Leaflet

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Introduction

Leaflet is one of the most popular Javascript libraries for creating interactive maps. The leaflet R package allows you to create your own leaflet maps without needing to know any Javascript!

Installation

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

Your First Map

Getting started with leaflet is easy. The leaflet() function creates a map widget that you can store in a variable so that you can modify the map later on. You can add features to the map using the pipe operator (%>%) just like in dplyr. The addTiles() function adds mapping data from Open Street Map.

```
library(leaflet)
my_map <- leaflet() %>%
  addTiles()
my_map
```

Your First Map

Adding Markers

You can add markers to your map one at a time using the
addMarkers() function by specifying the longitude and latitude.
(Here's a tip if you tend to mix them up.) You can specify popup
text for when you click on the marker with the popup argument.

```
library(leaflet)
my_map <- my_map %>%
  addMarkers(lat=39.2980803, lng=-76.5898801,
             popup="Jeff Leek's Office")
my_map
```

Adding Markers

Adding Many Markers

Adding one marker at a time is often not practical if you want to display many markers. If you have a data frame with columns lat and lng you can pipe that data frame into leaflet() to add all the points at once.

```
set.seed(2016-04-25)
df <- data.frame(lat = runif(20, min = 39.2, max = 39.3),
                 lng = runif(20, min = -76.6, max = -76.5))
df %>%
  leaflet() %>%
  addTiles() %>%
  addMarkers()
```

Adding Many Markers

Making Custom Markers

The blue markers that leaflet comes packaed with may not be enough depending on what you're mapping. Thankfully you can make your own markers from `.png` files.

```r
hopkinsIcon <- makeIcon(
  iconUrl = "http://brand.jhu.edu/content/uploads/2014/06/u
  iconWidth = 31*215/230, iconHeight = 31,
  iconAnchorX = 31*215/230/2, iconAnchorY = 16
)

hopkinsLatLong <- data.frame(
  lat = c(39.2973166, 39.3288851, 39.2906617),
  lng = c(-76.5929798, -76.6206598, -76.5469683))

hopkinsLatLong %>%
  leaflet() %>%
  addTiles() %>%
  addMarkers(icon = hopkinsIcon)
```

Making Custom Markers

Adding Multiple Popups

When adding multiple markers to a map, you may want to add popups for each marker. You can specify a string of plain text for each popup, or you can provide HTML which will be rendered inside of each popup.

```
hopkinsSites <- c(
  "<a href='http://www.jhsph.edu/'>East Baltimore Campus</a
  "<a href='https://apply.jhu.edu/visit/homewood/'>Homewood
  "<a href='http://www.hopkinsmedicine.org/johns_hopkins_ba
  "<a href='http://www.peabody.jhu.edu/'>Peabody Institute<
  "<a href='http://carey.jhu.edu/'>Carey Business School</a
)

hopkinsLatLong %>%
  leaflet() %>%
  addTiles() %>%
  addMarkers(icon = hopkinsIcon, popup = hopkinsSites)
```

Adding Multiple Popups

Mapping Clusters

Sometimes you might have so many points on a map that it doesn't make sense to plot every marker. In these situations leaflet allows you to plot clusters of markers using
addMarkers(clusterOptions = markerClusterOptions()).
When you zoom in to each cluster, the clusters will separate until you can see the individual markers.

```
df <- data.frame(lat = runif(500, min = 39.25, max = 39.35),
                 lng = runif(500, min = -76.65, max = -76.5
df %>%
  leaflet() %>%
  addTiles() %>%
  addMarkers(clusterOptions = markerClusterOptions())
```

Mapping Clusters

Mapping Circle Markers

Instead of adding markers or clusters you can easily add circle markers using `addCircleMarkers()`.

```r
df <- data.frame(lat = runif(20, min = 39.25, max = 39.35),
                 lng = runif(20, min = -76.65, max = -76.55
df %>%
  leaflet() %>%
  addTiles() %>%
  addCircleMarkers()
```

Mapping Circle Markers

Drawing Circles

You can draw arbitrary shapes on the maps you create, including
circles and squares. The code below draws a map where the circle
on each city is proportional to the population of that city.

```
md_cities <- data.frame(name = c("Baltimore", "Frederick",
                                 "Bowie", "Hagerstown", "Ar
                        pop = c(619493, 66169, 62334, 61045
                                39890, 38880, 30587, 30484,
                        lat = c(39.2920592, 39.4143921, 39.
                        lng = c(-76.6077852, -77.4204875, -
md_cities %>%
  leaflet() %>%
  addTiles() %>%
  addCircles(weight = 1, radius = sqrt(md_cities$pop) * 30)
```

Drawing Circles

```
## Assuming 'lng' and 'lat' are longitude and latitude, res
```

Drawing Rectangles

You can add rectangles on leaflet maps as well:

```
leaflet() %>%
  addTiles() %>%
  addRectangles(lat1 = 37.3858, lng1 = -122.0595,
                lat2 = 37.3890, lng2 = -122.0625)
```

Drawing Rectangles

Adding Legends

Adding a legend can be useful if you have markers on your map with different colors:

```r
df <- data.frame(lat = runif(20, min = 39.25, max = 39.35),
                 lng = runif(20, min = -76.65, max = -76.55),
                 col = sample(c("red", "blue", "green"), 20,
                 stringsAsFactors = FALSE)

df %>%
  leaflet() %>%
  addTiles() %>%
  addCircleMarkers(color = df$col) %>%
  addLegend(labels = LETTERS[1:3], colors = c("blue", "red"
```

Adding Legends

Conclusion

For for details about the leaflet package for R visit
`http://rstudio.github.io/leaflet/`.