



ITU

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Homework 3

Abstract

The lecture material is contained in HoffmanGraphicsWithR.pdf.
This homework uses the sample code in the file ggplotSimple.R.

Question 1

This question uses the lattice package. Show the code you used to generate the graphs. Use the state.region and state.x77 data set (recall typing ?state.x77 into the console will provide a discription of this data set).

Question 1a

Investigate the population density of USA states within the four regions: Northeast, South, North Central and West. Observe the graph of State Population as a Function of Area. Create Figure 1.

Question 1b

There is one state in the west which has a relatively dense population (Area is relatively small compared to the number of people). Which state is that?

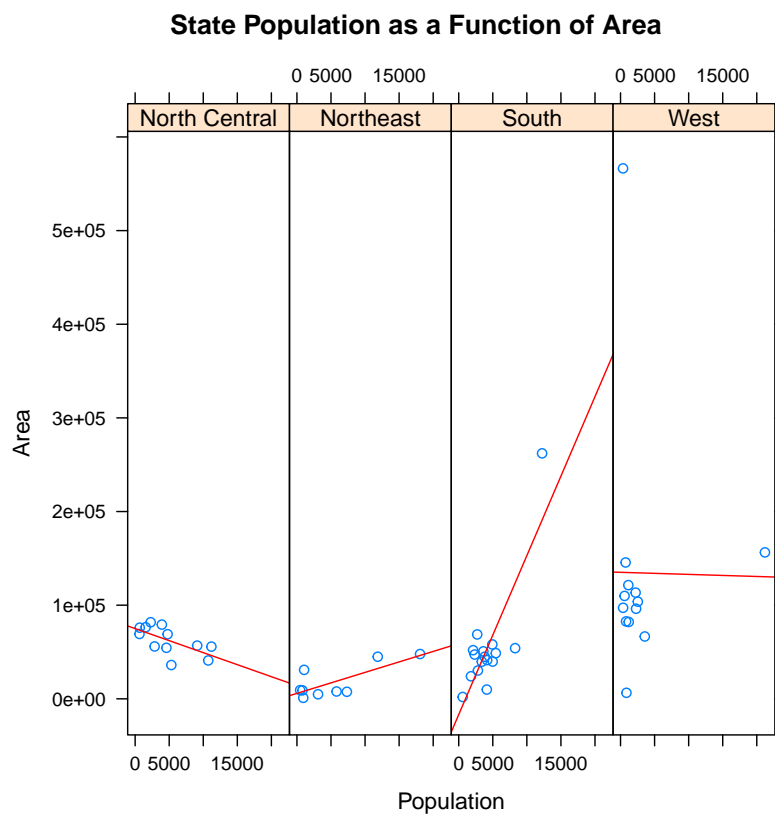


Figure 1: State Population.

Question 1c

Use the `cloud()` function from the `lattice` package to create the 3D plot of States (Figure 2). Can you make this plot look more informative or interesting?

3D plot of States

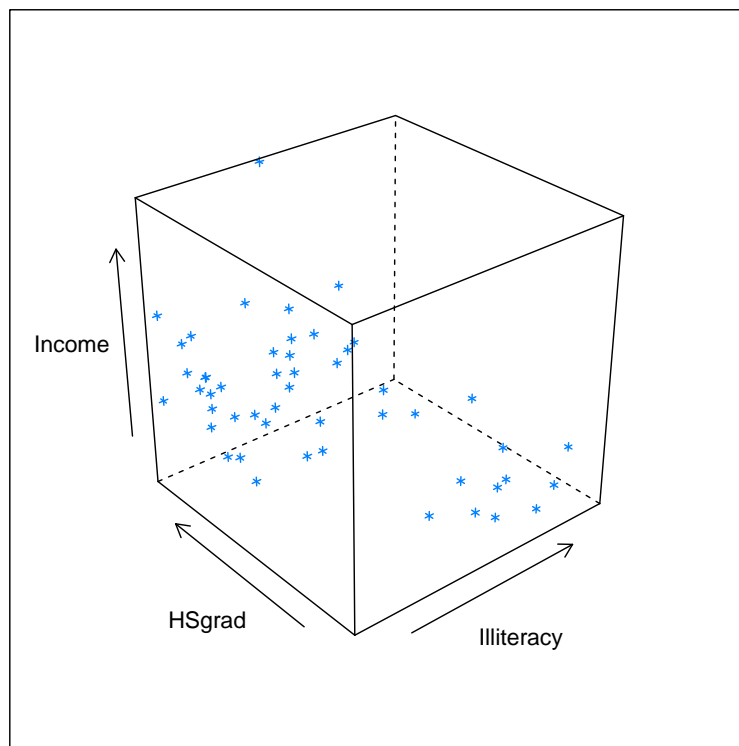


Figure 2: $\text{Income} \sim \text{Illiteracy}$

Given : `as.factor(HSgradGroup)`

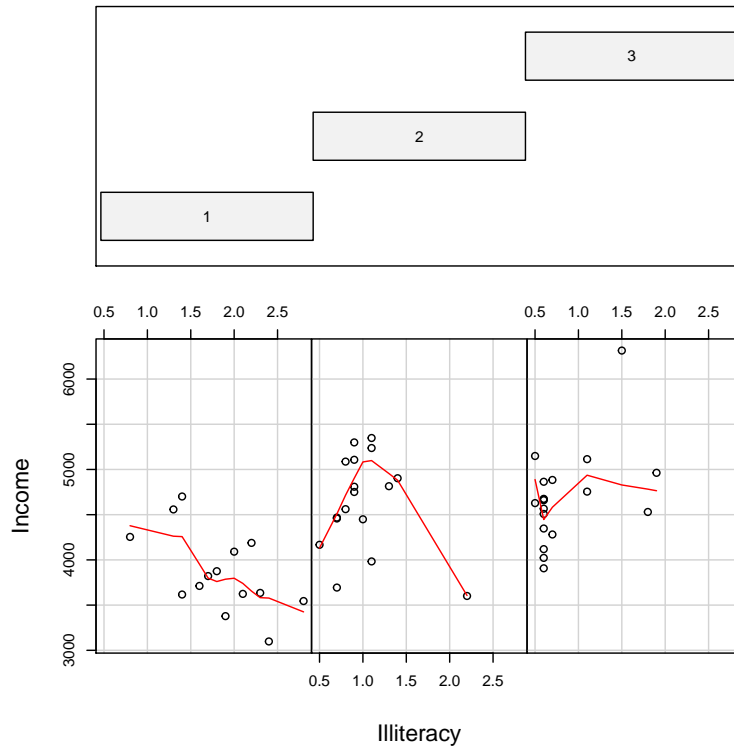


Figure 3: `coplot(Income ~ Illiteracy)`

Question 1d

For this question the HS Grad column has been divided into three groups. For the first group, the HS Grad percentage is less than 50. In the second group the HS Grad percentage is between 50 and 57, while the HS Grad percentage for the third group is greater than 57. Use the `lattice coplot()` function to create Figure 3 .

Question 1e

Also create another illustration of your choice using this data and the lattice package.

Answer 1

Question 2

Create the graphs for this question using the ggplot2 package.

Question 2a

Recreate the graph of State Population as a Function of Area from Question 1a using the `qplot()` function from the ggplot2 package (Figure 4). Can you make the Population Axis look better?

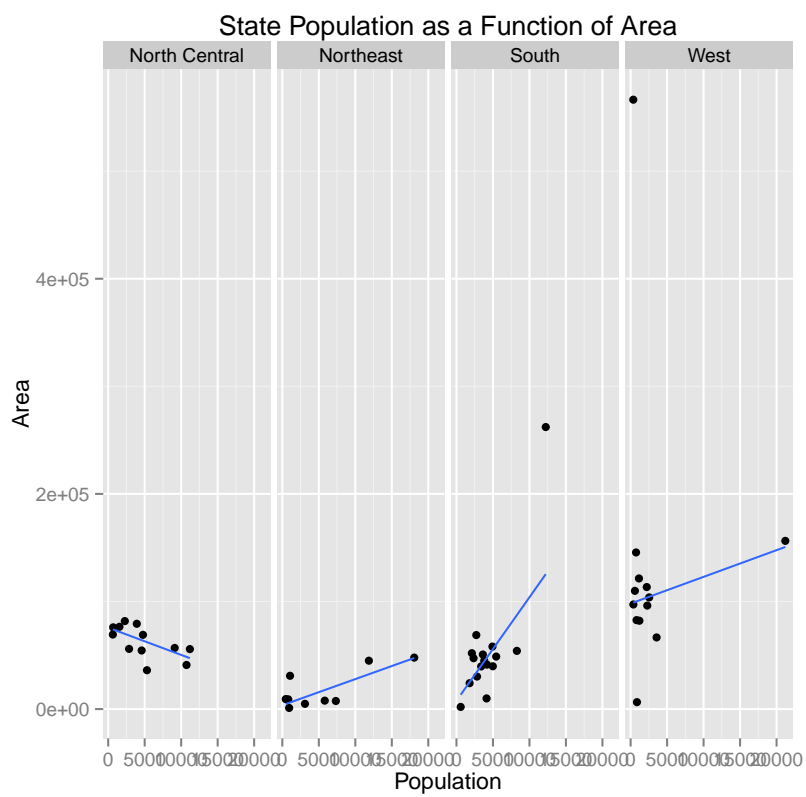


Figure 4: Population

Question 2b

Investigate the land areas of USA regions. State regions can be found in the `state.region` data set. Use the `qplot` function from the `ggplot2` package. Show the code you used to generate the graphs. Use the data sets `state.x77` and `state.region`. Notice the axis for the charts. Use the `grid.arrange()` function from the package `gridExtra` to put two plots on the same page. Create the graphs and charts exactly as in Figure 5

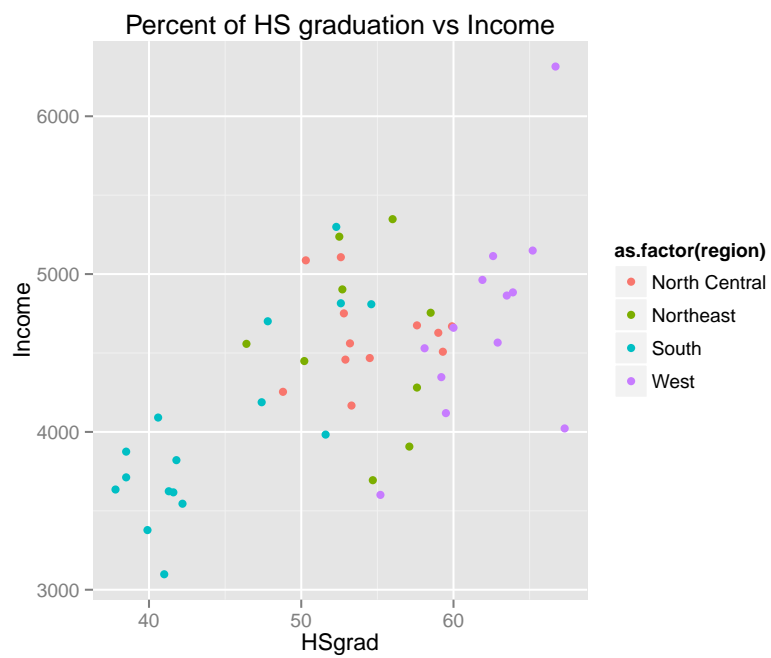
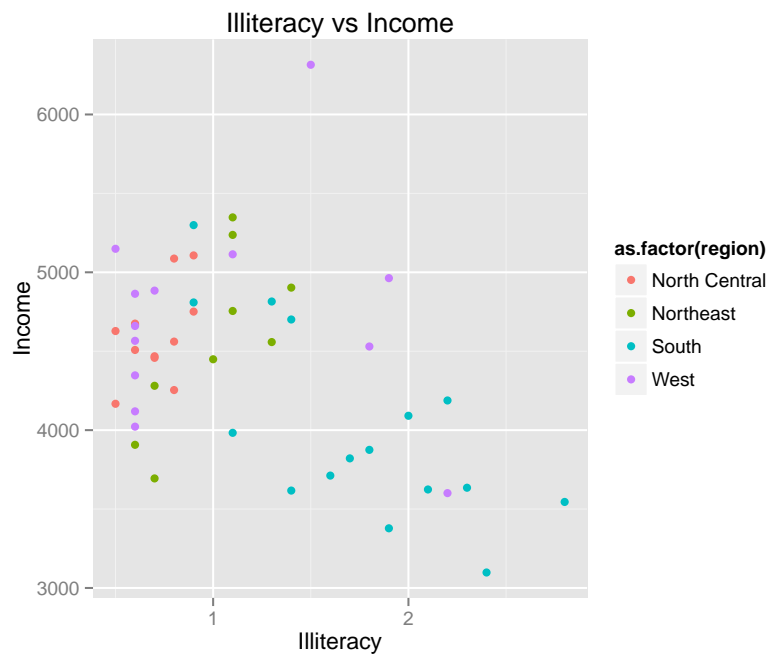


Figure 5: Two Plots on Same Figure

Answer 2

Question 3

The figure for this question is a replica of one from Wickham's ggplot2 text. To produce the figure, use the following data frame:

```
> df<- data.frame(  
+   x=c(3,1,5),  
+   y=c(2,4,6),  
+   label=c("a","b","c")  
+ )
```

Next create a variable named myPlot as follows:

```
> myPlot<-ggplot(df,aes(x,y,label=label))+  
+   xlab(NULL)+ylab(NULL)
```

Now create eight graphs. Each of these starts with myPlot and adds only one geom layer along with specifying a title.

The first graph adds a geom_point() layer and annotates with the title ggtitle("geom_point"). Recall that you would need to add an extra line of code (ie. add the line pP1) to get the plot to print.

```
> pP1<-myPlot+geom_point()+ggtitle("geom_point")
```

Each of the remaining seven graphs need to have one of the following layers added: geom_bar(stat="identity"), geom_line(), geom_area(), geom_path(), geom_text(),geom_tile(), geom_polygon(). Exactly replicate the graph as shown in Figure 6. Show your code and explain the charts.

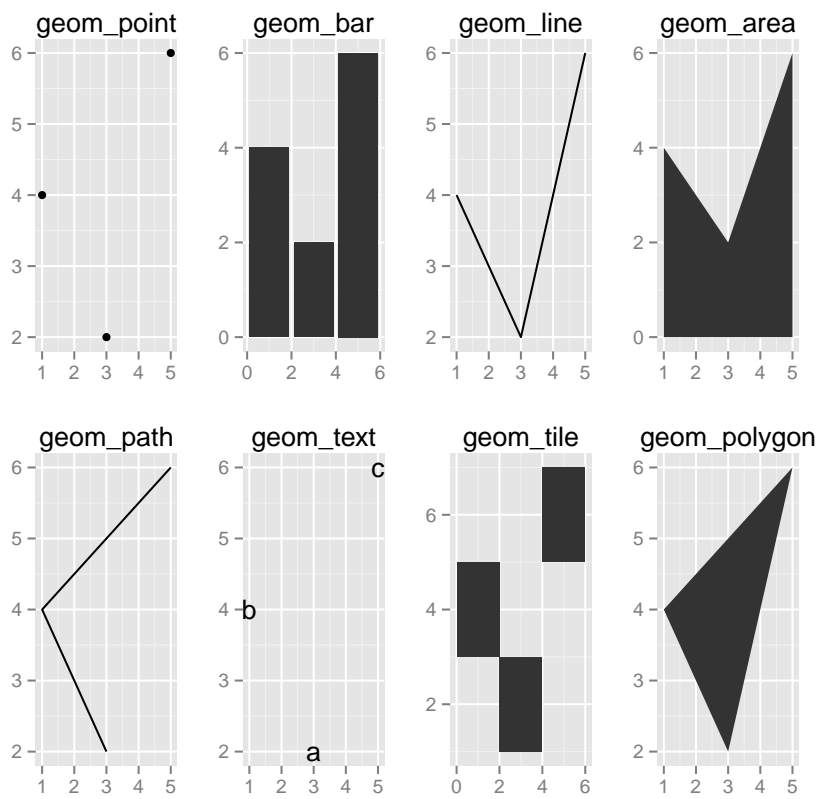


Figure 6: Example: `geom_xxxx()`

Question 4

Create a population density map of the United States in the year 1977. Make the map look exactly like the one in Figure 7. Notice that `keywidth` is set to 3, in order to make the legend wider. Check out the `annotate()` function described in the `geom_text()` documentation. The state with the maximum population density at that time was New Jersey, while the minimum was in Alaska. The following few lines of code will be useful:

```
> #install.packages("maps")
> library(maps)
> stateMap <- map_data("state")
```

Question 4b

What about using the data at <http://www.census.gov/popest/data/state/totals/2013/index.html> to create a more current version of the map in Figure 7?

Answer 4

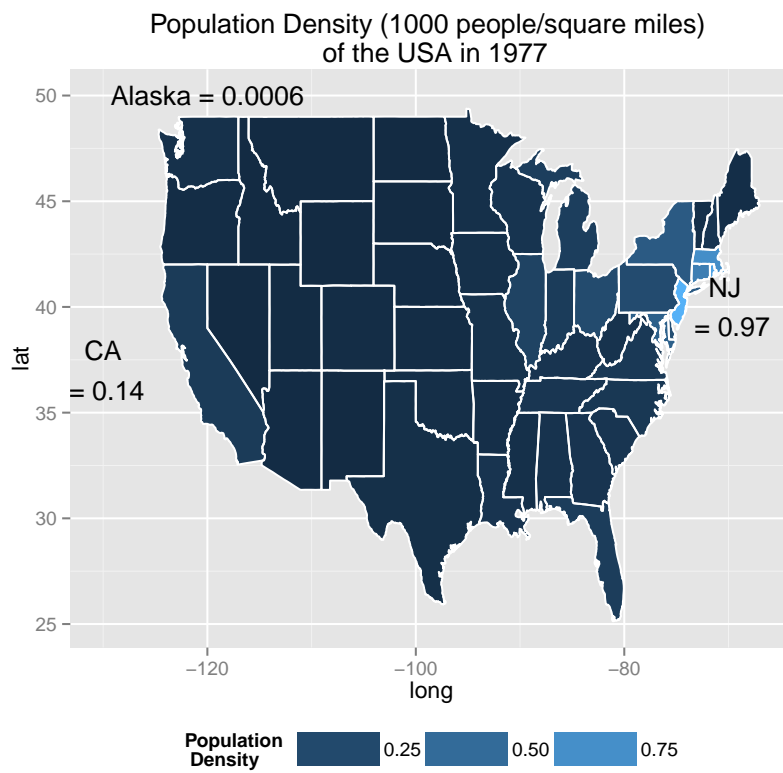


Figure 7: Example: Population Density Map

Question 5

Use the ggplot2 package. Show the code you used to generate the graphs. What about coloring a USA map using either the "state.division" or "state.region" the "state" data set? What about making a map of another country?

Be creative. Generate some graphs and charts using a data set of your choice.

Answer 5