Mapping with Leaflet

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Note: this presentation relies on the work of Kyle Walker (https://www.github.com/walkerke) who developed the tigris and tidycensus package, it is adapted from the file linked at the bottom of this document. An example by Zev Ross (@zevross) was key to the leaflet components

```
library(sf)
library(tidyverse)
library(tigris)
library(tidycensus)
options(tigris_class = "sf")
options(tigris_use_cache = TRUE)
library(leaflet)
```

Output TIGER/Line files for Census tracts and County subdivisions

```
tracts <- tracts(state = 'WI', county = 25, cb=TRUE)
daneco <- county_subdivisions(55, county = 025, cb = TRUE)
```

subset the Madison shapefile and convert to a format that can be used in leaflet

```
madison <- daneco[3,]
shapemad <- as(madison, 'Spatial')
```

Get the variables and add a header row

```
pov.fam.dane <- get_acs(geography = "tract",
                    variables = "B17010_002",
                    state = "WI",
                    county = "dane",
                    year = 2017)

## Getting data from the 2013-2017 5-year ACS

names(pov.fam.dane)<-c("GEOID","Tract","variable","est.fam.pov","moe")
```

Simplify the statistics data frame to join with the shapefiles

```
faminpoverty <- pov.fam.dane[c(1,4,5)]
```

Use the geo_join function in tigris to merge tabular with spatial data

```
fampovmerged <- geo_join(tracts, faminpoverty, "GEOID", "GEOID")

## Warning: st_crs<- : replacing crs does not reproject data; use
st_transform
## for that
```

Eliminate the areas that contain no land and are only water

```
fampovmerged<- fampovmerged[fampovmerged$ALAND>0,]
```

Since we are dealing with margins of error, we will produce statistics for the upper and lower bounds and normalize all negative values to 0.

```
fampovmerged$lowerbound <- fampovmerged$est.fam.pov-fampovmerged$moe
fampovmerged$upperbound <- fampovmerged$est.fam.pov+fampovmerged$moe
fampovmerged[fampovmerged$lowerbound < 0, "lowerbound"] <-0
```

Set the palette and the aspect to graph

```
pal2 <- colorNumeric(
  palette = "magma",
  domain = fampovmerged$lowerbound,
  reverse = TRUE
)
```

Define the content of the pop-up we can show the uncertainty in the estimate as well as the upper an lower bounds - ACS estimates fall within a 90% confidence interval.

```
popup2 <- paste0("Census Tract: ", fampovmerged$NAME, "<br>",
                 "Est. no. households w/children under poverty level:
", fampovmerged$est.fam.pov, "<br>",
                 "margin of error (90% confidence interval): ",
fampovmerged$moe, "<br>",
                 "lower bound: ", fampovmerged$lowerbound, "<br>",
                 "upper bound: ", fampovmerged$upperbound)

map6 <- leaflet() %>%
  addProviderTiles("CartoDB.Positron") %>%
  addPolygons(data = fampovmerged,
              fillColor = ~pal2(lowerbound),
              color = "#b2aeae", # you need to use hex colors
              fillOpacity = 0.2,
              weight = 1,
```

```
              smoothFactor = 0.2,
              popup = popup2,
              popupOptions = c(autoClose = FALSE, closeOnClick =
FALSE)) %>%
  addLegend(pal = pal2,
            values = fampovmerged$lowerbound,
            position = "bottomright",
            title = "Households with children under poverty level",
            labFormat = labelFormat(suffix = "Households")) %>%
 addPolygons(data = shapemad,
        weight = 2,
      fill = FALSE,
    color = "#800000",
  group = "city boundary")
```

```
## Warning: sf layer has inconsistent datum (+proj=longlat
+ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +no_defs).
## Need '+proj=longlat +datum=WGS84'
```

```
map6
```

```
## PhantomJS not found. You can install it with
webshot::install_phantomjs(). If it is installed, please make sure the
phantomjs executable can be found via the PATH variable.
```

```
## Input to asJSON(keep_vec_names=TRUE) is a named vector. In a future
version of jsonlite, this option will not be supported, and named
vectors will be translated into arrays instead of objects. If you want
JSON object output, please use a named list instead. See ?toJSON.
```

for more information go to https://walkerke.github.io/2017/05/tigris-metros/

http://zevross.com/blog/2015/10/14/manipulating-and-mapping-us-census-data-in-r-using-the-acs-tigris-and-leaflet-packages-3/