# Lab 1 - Data visualization

Miranda Zhong

### Load Packages

```
library(tidyverse)
```

```
-- Attaching packages --------------------------------------- tidyverse 1.3.2 --
v ggplot2 3.3.6     v purrr   0.3.4
v tibble  3.1.8     v dplyr   1.0.9
v tidyr   1.2.0     v stringr 1.4.1
v readr   2.1.2     v forcats 0.5.2
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
```

```
library(viridis)
```

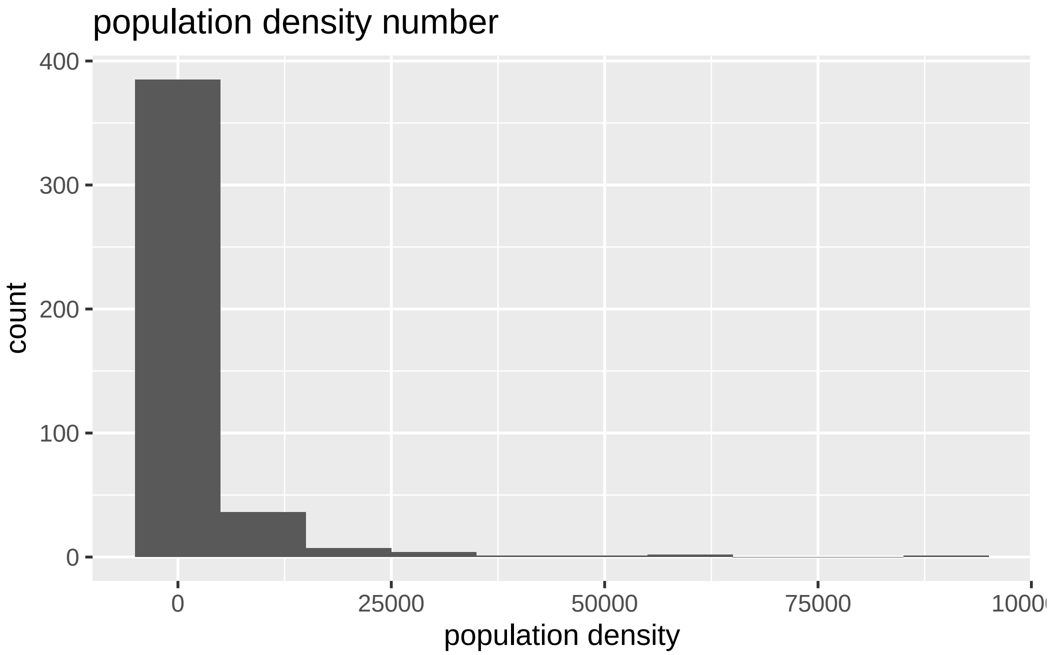
```
Loading required package: viridisLite
```

### Exercise 1

```
glimpse(midwest)
```

```
Rows: 437
Columns: 28
$ PID                  <int> 561, 562, 563, 564, 565, 566, 567, 568, 569, 570,~
$ county               <chr> "ADAMS", "ALEXANDER", "BOND", "BOONE", "BROWN", "~
$ state                <chr> "IL", "IL", "IL", "IL", "IL", "IL", "IL", "IL", "~
$ area                 <dbl> 0.052, 0.014, 0.022, 0.017, 0.018, 0.050, 0.017, ~
$ poptotal             <int> 66090, 10626, 14991, 30806, 5836, 35688, 5322, 16~
$ popdensity           <dbl> 1270.9615, 759.0000, 681.4091, 1812.1176, 324.222~
$ popwhite             <int> 63917, 7054, 14477, 29344, 5264, 35157, 5298, 165~
$ popblack             <int> 1702, 3496, 429, 127, 547, 50, 1, 111, 16, 16559,~
$ popamerindian        <int> 98, 19, 35, 46, 14, 65, 8, 30, 8, 331, 51, 26, 17~
$ popasian             <int> 249, 48, 16, 150, 5, 195, 15, 61, 23, 8033, 89, 3~
$ popother             <int> 124, 9, 34, 1139, 6, 221, 0, 84, 6, 1596, 20, 7, ~
$ percwhite            <dbl> 96.71206, 66.38434, 96.57128, 95.25417, 90.19877,~
$ percblack            <dbl> 2.57527614, 32.90043290, 2.86171703, 0.41225735, ~
$ percamerindan        <dbl> 0.14828264, 0.17880670, 0.23347342, 0.14932156, 0~
$ percasian            <dbl> 0.37675897, 0.45172219, 0.10673071, 0.48691813, 0~
$ percother            <dbl> 0.18762294, 0.08469791, 0.22680275, 3.69733169, 0~
$ popadults            <int> 43298, 6724, 9669, 19272, 3979, 23444, 3583, 1132~
$ perchsd              <dbl> 75.10740, 59.72635, 69.33499, 75.47219, 68.86152,~
$ percollege           <dbl> 19.63139, 11.24331, 17.03382, 17.27895, 14.47600,~
$ percprof             <dbl> 4.355859, 2.870315, 4.488572, 4.197800, 3.367680,~
$ poppovertyknown      <int> 63628, 10529, 14235, 30337, 4815, 35107, 5241, 16~
$ percpovertyknown     <dbl> 96.27478, 99.08714, 94.95697, 98.47757, 82.50514,~
$ percbelowpoverty     <dbl> 13.151443, 32.244278, 12.068844, 7.209019, 13.520~
$ percchildbelowpovert <dbl> 18.011717, 45.826514, 14.036061, 11.179536, 13.02~
$ percadultpoverty     <dbl> 11.009776, 27.385647, 10.852090, 5.536013, 11.143~
$ percelderlypoverty   <dbl> 12.443812, 25.228976, 12.697410, 6.217047, 19.200~
$ inmetro              <int> 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0~
$ category             <chr> "AAR", "LHR", "AAR", "ALU", "AAR", "AAR", "LAR", ~
```

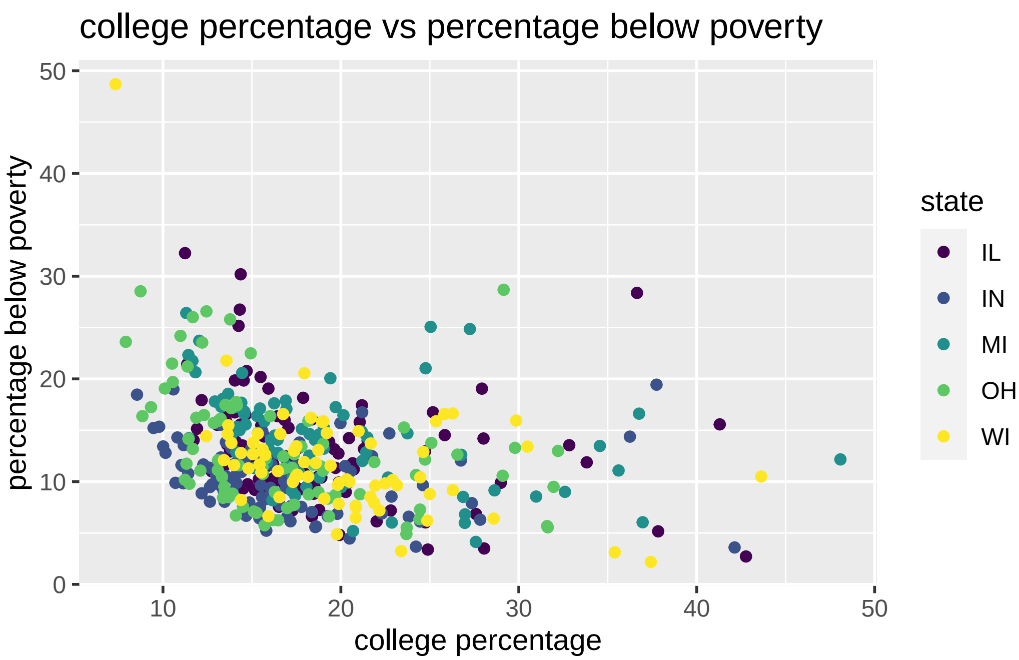
```
ggplot(midwest,
       aes(x= popdensity)) + geom_histogram(binwidth = 10000) + labs(title= "population de
```



As shown in the graph, the distribution of the graph skew to the right. Althoguh most county have population density below 25000, there are some outliers which population locates between 50000 and 75000.

### Exercise 2

```
ggplot(midwest,
       aes(x=percollege, y= percbelowpoverty, color= state))+ geom_point()+scale_color_vir
```



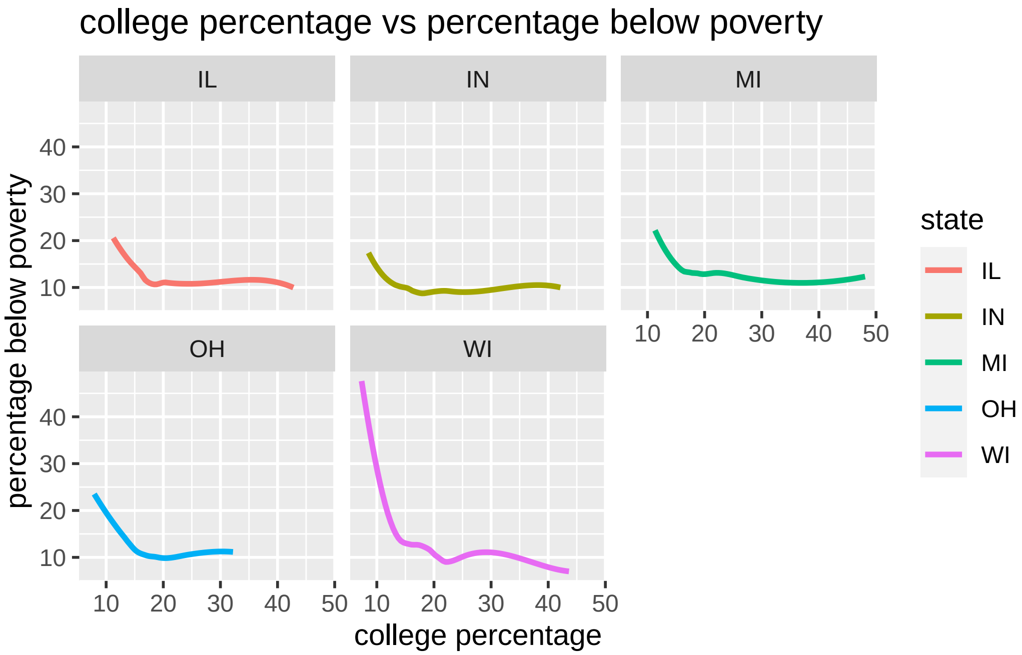
### Exercise 3

Most state have very similar college percentage, clustered around 10-20% with 10-20% below the poverty line. This means the amount of population that revieves college degree is roughly the same as the amount of people in poverty.

### Exercise 4

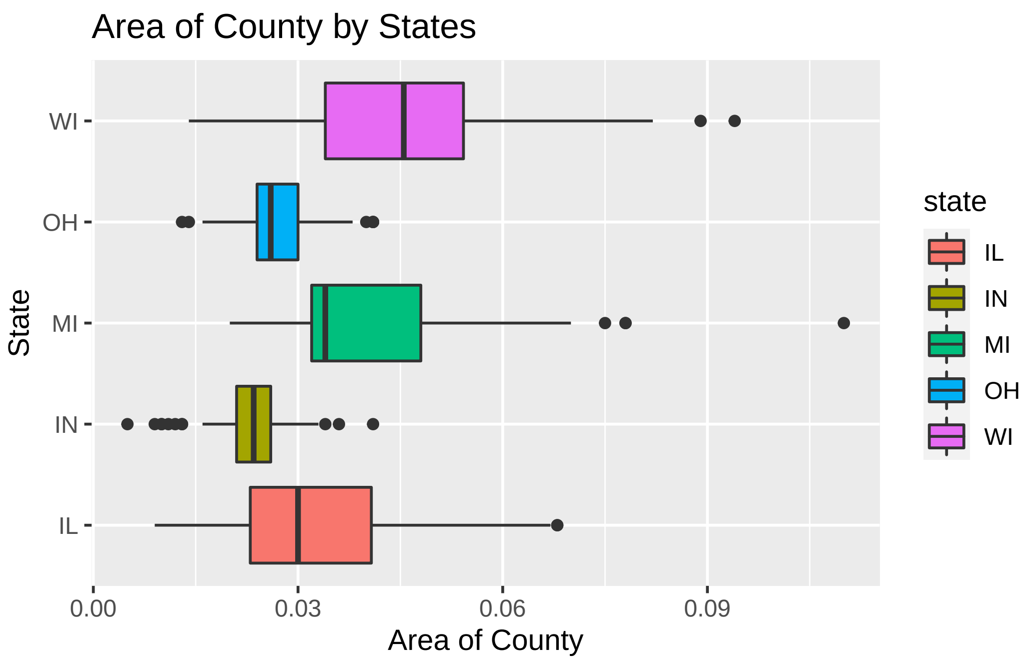
```
ggplot(midwest,
       aes(x=percollege, y= percbelowpoverty, color= state))+ geom_smooth(se=FALSE) +facet
```

```
`geom_smooth()` using method = 'loess' and formula 'y ~ x'
```



Personally I would prefer this plot over the plot from exercise 2. This plot shows the trend of how the percentage of college attendees change according to the percentage below poverty. From this graph one can see WI is the state with the least amount of college attendee percentage with the greatest amount of percentage below poverty. Meanwhile, plot from exercise 2 only shows the general relative comparison between poverty and college percentage without specify the trend within each state. ## Exercise 5

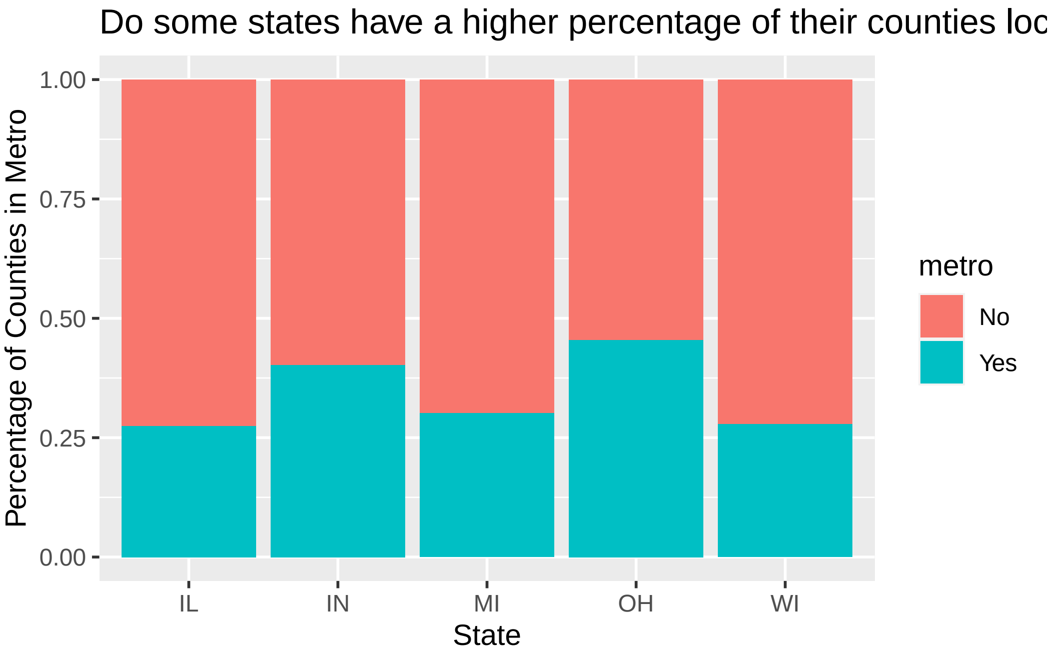
```
ggplot(midwest,
       aes(x= area, y=state, fill=state))+ geom_boxplot()+ labs(title= "Area of County by
```



Based on the graph, On average, IN has the smallest county, and MI has the single largest county.This is because MI has a large outlier county located at the far right of the graph.

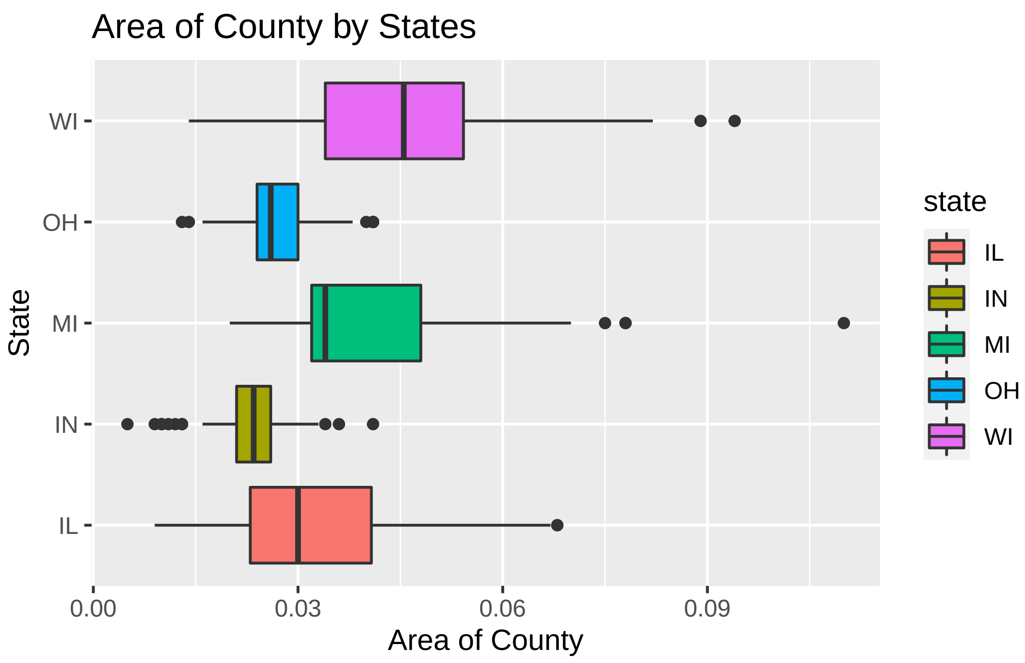
### Exercise 6

```
midwest <- midwest |>
  mutate(metro = if_else(inmetro == 1, "Yes", "No"))
ggplot(midwest,aes(x= state, fill=metro))+ geom_bar(position="fill") + labs(title= "Do som
```



### Exercise 7

```
ggplot(midwest,
       aes(x= area, y=state, fill=state))+ geom_boxplot()+ labs(title= "Area of County by
```


Area of County by States
State
WI
OH
MI
IN
IL
0.00
0.03
0.06
0.09
Area of County
state
IL
IN
MI
OH
WI