIVE MAPS WITH LEAFLET IN R

Color Coding Colleges

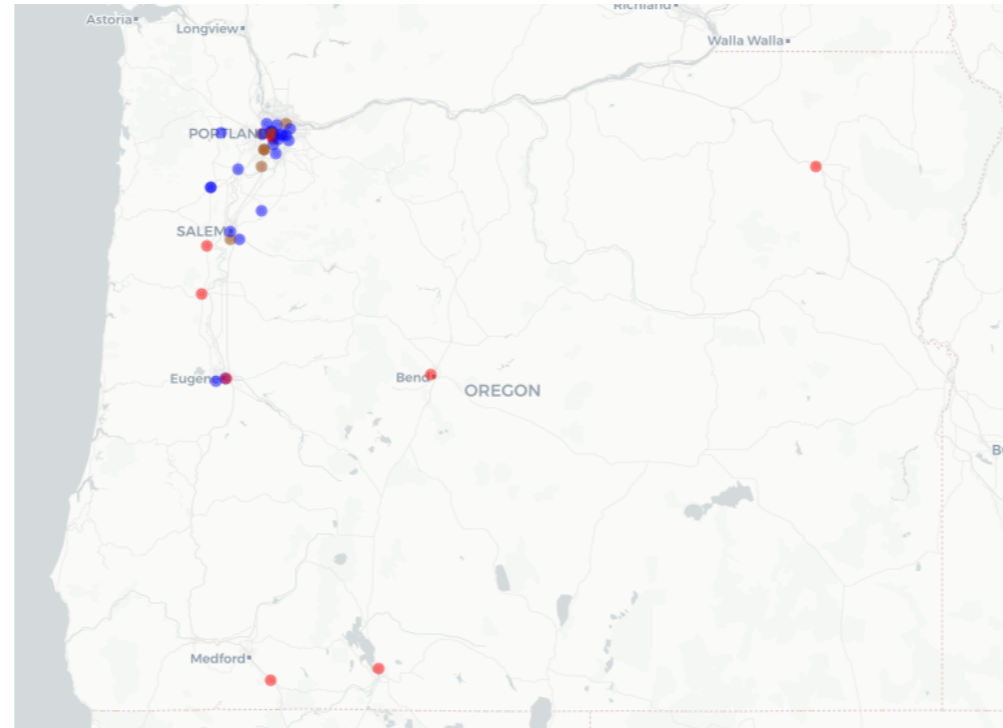
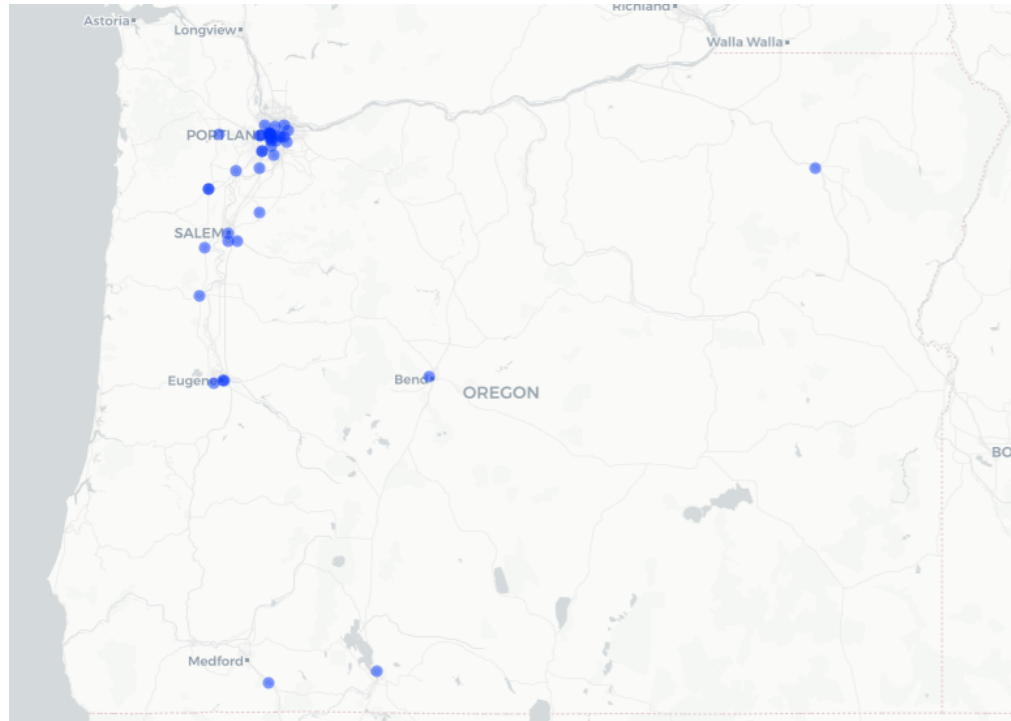
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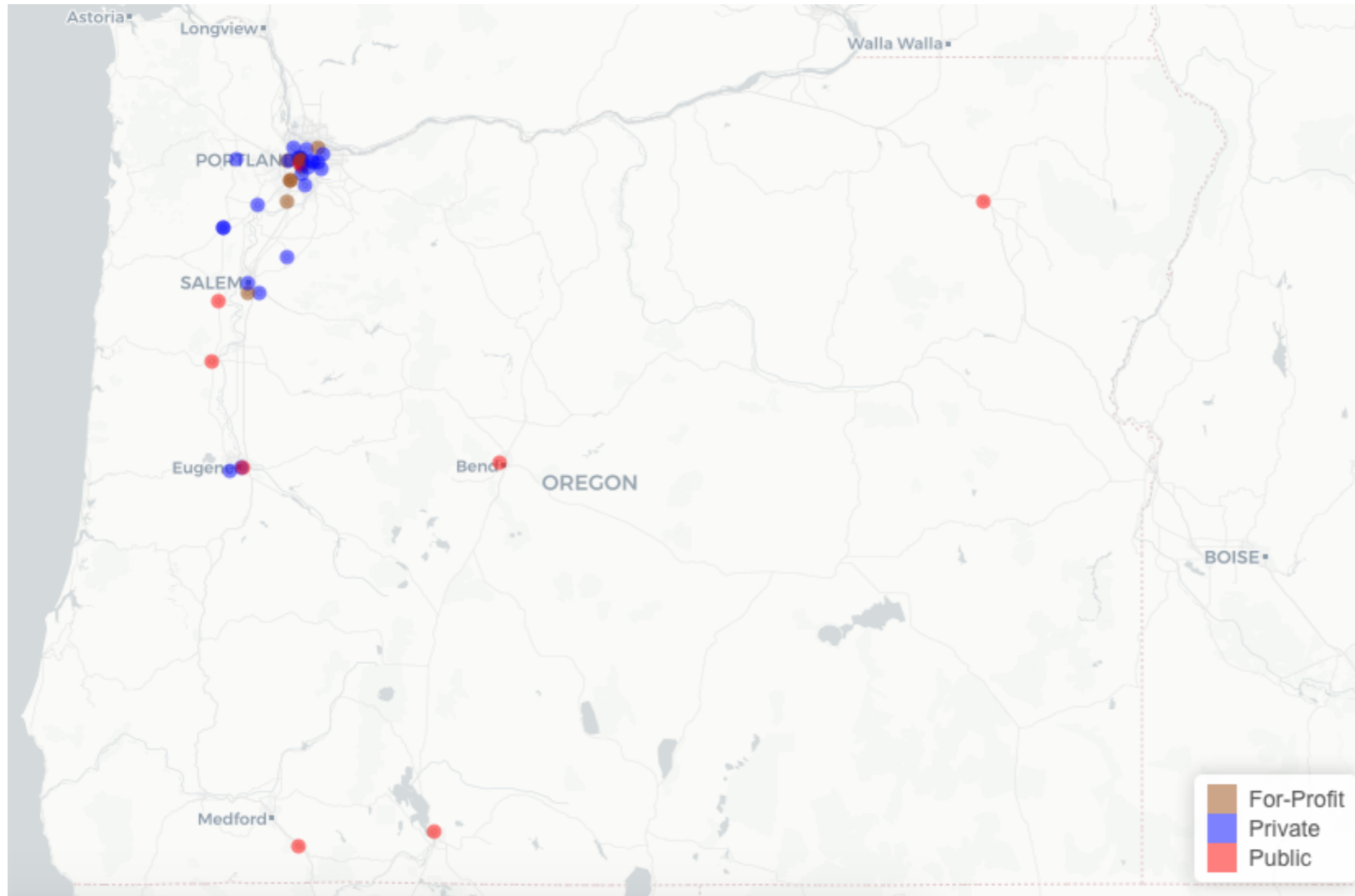
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Adding Color (and Information)



Remembering your Colors



colorFactor()

```
OR <- ipeds %>%  
  filter(state == "OR")  
pal <- colorFactor(palette = c("red", "blue", "#9b4a11"),  
  levels = c("Public", "Private", "For-Profit"))
```

```
oregon_colleges <- OR %>%  
  leaflet() %>%  
  addProviderTiles("CartoDB") %>%  
  addCircleMarkers(radius = 2,  
    color = ~pal(sector_label), label = ~name)
```

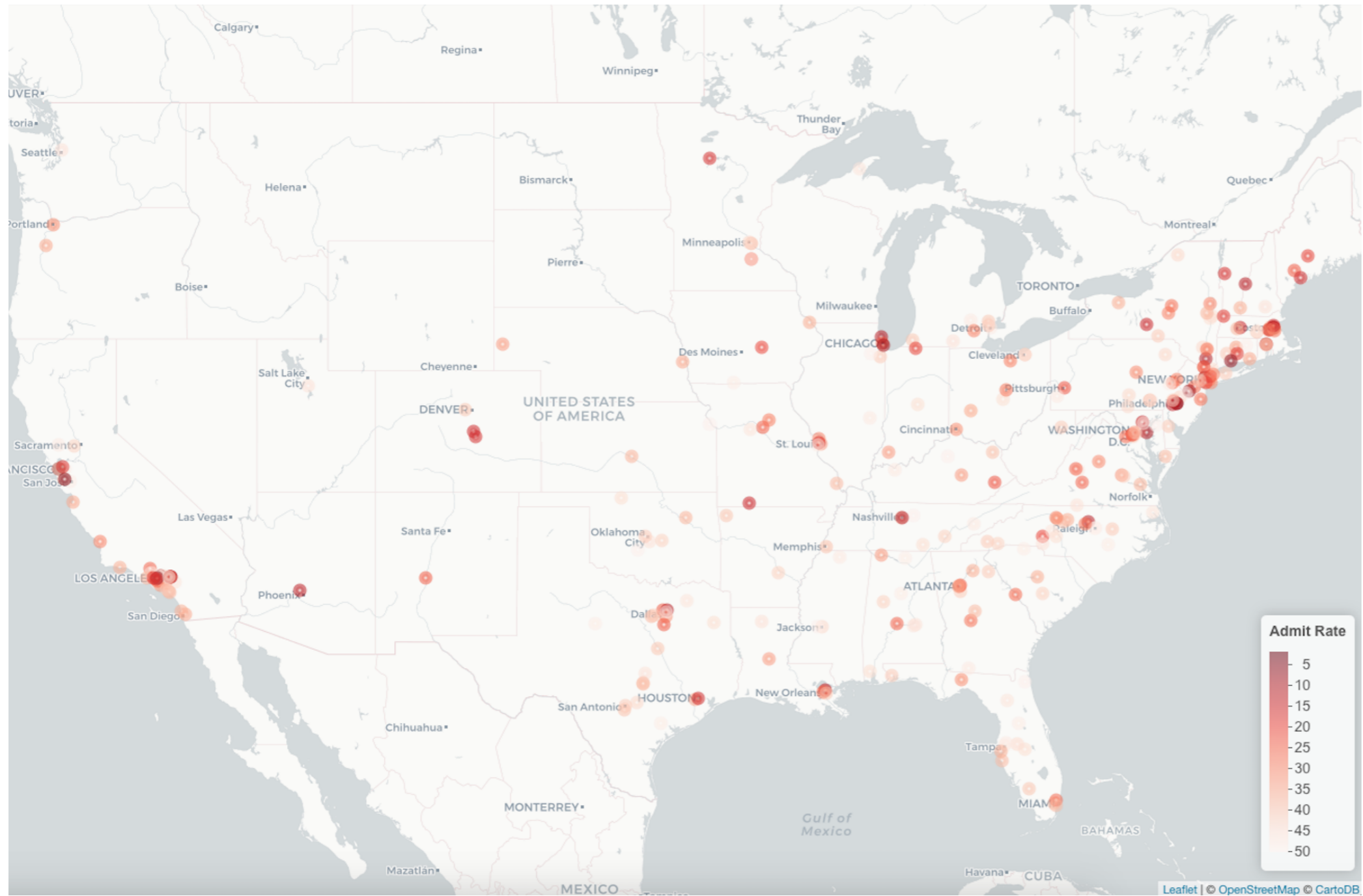
```
oregon_colleges %>%  
  addLegend(position = "bottomright", pal = pal,  
    values = c("Public", "Private", "For-Profit"))
```

colorNumeric()

```
admit <- admit %>%  
  filter(!is.na(rate), rate < 50, rate > 0)
```

```
pal <- colorNumeric(palette = "Reds", domain = c(1:50),  
  reverse = TRUE)
```

```
admit_map <- admit %>%  
  leaflet() %>%  
  addProviderTiles("CartoDB") %>%  
  addCircleMarkers(radius = 4, color = ~pal(rate),  
    label = ~name) %>%  
  addLegend(title = "Admit Rate", pal = pal, values = c(1:50),  
    position = "bottomright")
```



Picking a Color Palette

```
# see http://colorbrewer2.org/ for interactive examples  
library(RColorBrewer)  
display.brewer.all()
```



Let's practice!

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