Maping with Leaflet

Kristine Dinh

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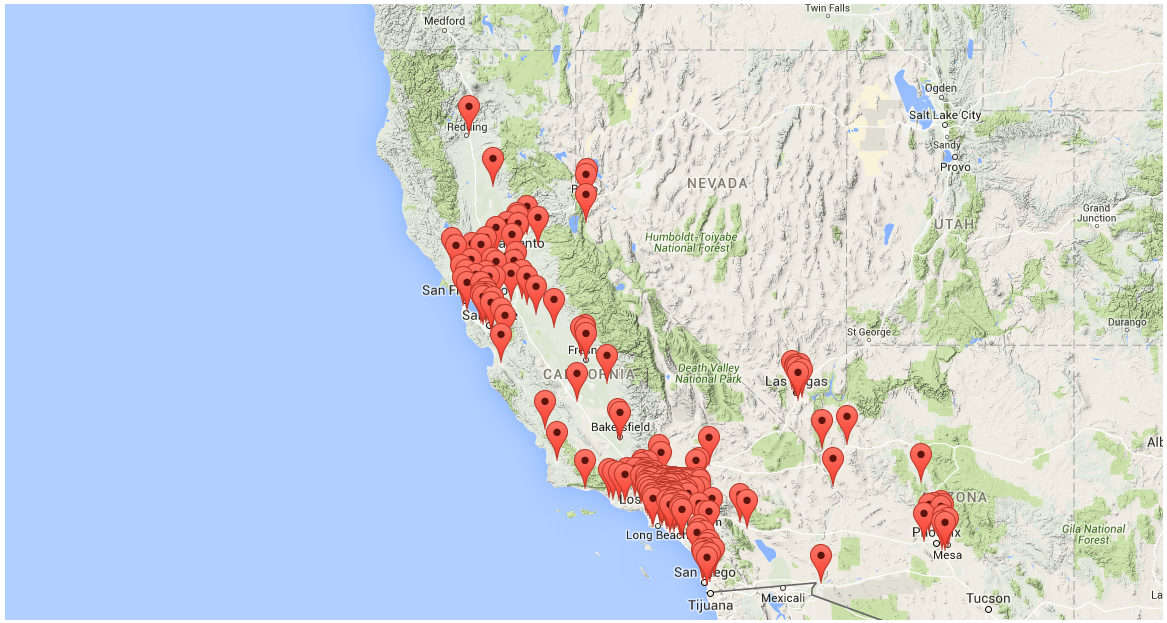
Before we start

- Why I choose this topic?



Introduction

What is `Leaflet`?

- 'Leaflet' JavaScript library and `htmlwidgets` package
- Interactive maps
- Use to present, report, GIS, etc.

Content

- Simple maps
- Some cool functions in the package
- I try it
- Summary

But first, let's install the package

- To install CRAN package:

```
install.packages("leaflet")
```

- To install developing github package:

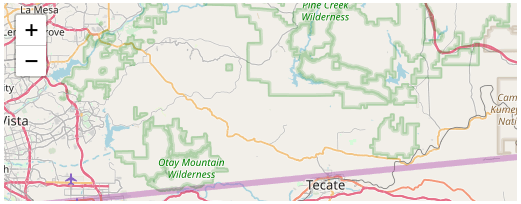
```
devtools::install_github("rstudio/leaflet")
```

Simple maps

San Diego County

```
library(leaflet)
library(maps)

leaflet() %>%
  setView(lng = -117.0713, lat = 32.7760, zoom = 10) %>%
  addTiles()  ## Add tiles layer to the map
```



- Third-Party Tiles: use function `addProviderTiles()`

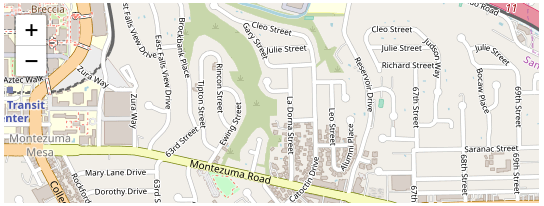
Some cool functions

- `addMarker()`
- `addRectangles()`
- `addPolygons()`

leaflet::addMarker()

Default marker

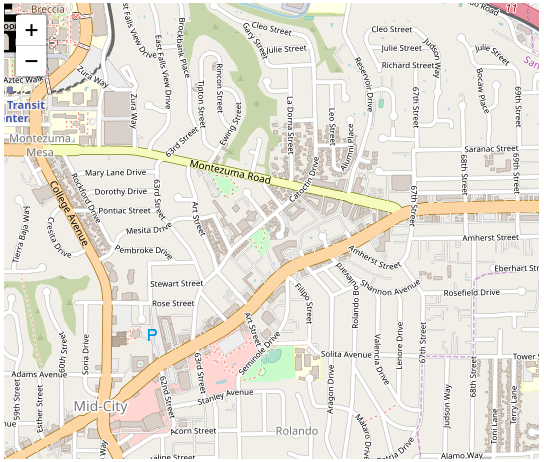
```
leaflet() %>%
  addTiles() %>%
  addMarkers(lng = -117.0713, lat = 32.7760, label="Here is San Diego State University")
```



Customize marker

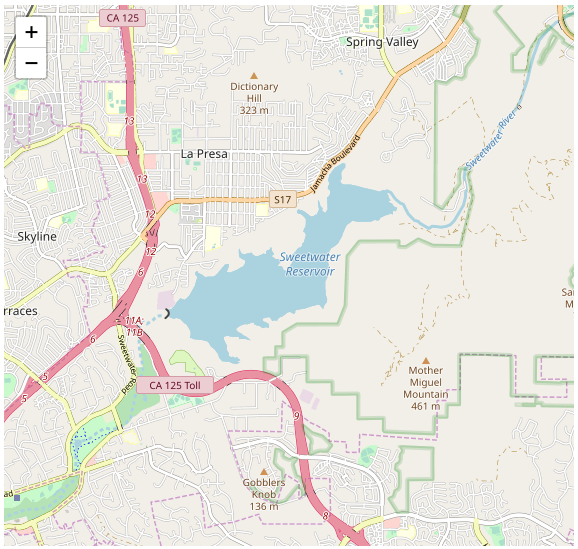
```
icon <- makeIcon("school-icon-png-3.png", iconWidth = 50)

leaflet() %>%
  addTiles() %>%
  addMarkers(lng = -117.0713, lat = 32.7760, popup="Here is San Diego State University", icon = icon)
```



leaflet::addRectangles()

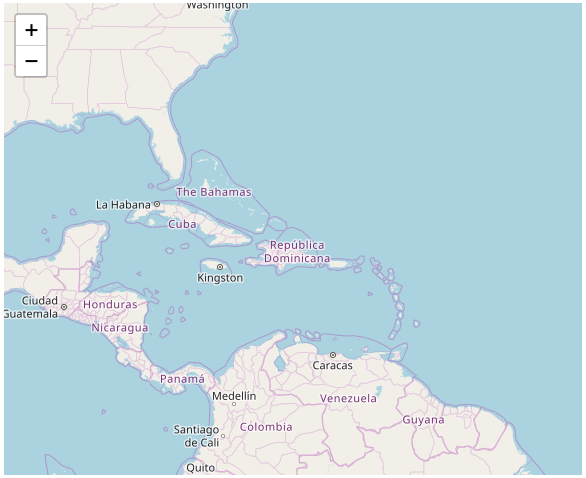
```
leaflet() %>% addTiles() %>%
  addRectangles(
    lng1=-117.0713, lat1=32.7760,
    lng2=-117.0013, lat2=32.6960,
    fillColor = "transparent"
  )
```



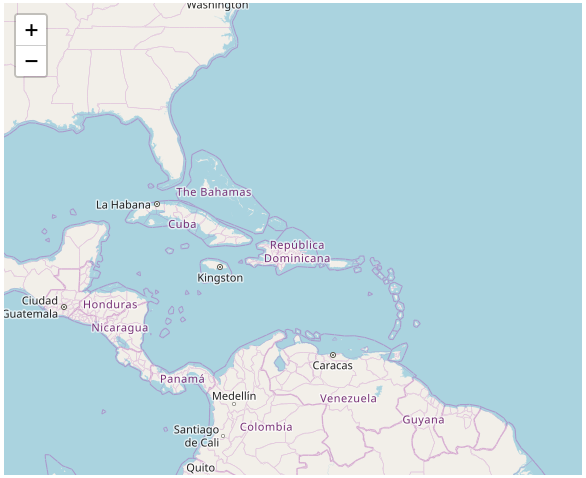
leaflet::addPolygons()

```
mapStates <- map("state", fill = TRUE, plot = FALSE)

leaflet(data = mapStates) %>%
  addTiles() %>%
  addPolygons()
```




```
leaflet(data = mapStates) %>%
  addTiles() %>%
  addPolygons(fillColor = c("red", "green"), stroke = FALSE)
```



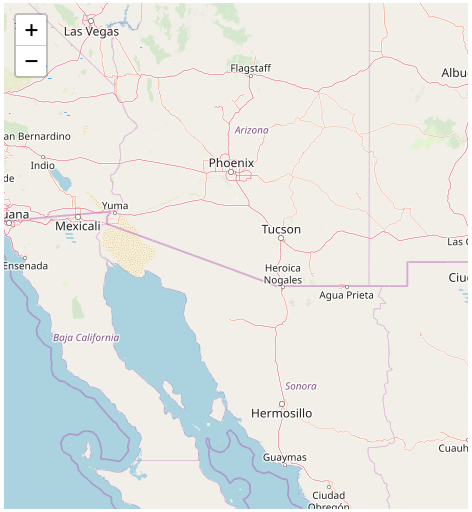
I try it

```
lat <- c(37.8651, 36.4864, 33.8734, 36.5054)
lng <- c(-119.5383, -118.5658, -115.9010, -117.0794)
np <- c("Yosemity", "Sequoia", "Joshua Tree", "Death Valley")
has_been <- c("yes", "yes", "yes", "no")

df <- data.frame(lng, lat, np, has_been)

colors <- colorFactor(palette = c("red", "blue"), df$has_been)

leaflet(df) %>%
  setView(lng = -117.0713, lat = 36.4864, zoom = 6) %>%
  addTiles() %>%
  addCircleMarkers(lat = ~lat, lng = ~lng,
                   color = ~colors(has_been), label = np) %>%
  addLegend('bottomright', pal = colors, values = has_been,
            title = "Have I been to this National Park?",
            opacity = 1)
```



Summary

What is it?

- A package that is used to create and customize interactive maps

How does it work?

- Use longitude and latitude to map any variables.
- The map dataset is already included in the package, we only have to plot out point on top of the map
- Use `dataframe` to plot, or object from the `sp` package
- Embed in Rmd documents and Shiny apps

Why is it cool?

- Zoom in and out
- Change icon
- Change colors, color blind friendly
- Interactive

What are some limitations?

- Very difficult to work with in the beginning
- Cannot capture animation changes over time

For more information:

- `Leaflet` Github for R: https://rstudio.github.io/leaflet/
- Information about the package: https://cran.r-project.org/web/packages/leaflet/index.html