Patterson_Lab8

Tim Patterson

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1. Use `tidycensus` to download 1. race/ethnicity (B03002) and 2. median household income for Baltimore City. Store this data in a new object. Choose which race/ethnicity you'd like to relate to income (Non-Hispanic Black and Non-Hispanic White work best). Which census tract has the highest *percentage* of your target race/ethnicity (and what is the percent) and which has the highest median household income (and how much is it?)? (5 points) Reminder: Since we will be mapping our data, make sure you include use `geometry = TRUE` in `get_acs()`

```
# settings for tidycensus
options(tigris_class = "sf")
options(tigris_use_cache = TRUE)
census_api_key("7da13c910d6b0d231eff70a1168b636ee281edd3", overwrite = TRUE)

## To install your API key for use in future sessions, run this function with
`install = TRUE`.

setwd("C:/Users/vival/Documents/GES 486/Lab8")


# This gets African American Population and MHHI in 2019
MD_household_2019 <- get_acs(geography = "tract",
    variables = c("total_population" = "B01003_001", # Total population
                "black_pop" = "B01001B_001",
                "med_hh_inc" = "B19013_001" # Median household income
              ),
    year = 2019,
    survey = "acs5",
    state = c(24),
    county = c(510),
    geometry = TRUE, # download the shapefile with the data
    output = "wide")%>% clean_names() # need this 2019

## Getting data from the 2015-2019 5-year ACS

MD_household_2019$blackprop = MD_household_2019$black_pop_e /
MD_household_2019$total_population_e
max(MD_household_2019$black_pop_e)

## [1] 7141

baltdrop2 = MD_household_2019$blackprop[!is.na(MD_household_2019$blackprop)]
max(baltdrop2)
```

```
## [1] 0.9931774

baltdata1 = MD_household_2019 %>%
filter(!is.na(MD_household_2019$med_hh_inc_e))

max(baltdata1$med_hh_inc_e)

## [1] 195156
```

Census tract 2711.02 gave me the highest median household income with an amount of
$195,156. Census Tract 2007.02 gave me the highest Percentage of African Americans with
99.3 %.

2. Please reproject this data to Web Mercator. (1 points)

```
baltdata1transform = st_transform(baltdata1, 3857)
```

3. Create two plots. In the first plot highlight the tract with the highest concentration of your selected race/eth. In the second plot highlight the tract with the highest median household income? (5 points)

```
colnames(baltdata1)

##  [1] "geoid"              "name"              "total_population_e"
##  [4] "total_population_m" "black_pop_e"        "black_pop_m"
##  [7] "med_hh_inc_e"       "med_hh_inc_m"       "geometry"
## [10] "blackprop"

bidata = bi_class(baltdata1, x = blackprop, y= med_hh_inc_e, style =
"quantile", dim = 3)

highest_black = baltdata1 %>% filter(med_hh_inc_e == 195156)
highest_mhhi = baltdata1 %>% filter(blackprop > 0.99)

# Mapping Highest Percentage of African Americans of Baltimore City
ggplot(bidata)+
  geom_sf(mapping = aes(fill = bi_class), color = "white", size = 0.1,
show.legend = FALSE)+
  bi_scale_fill(pal = "DkBlue", dim = 3)+
  geom_sf(data = highest_black , fill = "red", color = NA)+ # Highest
Percentage of A.A. displayed in red
  labs(
    title = "Highest Proportion of African American",
    subtitle = "Baltimore City")+
  bi_theme()
```
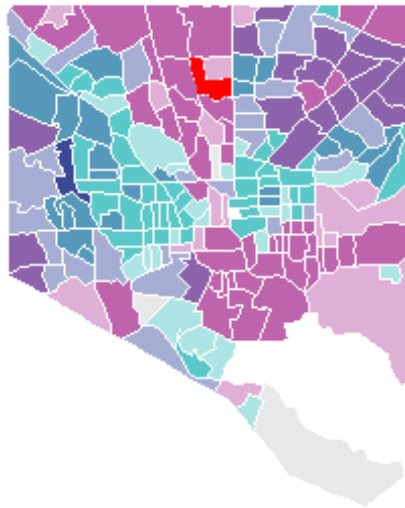
t Proportion of African An

Baltimore City


```
# Mapping Highest Median Household Income of Baltimore City
ggplot(bidata)+
  geom_sf(mapping = aes(fill = bi_class), color = "white", size = 0.1,
show.legend = FALSE)+
  bi_scale_fill(pal = "DkBlue", dim = 3)+
  geom_sf(data = highest_mhhi , fill = "red", color = NA)+ # Highest Median
Household Income displayed in red
  labs(
    title = "Highest Median Household Income",
    subtitle = "Baltimore City")+
  bi_theme()
```

est Median Household Inc

Baltimore City
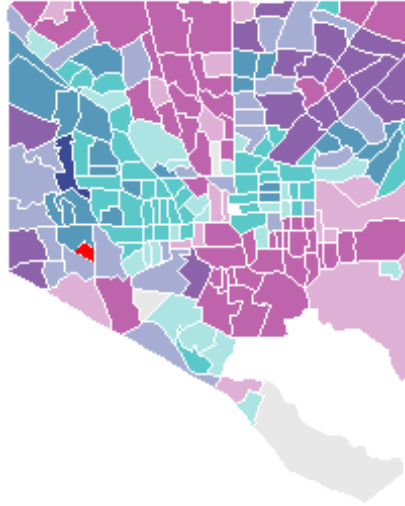
4. Create a third column using the bi_class function from the tutorial. (2 points)

```
colnames(baltdata1)

##  [1] "geoid"             "name"            "total_population_e"
##  [4] "total_population_m" "black_pop_e"      "black_pop_m"
##  [7] "med_hh_inc_e"       "med_hh_inc_m"     "geometry"
## [10] "blackprop"

#Creating a third column using the bi_class function
bidata = bi_class(baltdata1, x= blackprop, y = med_hh_inc_e, style =
"quantile", dim = 3)
```

5. Create a bivariate map with your data. (3 points)

```
# Creating Bi-Variate Map
bi_map =
  ggplot()+
  geom_sf(data = bidata, mapping = aes(fill = bi_class), color = "white",
size = 0.1, show.legend = FALSE) +
  bi_scale_fill(pal = "DkBlue", dim = 3)+
  labs(
    title = "Proportion of Income and Race",
    subtitle = "Batimore City")+
  bi_theme()
```
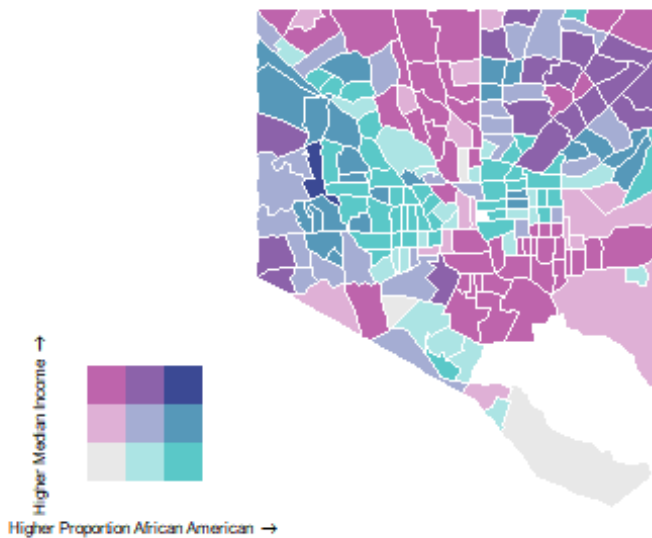
6. Use the cowplot package and ggdraw, like in the tutorial to add a legend (2 points).

```
# Creating bivariate legend using cowplot
legend <- bi_legend(pal = "DkBlue",
                    dim = 3,
                    xlab = "Higher Proportion African American ",
                    ylab = "Higher Median Income ",
                    size = 6)

# Combining map with legend
legend_plot <- ggdraw() +
  draw_plot(bi_map, 0, 0, 1, 1) +
  draw_plot(legend, 0.01, .01, 0.3, 0.3)

legend_plot
```


7. Rinse and repeat for another county of your choosing, using a *different* color scheme. Be sure to use Psuedo-Mercator (3857). (5 points)

```
# This gets African American Population and MHHI in 2019 for A.A. county
AA_Data =  get_acs(geography = "tract",
    variables = c("total_population" = "B01003_001", # Total population
                  "black_pop" = "B01001B_001",
                  "med_hh_inc" = "B19013_001" # Median household income
                  ),
    year = 2019,
    survey = "acs5",
    state = c(24),
    county = "Anne Arundel",
```

```r
    geometry = TRUE, # download the shapefile with the data
    output = "wide")%>% clean_names() # need this 2019
```

Getting data from the 2015-2019 5-year ACS

```r
colnames(AA_Data)
```

```
## [1] "geoid"              "name"              "total_population_e"
## [4] "total_population_m" "black_pop_e"        "black_pop_m"
## [7] "med_hh_inc_e"       "med_hh_inc_m"       "geometry"
```

```r
# Measuring census tract with highest AA. proportion
AA_black_pop = AA_Data$black_pop_e[!is.na(AA_Data$black_pop_e)]

# Measuring census tract with highest MHHI
AA_mhhi = AA_Data %>% filter(!is.na(AA_Data$med_hh_inc_e))

# Creating a Bi_class for A.A. County
AA_bi_data = bi_class(AA_mhhi, x= black_pop_e, y = med_hh_inc_e, style =
"quantile", dim = 3)

# Mapping Bivariate Data for AA County
AA_bi_map =
  ggplot()+
  geom_sf(data = AA_bi_data, mapping = aes(fill = bi_class), color = "white",
size = 0.5, show.legend = FALSE) +
  bi_scale_fill(pal = "DkViolet", dim = 3)+
  labs(
    title = "Proportion of Income and Race",
    subtitle = "Anne Arundel County")+
  bi_theme()


  ggplot()+
  geom_sf(data = AA_bi_data, mapping = aes(fill = bi_class), color = "white",
size = 0.5, show.legend = FALSE) +
  bi_scale_fill(pal = "DkViolet", dim = 3)+
  labs(
    title = "Proportion of Income and Race",
    subtitle = "Anne Arundel County")+
  bi_theme()
```
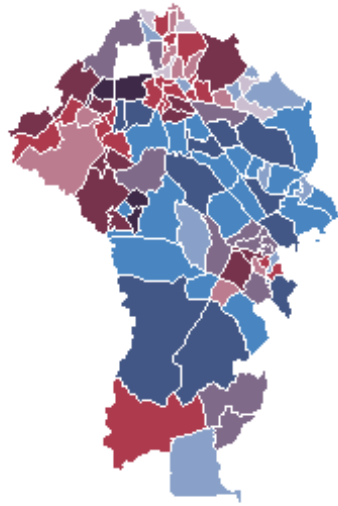
oportion of Income and Ra
Anne Arundel County


```r
# Creating bivariate legend using cowplot
AA_legend <- bi_legend(pal = "DkViolet",
                       dim = 3,
                       xlab = "Higher Proportion African American ",
                       ylab = "Higher Median Income ",
                       size = 6)

# Combining map with legend
AA_legend_plot <- ggdraw() +
  draw_plot(AA_bi_map, 0, 0, 1, 1) +
  draw_plot(AA_legend, 0.01, .01, 0.3, 0.3)

AA_legend_plot
```
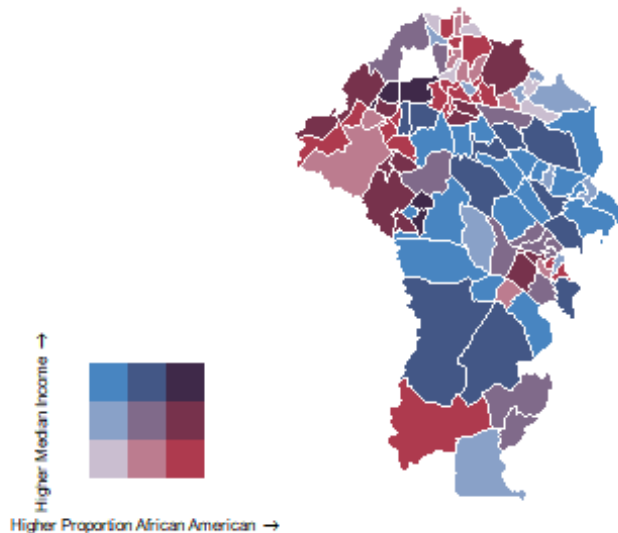
oportion of Income and Ra

Anne Arundel County

Higher Median Income →

Higher Proportion African American →

8. Write the bi_class output to a geojson file. (1 points)

```
#st_write(AA_bi_data, "Patterson_Lab8.geojson")
```

9. Now open your geojson output and create a QGIS map of your bivariate map. Put an image of that map here. (2 points)

```
# Inserting the image into this Rmarkdown document
img1_path1 <- "C:/Users/vival/Documents/GES 486/Lab8/Patterson_AAcounty.PNG"
img1 <- readPNG(img1_path1, native = TRUE, info = TRUE)
attr(img1, "info")

## $dim
## [1] 1354  961
##
## $bit.depth
## [1] 8
##
## $color.type
## [1] "RGBA"
##
## $gamma
## [1] 0.45455
##
## $dpi
## [1] 239.9792 239.9792

include_graphics(img1_path1)
```

Proportion of African American and Median Household Income
Anne Arundel County
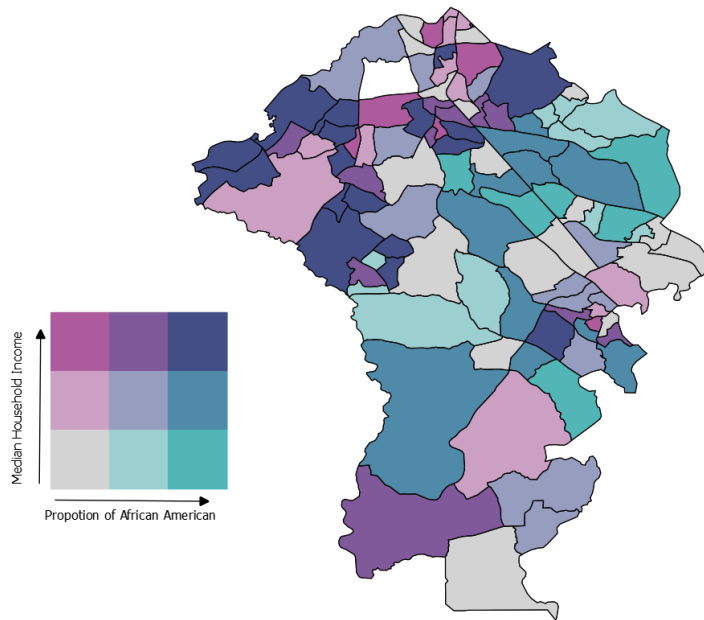
Author: Tim Patterson
Source: https://www.socialexplorer.com/data/ACS2019_5yr/metadata/?ds=ACS19_5yr

10. Use qgis2web and put a link here to your github site with the webmap of your bivariate map. (3 points)

https://github.com/timpatt1/timpatt1.github.io/tree/master/Patterson_Lab9/qgis2web_2021_05_03-20_50_13_088985

3. Reflection (3 points)

From this assignment I have gained a better understanding of how the organization of data is detrimental in the work flow process. Taking the time to label code chunks as well as leaving comments allows for you to look back at your code and use it more efficiently in the future. I struggled with that I would like to remember for this assignment is editing specific data within a map. The process of transforming specific data in order to drop and generate variables was very beneficial it allowed me to better edit my map and highlight specific areas of interest. This is something I plan to use for projects in the future.

4. Extra Credit (2 points)

Put an image as a legend in your web map.

Knit your document to a .html file. Submit this knitted document.