Mapping US Counties

```r
# load packages for data wrangling
library(tidyverse)
library(ggthemes)
library(usdata)
library(scales)
```

In each part of this mini-assignment, you will be shown an example code that creates a specific map. After you examine the example code, please do the exercises in each part.

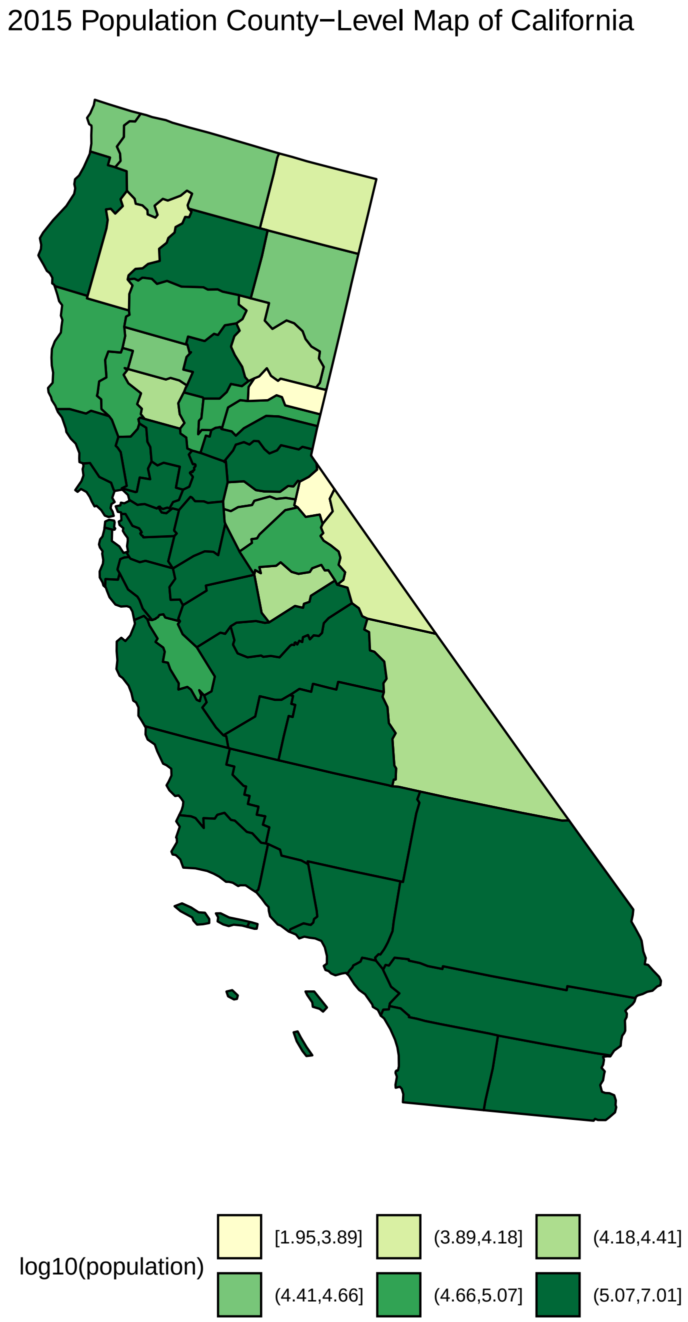
1. **Mapping US State(s) with county-level data using `usmap`.** Below, we demonstrate how to create maps using the `usmap` package. This package is specifically for making US maps for national, state, and county levels. For the R code block below, examine the R code and solve the following:

   a. Choose a US state to map.
   b. Choose a color sequential scheme from ColorBrewer 2.0.

Make sure to adjust your figure widths and heights to avoid distortions or overlapping labels. No need to describe your observations.

```r
library(usmap) # mapping tools packages (USA specific)
```

```r
# New variable where the 2015 population is converted into an
#   ordinal categorical variable with n levels.
#   Here we are using the countypop dataframe
n_levels <- 6
pop_5level <- cut_number(log10(countypop$pop_2015),n_levels)
countypop_new <- countypop %>%
  mutate(population_5 = pop_5level)

# Map a state with county borders

#### Start: (1) Choose a US State here
state_full <- "California"
state_abrv <- "CA"
#### End: (1) Choose a US State here

plot_usmap(data = countypop_new,
           values = "population_5",
           include = c(state_abrv)) + # uses the state abbv

#### Start: (2) Change color scheme here
  # number of colors must match number of levels - these are HEX color codes
  scale_fill_manual(values =
                      c('#ffffcc','#d9f0a3','#addd8e',
                        '#78c679','#31a354','#006837')) +
#### Start: (2) Change color scheme here

  guides(fill=guide_legend(nrow=2,byrow=TRUE)) +
  labs(fill = "log10(population)",
       title = paste("2015 Population County-Level Map of",state_full)) +
  theme(legend.position = "bottom")
```



2. **Mapping US State(s) with county-level data using `sf`.** Below, we demonstrate another way to map a US state using the `sf` package, which it can extend shapefiles into dataframe-like objects. Here, we are using the shapefiles provided by the `urbnmapr` package, which is from the Urban Institute. For the R code block below, examine the R code and solve the following:

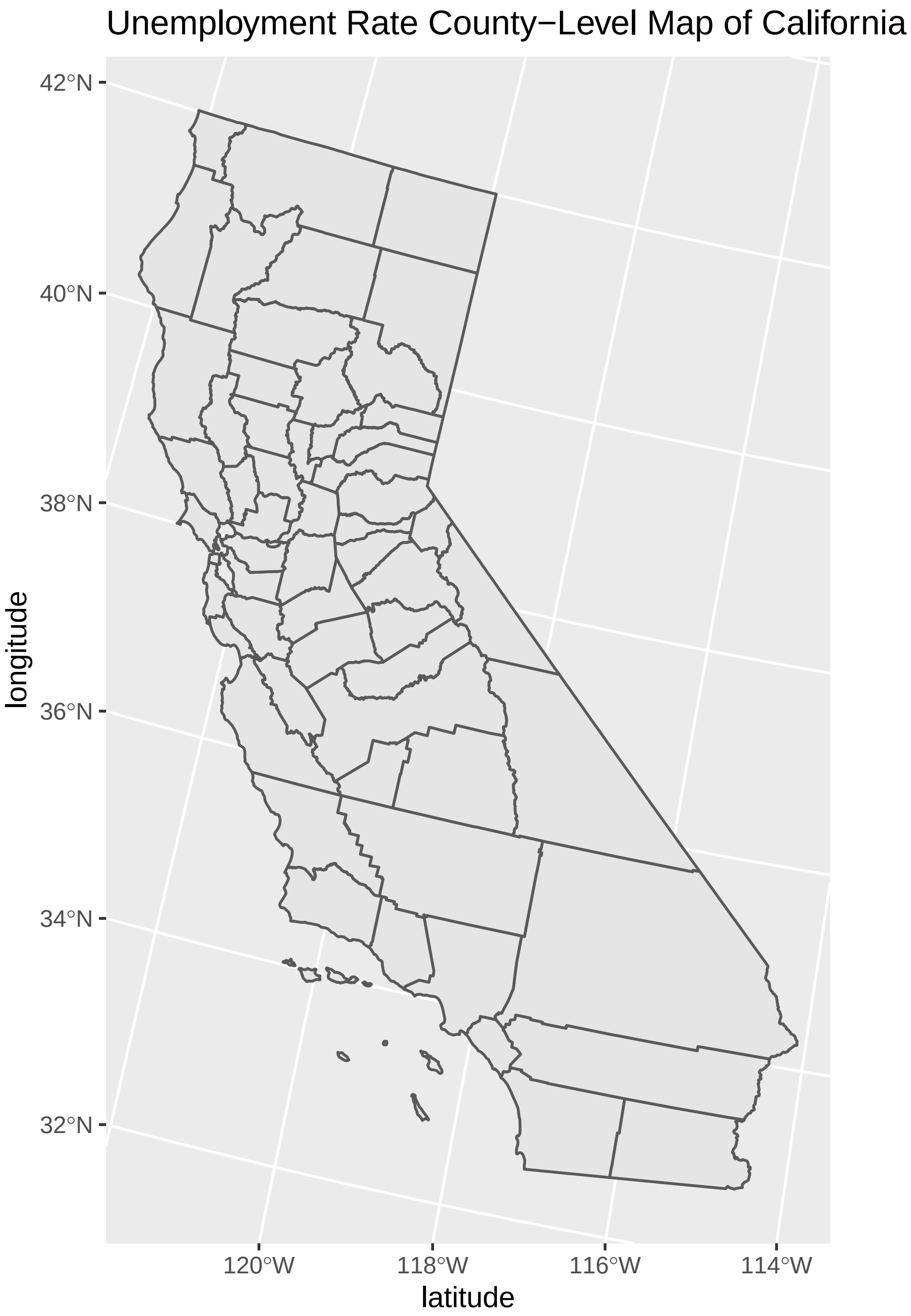
    a. Choose a US state to map other than what you chose in problem 1.
    b. Use the `county` data set from the `usdata` package where you use the `unemployment_rate` variable and convert it into an ordinal categorical variable with 6 levels.
    c. Combine the shapefile dataframe and part (b)s dataframe where you match the county and the state names.
    d. Plot the county-level state map where you color each county proportional to the ordinal categorical variable done in part (b). Choose a color sequential scheme from ColorBrewer 2.0.

Make sure to adjust your figure widths and heights to avoid distortions or overlapping labels. No need to describe your observations.

```
library(sf) # classes and functions for vector data (or shapefiles)

# Urban Institute shape files: https://urbaninstitute.github.io/urbnmapr/
# install.packages("devtools")
# devtools::install_github("UrbanInstitute/urbnmapr")
library(urbnmapr) # provides state and county shapefiles
```

```
#### Start: (1) Choose a US State here
state_full <- "California"
#### End: (1) Choose a US State here

# Load the shapefile object of US counties and filter only the state of choice
#   using the urbnmapr package
counties_sf <- get_urbn_map("counties", sf = TRUE)
counties_sf_ca <- counties_sf %>% filter(state_name == state_full)
```

```
#### Start: (2) Wrangle the county data set here
county_sub <- county %>%
  select(name,state,unemployment_rate)
#### End: (2) Wrangle the county data set here

#### Start: (3) Update the ggplot pipeline here
ggplot(data = counties_sf_ca, aes()) +
  geom_sf() +
  labs(x = "latitude",
       y = "longitude",
#### End: (3) Update the ggplot pipeline here
       title = paste("Unemployment Rate County-Level Map of",state_full))
```


Unemployment Rate County−Level Map of California
42°N
40°N
38°N
36°N
34°N
32°N
longitude
120°W
118°W
116°W
114°W
latitude

3. **(Bonus) Mapping US county-level data using an actual set of shapefile files.** Below, we demonstrate another way to map a US state, were we use an actual shapefile. For the R code block below, examine the R code and solve the following:

   a. Use the `full_join()` function to combine the two shapefiles where you match the state and county codes.
   b. Choose a state and map it while coloring the counties using the `poverty` variable from the `county` data set.

Make sure to adjust your figure widths and heights to avoid distortions or overlapping labels. No need to describe you observations.

```r
library(sf) # classes and functions for vector data (or shapefiles)

# US Census Bureau 2018 county-level shapefile files (Downloaded)
# source:
#   https://www.census.gov/geographies/mapping-files/
#     time-series/geo/carto-boundary-file.html
# Downloaded files are included in the zip for for this mini assignment

# load the shapefiles
state_shp <- read_sf("cb_2018_us_state_20m/cb_2018_us_state_20m.shp")
county_shp <- read_sf("cb_2018_us_county_20m/cb_2018_us_county_20m.shp")
```