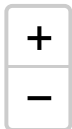# R Markdown and Leaflet

TSAI YI- FAN

2018/4/23

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
```


Leaflet (http://leafletjs.com) | © OpenStreetMap (http://openstreetmap.org) contributors, CC-BY-SA (http://creativecommons.org/licenses/by-sa/2.0/)
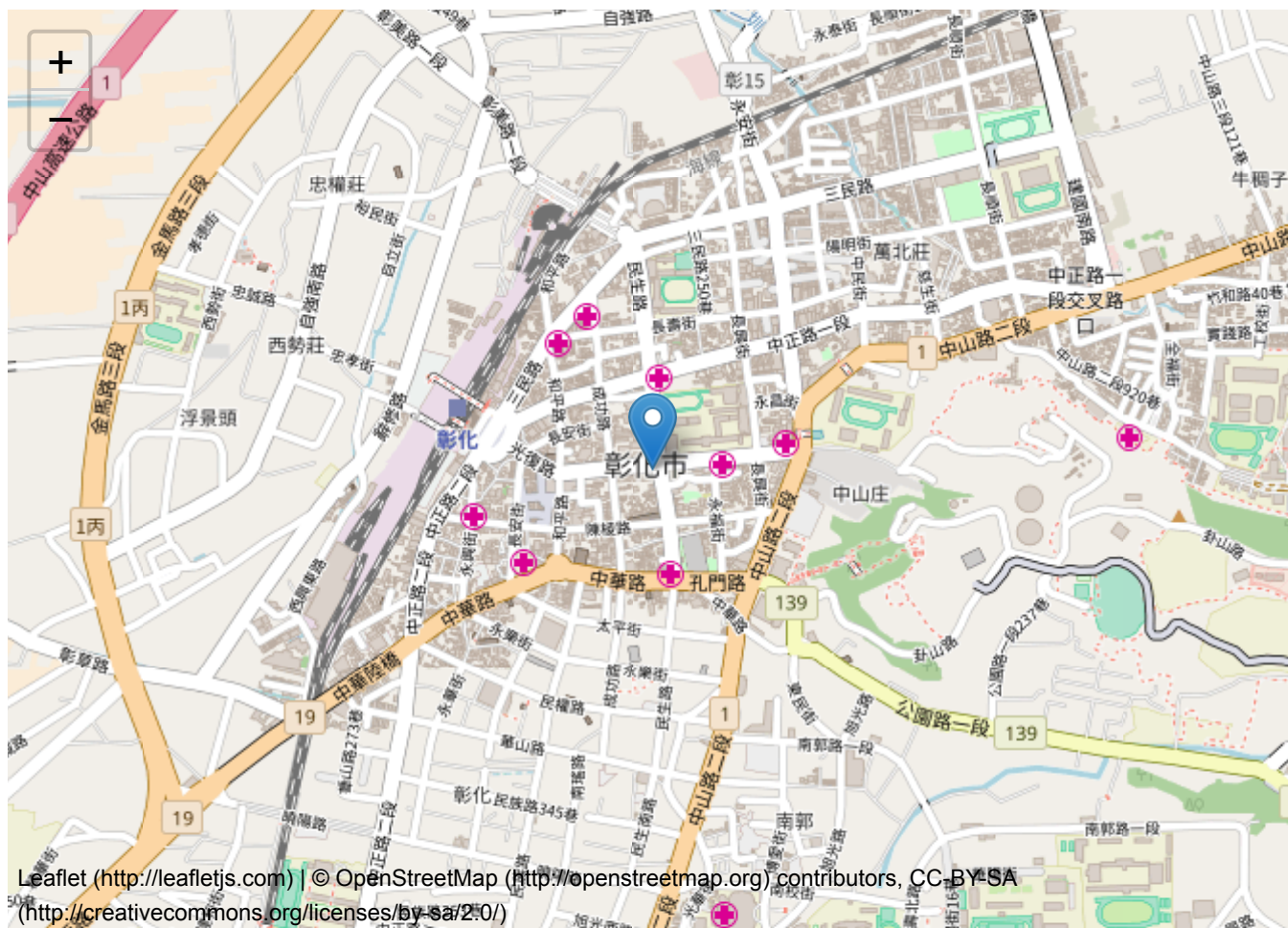
Your First Map

```
## Warning: package 'leaflet' was built under R version 3.3.2
```

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.

Adding Markers

```
library(leaflet)
my_map <- my_map %>%
addMarkers(lat=24.0806, lng=120.54244,
popup="book stone")
my_map
```


Leaflet (http://leafletjs.com) | © OpenStreetMap (http://openstreetmap.org) contributors, CC-BY-SA (http://creativecommons.org/licenses/by-sa/2.0/)
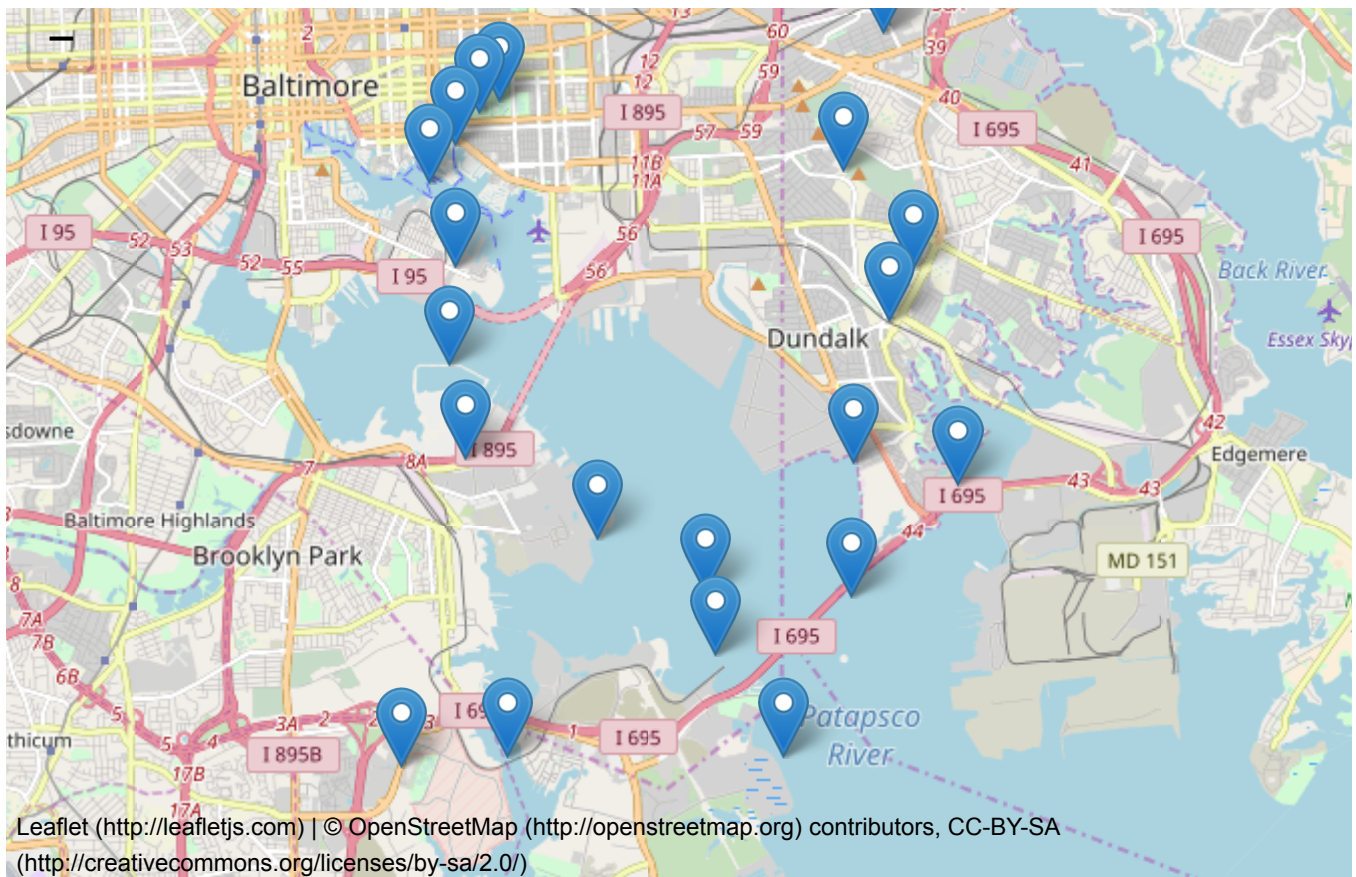
Adding Many Markers

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(2018-04-23)
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()
```
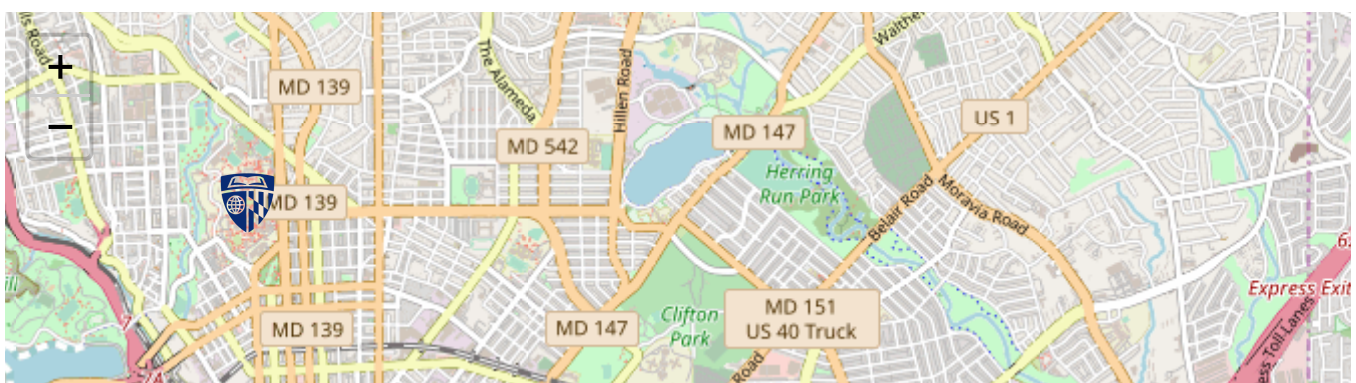
Leaflet (http://leafletjs.com) | © OpenStreetMap (http://openstreetmap.org) contributors, CC-BY-SA (http://creativecommons.org/licenses/by-sa/2.0/)

Adding Many Markers Warning in set.seed(2016 - 4 - 25): '.Random.seed' is not an integer vector but of type 'NULL', so ignored
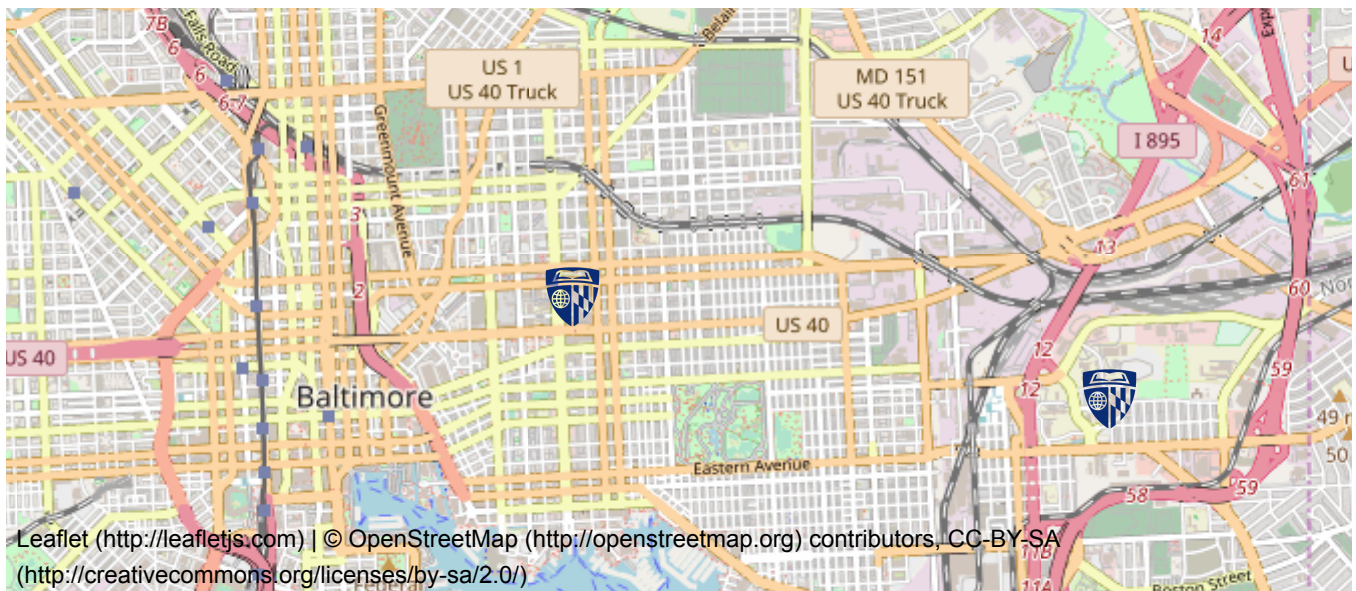
Making Custom Markers

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

```
hopkinsIcon <- makeIcon(
iconUrl = "http://brand.jhu.edu/content/uploads/2014/06/university.shield.small_.blue_.png",
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)
```

Leaflet (http://leafletjs.com) | © OpenStreetMap (http://openstreetmap.org) contributors, CC-BY-SA (http://creativecommons.org/licenses/by-sa/2.0/)

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 Campus</a>",
  "<a href='http://www.hopkinsmedicine.org/johns_hopkins_bayview/'>Bayview Medical Center</a
>",
  "<a href='http://www.peabody.jhu.edu/'>Peabody Institute</a>",
  "<a href='http://carey.jhu.edu/'>Carey Business School</a>"
)
hopkinsLatLong %>%
leaflet() %>%
addTiles() %>%
addMarkers(icon = hopkinsIcon, popup = hopkinsSites)
```
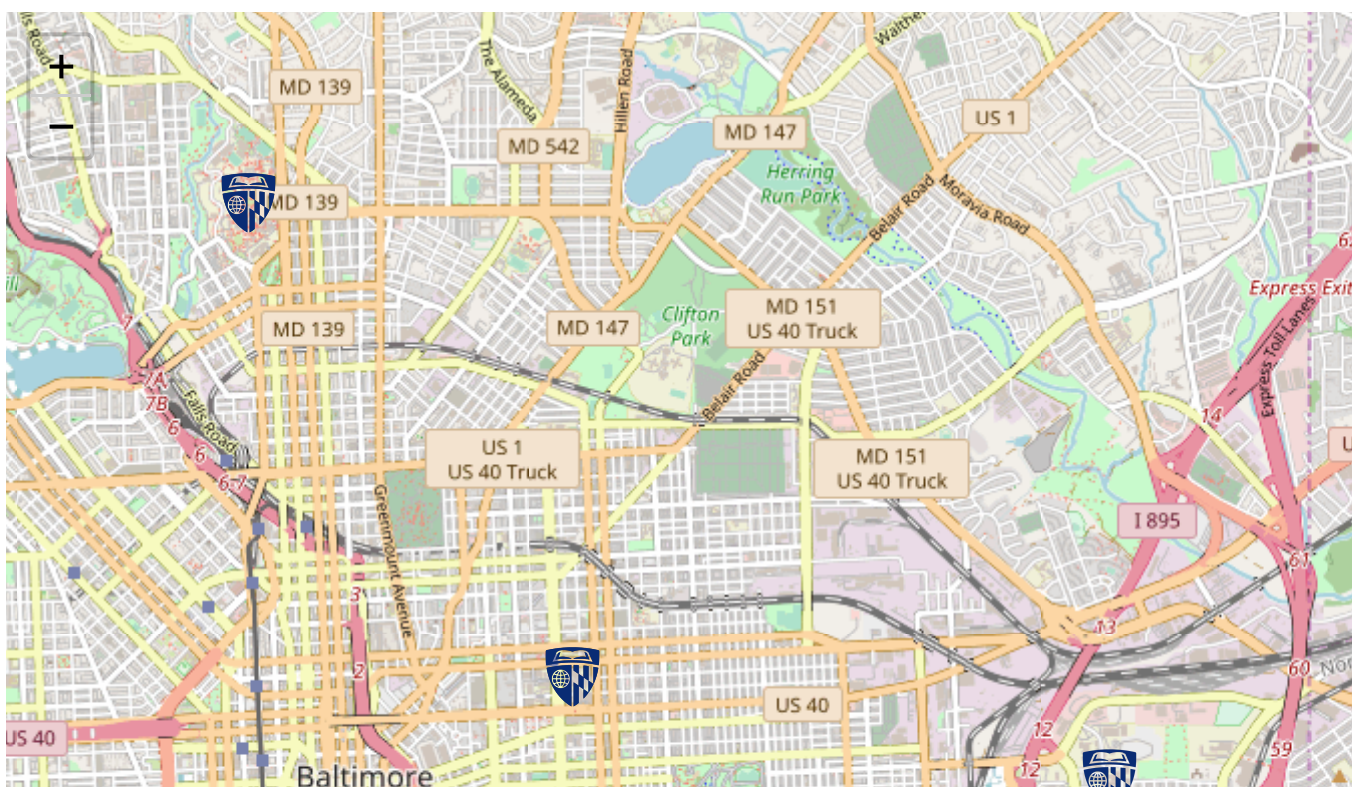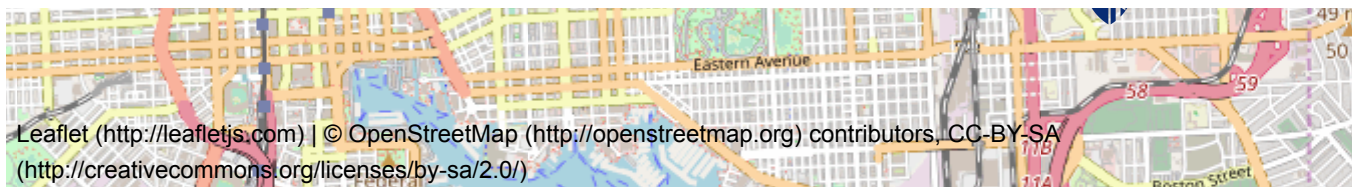
Mapping Clusters

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 = -76.55))
df %>%
leaflet() %>%
addTiles() %>%
addMarkers(clusterOptions = markerClusterOptions())
```
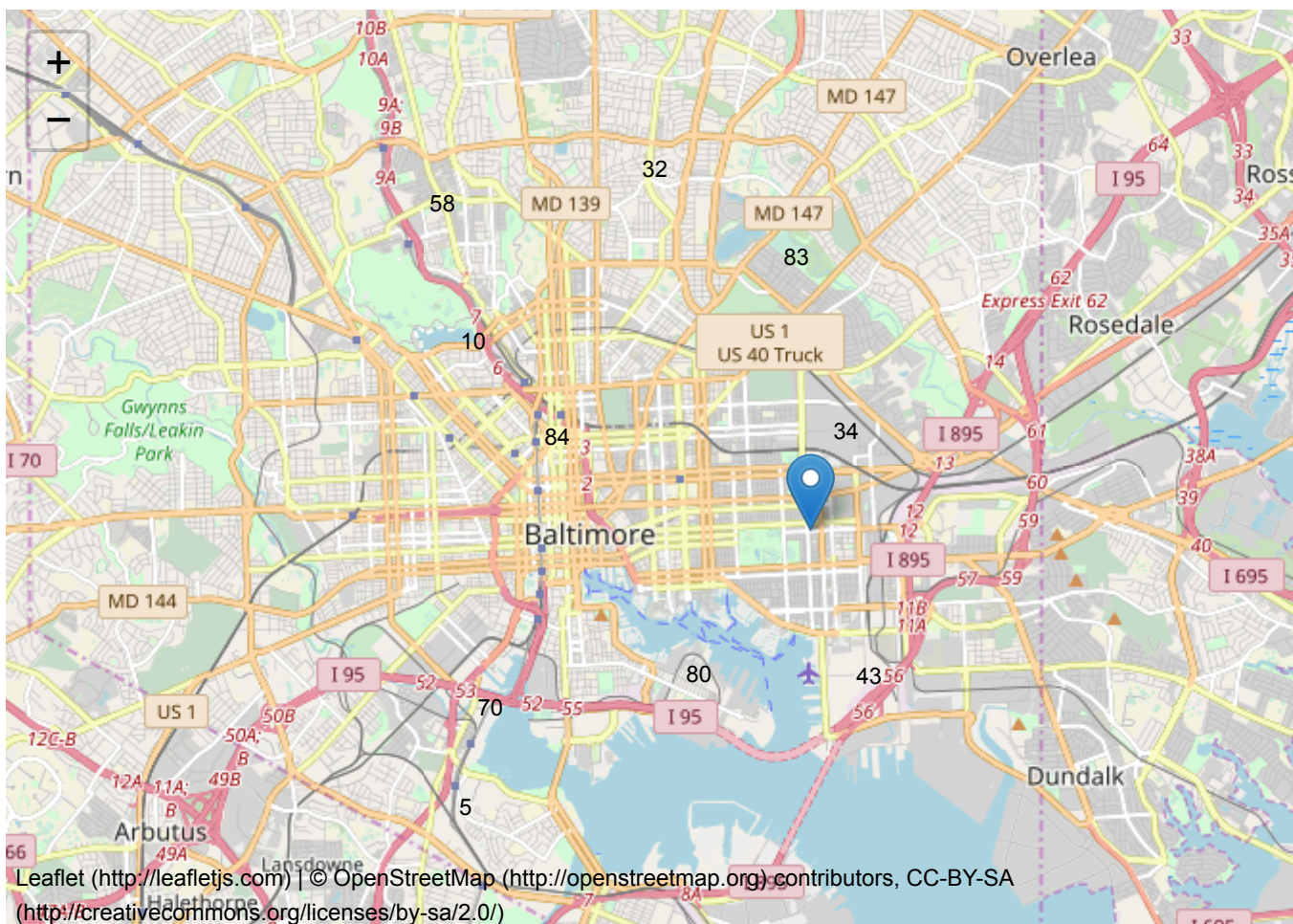
Drawing Circles

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", "Rockville", "Gaithersburg",
                                 "Bowie", "Hagerstown", "Annapolis", "College Park", "Salisbu
ry", "Laurel"),
pop = c(619493, 66169, 62334, 61045, 55232,
39890, 38880, 30587, 30484, 25346),
lat = c(39.2920592, 39.4143921, 39.0840, 39.1434, 39.0068, 39.6418, 38.9784, 38.9897, 38.3607
, 39.0993),
lng = c(-76.6077852, -77.4204875, -77.1528, -77.2014, -76.7791, -77.7200, -76.4922, -76.9378,
 -75.5994, -76.8483))
md_cities %>%
leaflet() %>%
addTiles() %>%
addCircles(weight = 1, radius = sqrt(md_cities$pop) * 30)
```

```
## Assuming "lng" and "lat" are longitude and latitude, respectively
```
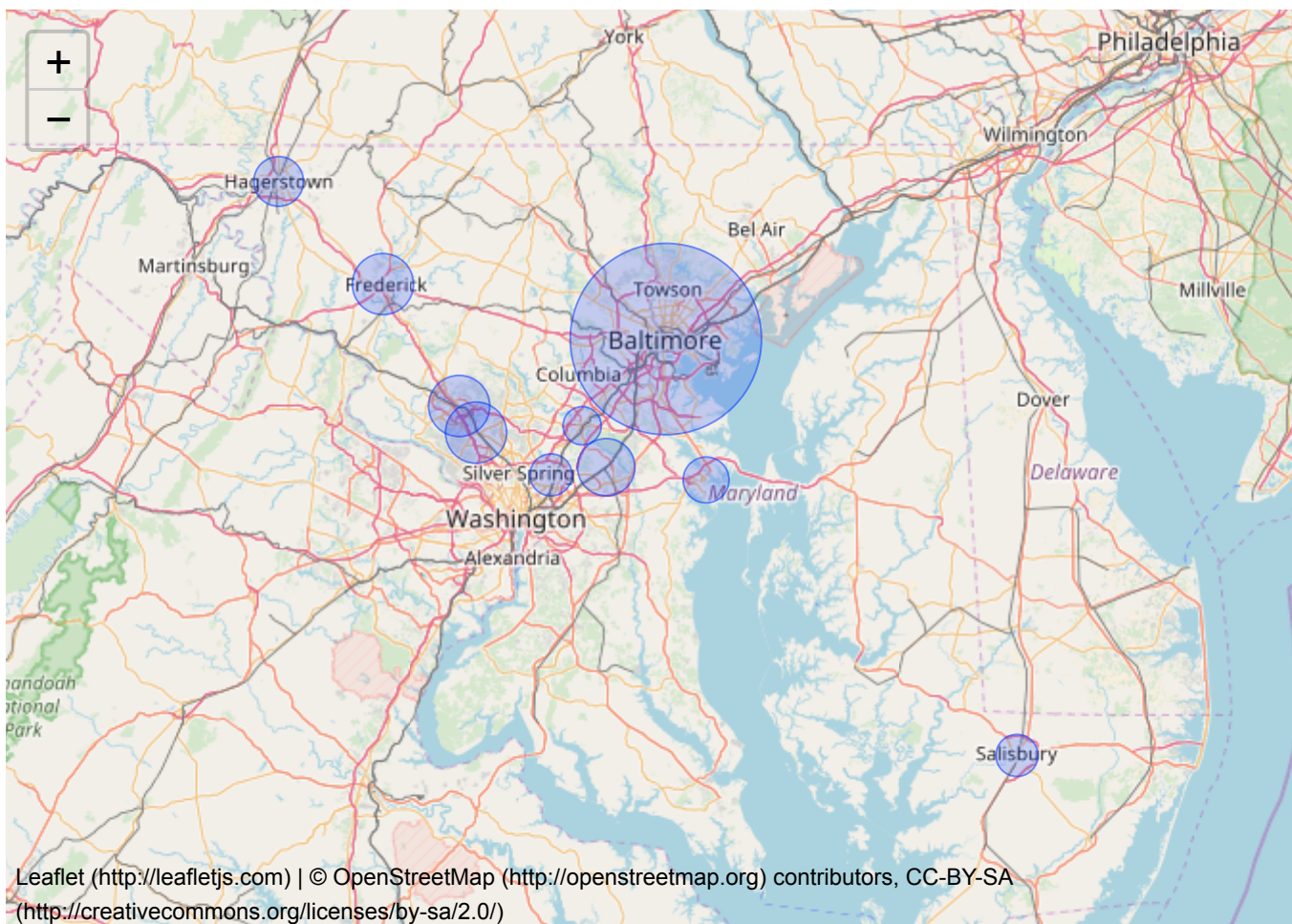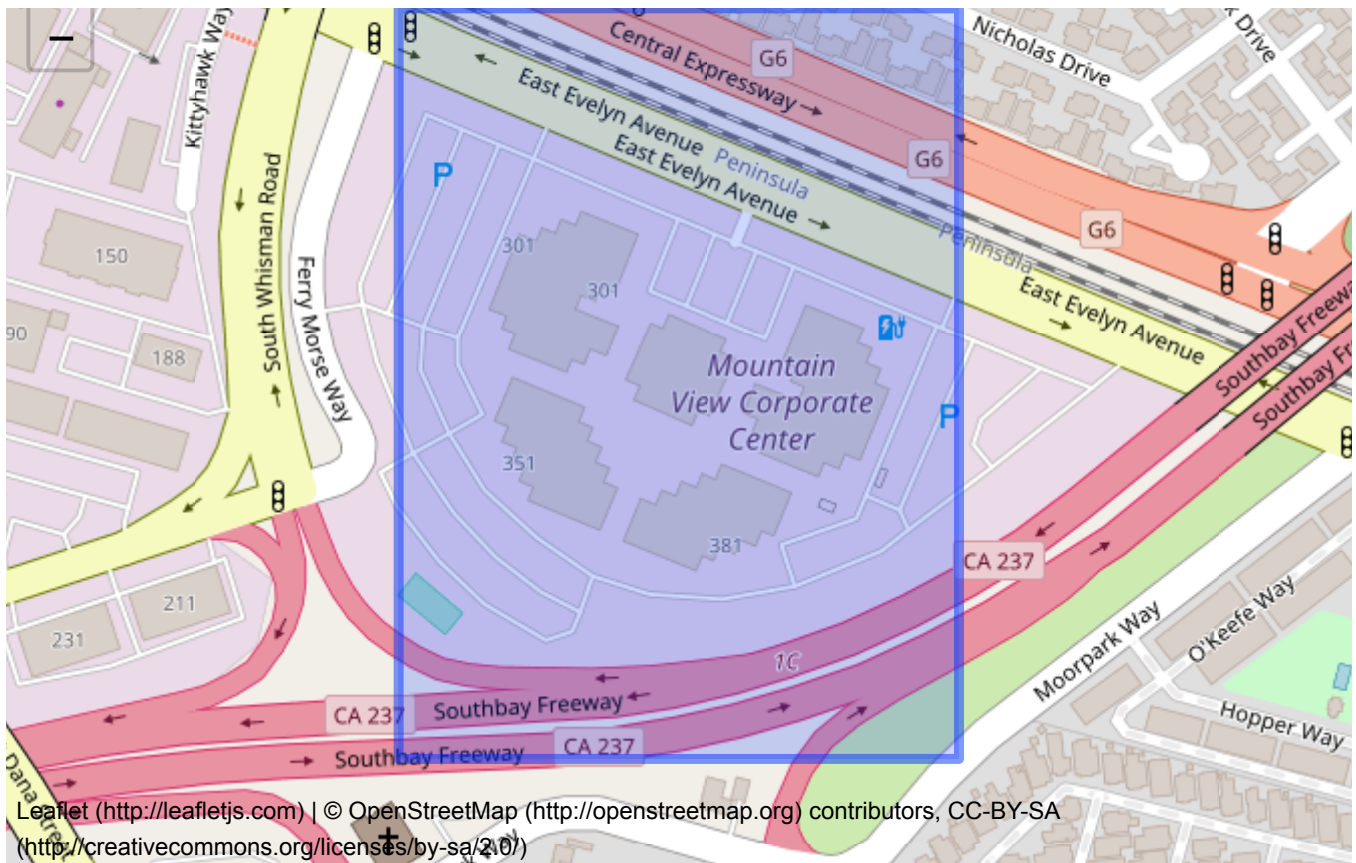

Drawing Rectangles

You can add rectangles on leaflet maps as well:

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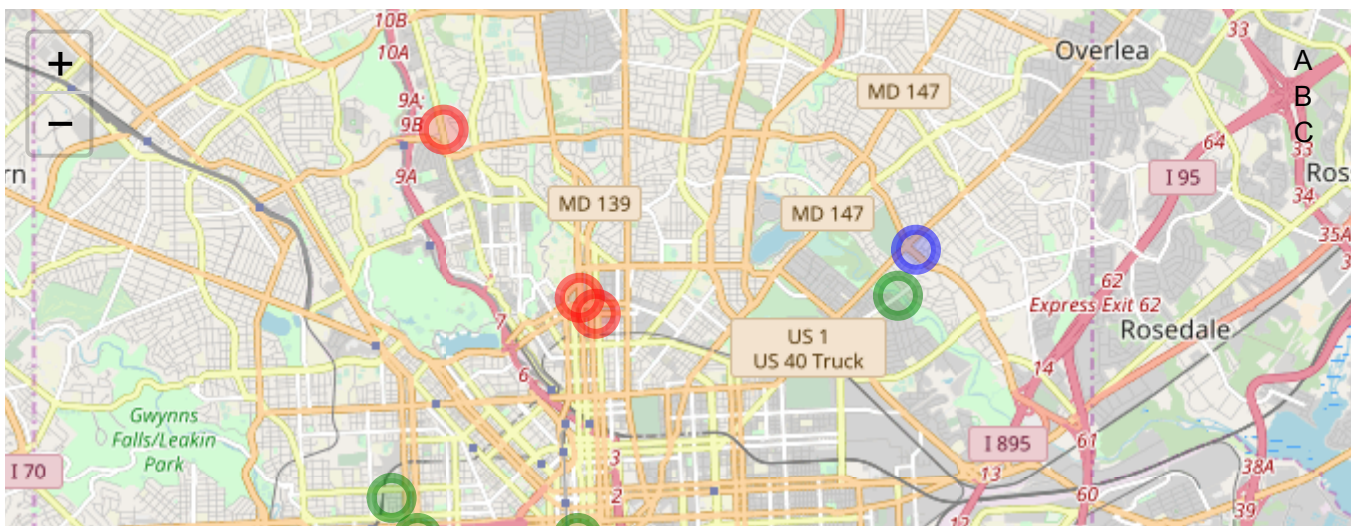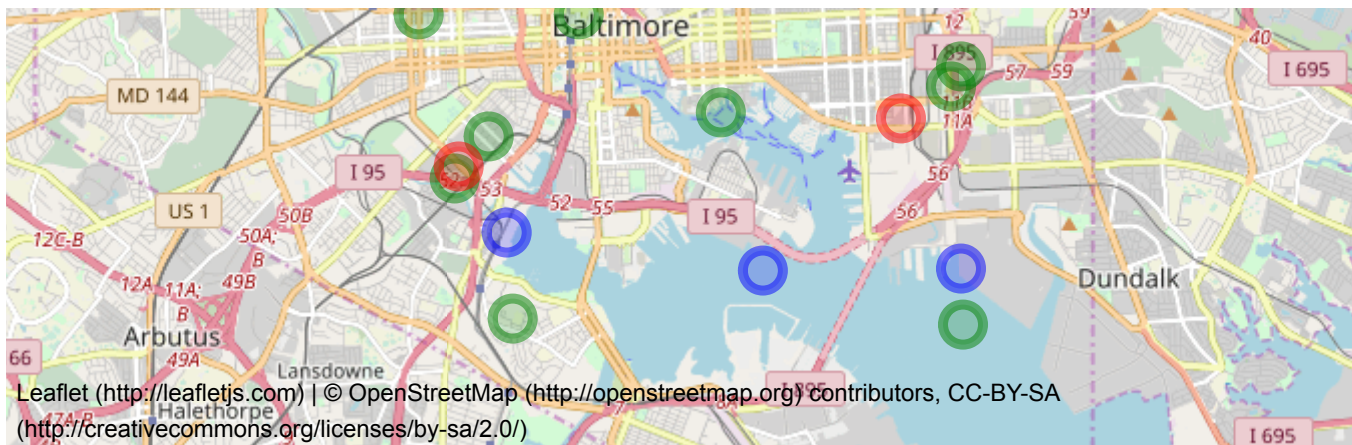
Adding Legends

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

```
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, replace = TRUE),
stringsAsFactors = FALSE)

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

```
## Assuming "lng" and "lat" are longitude and latitude, respectively
```

Conclusion

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