Sharat_Sripada_HW7.R

ssharat

2020-03-01

```
#
#       Course: IST-687
#       Name: Sharat Sripada
#       Homework #7
#       Due Date: 3/1/2020
#       Date Submitted: 3/1/2020
#       Topic: Map mashup!

# install.packages("gdata")
# install.packages("zipcode")
# install.packages("openintro")
# install.packages("ggmap")
# install.packages("maps")
# install.packages("mapproj")
# install.packages("tmaptools")

library("gdata")
library("ggplot2")
library("openintro")
library("ggmap")
library("maps")
library("mapproj")
library("tmaptools")

# Read the xls
medianzip <- read.xls("/Users/ssharat/Downloads/MedianZIP.xlsx")

# Rename colnames
colnames(medianzip) <- c("zip", "Median", "Mean", "Population")

# Remove the first row
medianzip <- medianzip[-1,]

# Remove the commas in the Median, Mean & population columns
medianzip$Median <- gsub(",","",medianzip$Median)
medianzip$Mean <- gsub(",","",medianzip$Mean)
medianzip$Population <- gsub(",","",medianzip$Population)

# NOTE - zipcode has been archived in the CRAN repository
# Download the package & install it via the .tar.gz
library(zipcode)
```

```r
medianzip$zip <- clean.zipcodes(medianzip$zip)
head(medianzip)
```

```
##     zip Median  Mean Population
## 2 01001  56663 66688      16445
## 3 01002  49853 75063      28069
## 4 01003  28462 35121       8491
## 5 01005  75423 82442       4798
## 6 01007  79076 85802      12962
## 7 01008  63980 78391       1244
```

```r
head(zipcode)
```

```
##     zip       city state latitude longitude
## 1 00210 Portsmouth    NH  43.0059  -71.0132
## 2 00211 Portsmouth    NH  43.0059  -71.0132
## 3 00212 Portsmouth    NH  43.0059  -71.0132
## 4 00213 Portsmouth    NH  43.0059  -71.0132
## 5 00214 Portsmouth    NH  43.0059  -71.0132
## 6 00215 Portsmouth    NH  43.0059  -71.0132
```

```r
df <- merge(medianzip, zipcode, by="zip")
df$Median <- as.numeric(df$Median)
df$Population <- as.numeric(df$Population)

# Step-2: Create simpler data-frame
# Data-frame 'dfmedian' <- Average median income by state
income <- tapply(df$Median, df$state, mean)
state <- rownames(income)
dfmedian <- data.frame(state, income)

# Data-frame 'dfpop' <- Population by state
pop <- tapply(df$Population, df$state, sum)
state <- rownames(income)
dfpop <- data.frame(state, pop)

# Create dfsimple merging the two DFs above by state
dfSimple <- merge(dfmedian, dfpop, by="state")
str(dfSimple)
```

```
## 'data.frame':    51 obs. of  3 variables:
##  $ state : Factor w/ 51 levels "AK","AL","AR",..: 1 2 3 4 5 6 7 8 9 10 ...
##  $ income: num  50451 40550 36961 48132 62629 ...
##  $ pop   : num  703159 4770242 2936699 6360679 36927999 ...
```

```r
head(dfSimple)
```

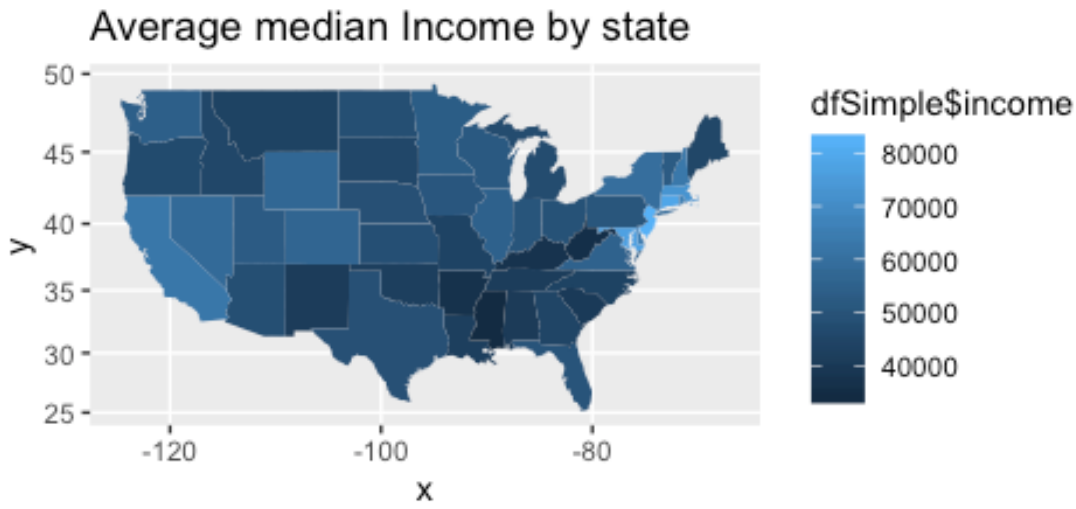
```
##   state   income      pop
## 1    AK 50450.88   703159
## 2    AL 40549.90  4770242
## 3    AR 36960.95  2936699
```

```
## 4    AZ 48132.07  6360679
## 5    CA 62628.72 36927999
## 6    CO 56303.02  4979279
```

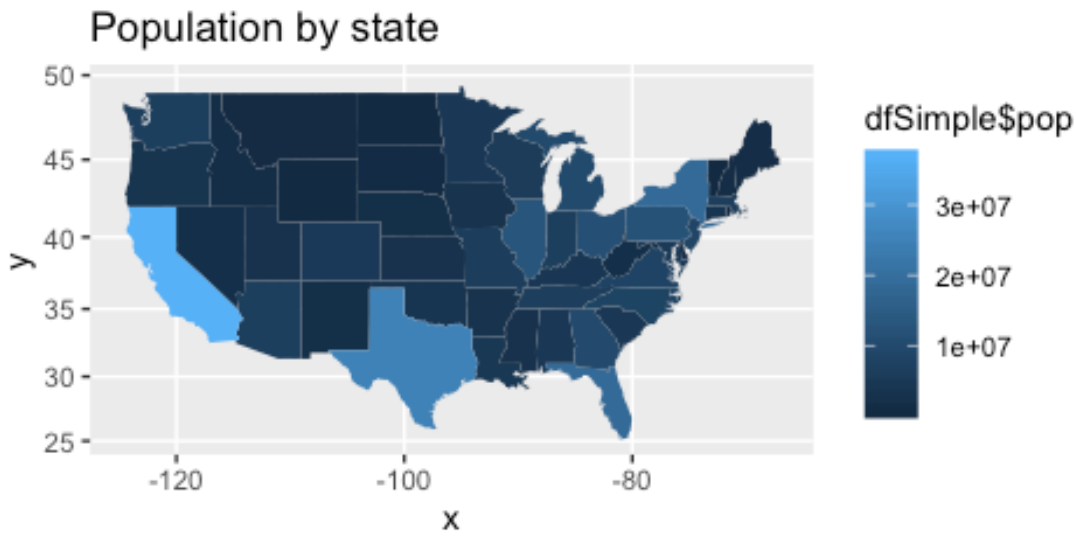
```
# Create a new column stateName in dfSimple
dfSimple$stateName <- state.name[match(dfSimple$state, state.abb)]
head(dfSimple)
```

```
##   state   income      pop  stateName
## 1    AK 50450.88   703159     Alaska
## 2    AL 40549.90  4770242    Alabama
## 3    AR 36960.95  2936699   Arkansas
## 4    AZ 48132.07  6360679    Arizona
## 5    CA 62628.72 36927999 California
## 6    CO 56303.02  4979279   Colorado
```

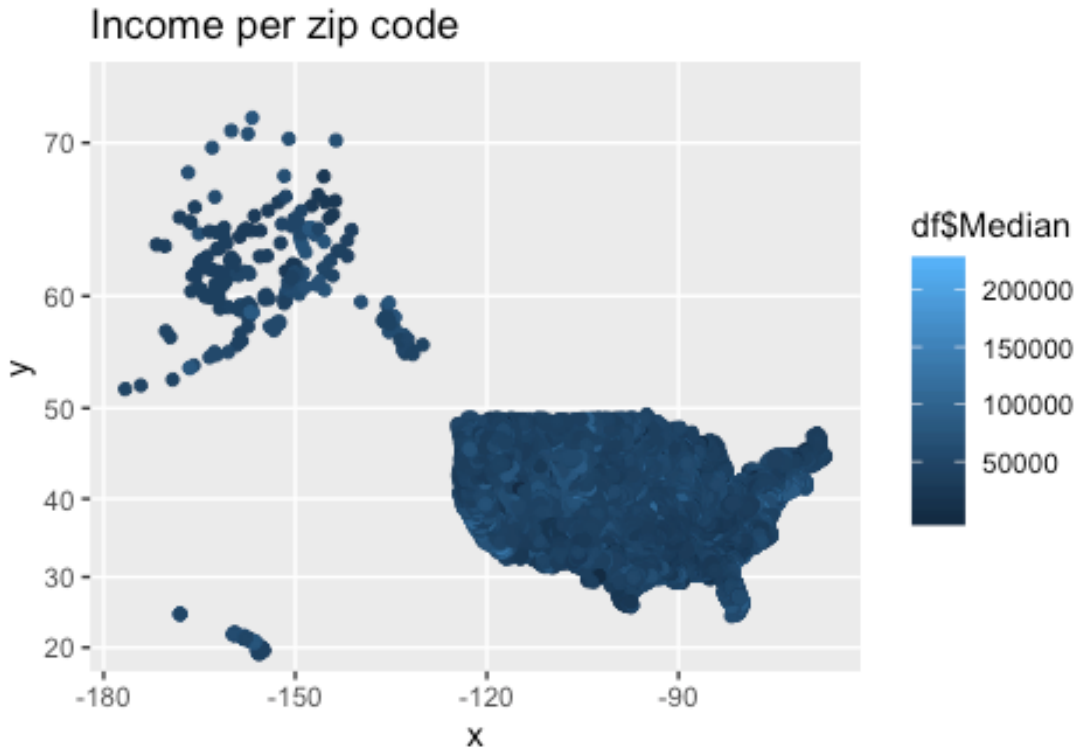
```
# Use tolower() on stateNames, since ggplot needs it that way
dfSimple$stateName <- tolower(dfSimple$stateName)

us <- map_data('state')

# Map average median income by states
mapIncome <- ggplot(dfSimple, aes(map_id = stateName))
mapIncome <- mapIncome + geom_map(map = us, aes(fill = dfSimple$income))
mapIncome <- mapIncome + expand_limits(x = us$long, y = us$lat)
mapIncome <- mapIncome + coord_map()
mapIncome <- mapIncome + ggtitle("Average median Income by state")
mapIncome
```



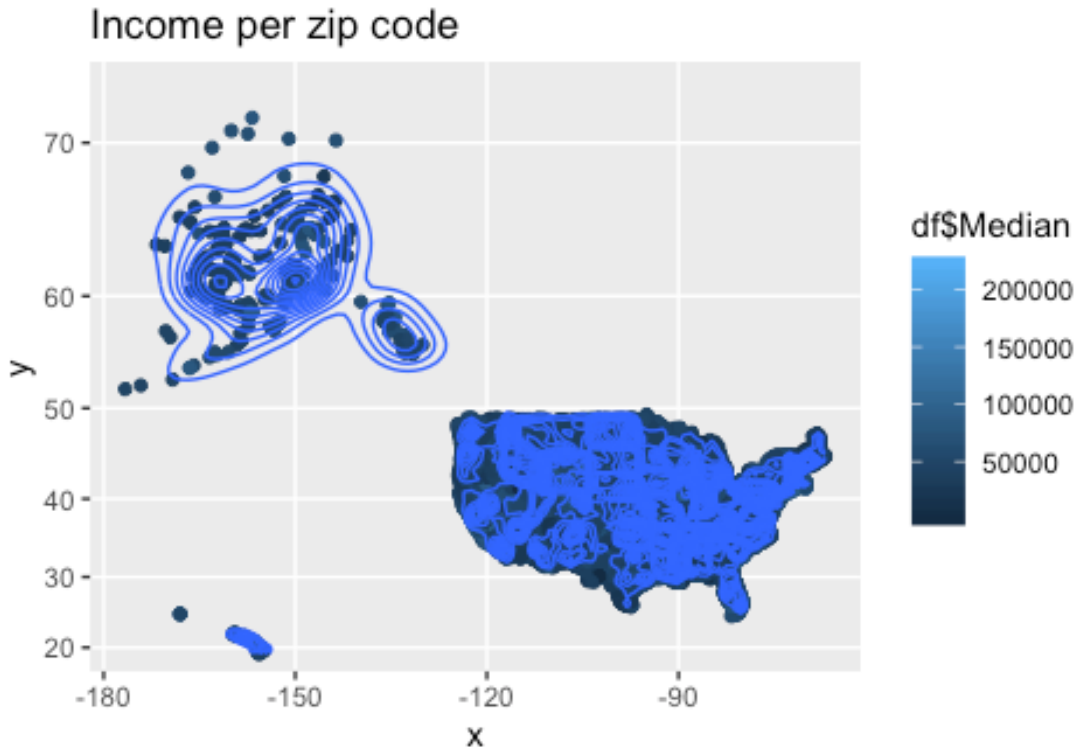

```
# Map population by states
mapPop <- ggplot(dfSimple, aes(map_id = stateName))
mapPop <- mapPop + geom_map(map = us, aes(fill = dfSimple$pop))
mapPop <- mapPop + expand_limits(x = us$long, y = us$lat)
mapPop <- mapPop + coord_map()
mapPop <- mapPop + ggtitle("Population by state")
mapPop
```



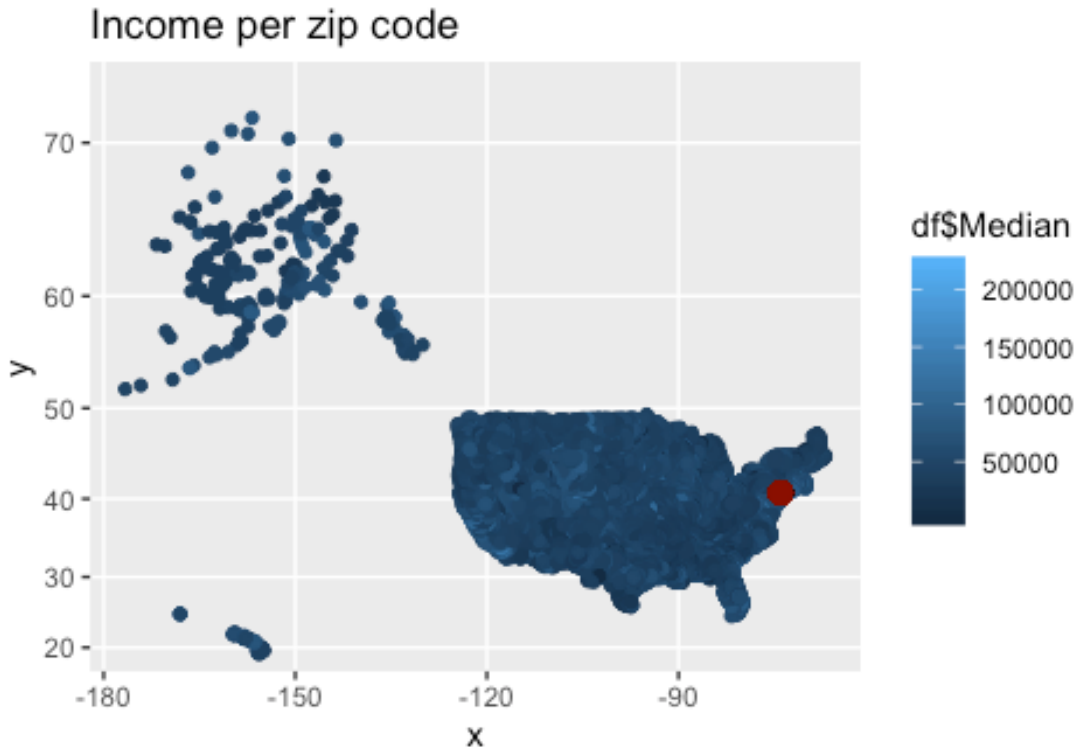

```
# Step-3: Income by zipcode
df$stateName <- state.name[match(df$state,state.abb)]
df$stateName <- tolower(df$stateName)
mapZip <- ggplot(df, aes(map_id = stateName))
mapZip <- mapZip + geom_map(map=us, fill="black", color="white")
mapZip <- mapZip + expand_limits(x = us$long, y = us$lat)
mapZip <- mapZip + geom_point(data = df, aes(x = df$longitude, y =
df$latitude, color=df$Median))
mapZip <- mapZip + coord_map() + ggtitle("Income per zip code")
mapZip
```



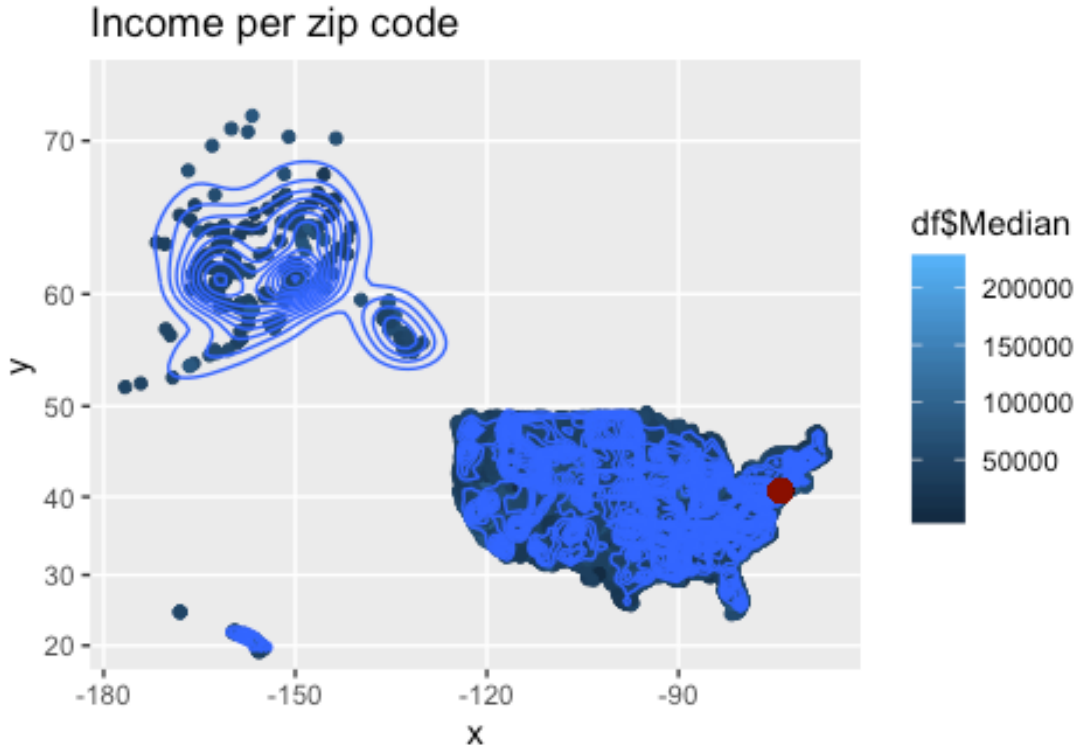

```
# Step-4: Zip-code density
mapD <- mapZip + geom_density_2d(data = df, aes(x = df$longitude, y =
df$latitude))
mapD
```




```
# Step-5: Zoom-In - NYC
Newlatlon <- function(address) {
  raw_latlon <- geocode_OSM(address,
                        return.first.only=T,
                        server = "http://nominatim.openstreetmap.org"
  )
  # Create a new df
  my_df <- data.frame(raw_latlon$coords[1], raw_latlon$coords[2])
  colnames(my_df) <- c("lon", "lat")
  return(my_df)
}

addresses <- c("NYC, ny")
latlon <- Newlatlon(addresses)

mapZipZoomed <-  mapZip + geom_point(aes(x = latlon$lon, y = latlon$lat),
color="darkred", size = 3)
mapZipZoomed
```




```
mapDZoomed <- mapD + geom_point(aes(x = latlon$lon, y = latlon$lat),
color="darkred", size = 3)
mapDZoomed
```


Income per zip code
70
60
50
40
30
20
y
-180
-150
-120
-90
x
df$Median
200000
150000
100000
50000