Lab 2

Thomas Weil GIS 3

- Libraries
- Data manipulation
- Summary
- Non-spatial figure
- Map
- Data Sourcs

Libraries

```
library(sf)
```

```
## Warning: package 'sf' was built under R version 3.5.2
```

```
## Linking to GEOS 3.6.1, GDAL 2.1.3, PROJ 4.9.3
```

```
library(raster)
```

```
## Warning: package 'raster' was built under R version 3.5.2
```

```
## Loading required package: sp
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.5.2
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:raster':
##
##     intersect, select, union
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(stringr) # for working with strings (pattern matching)
```

```
## Warning: package 'stringr' was built under R version 3.5.2
```

```
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 3.5.2
```

```
##
## Attaching package: 'tidyr'
```

```
## The following object is masked from 'package:raster':
##
##     extract
```

```
library(spData)
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.5.2
```

```
data(us_states)
data(us_states_df)
library(tmap)
```

Data manipulation

Create a new variables Filter out Distrcit of Columbia, a massive outlier

```
usa<- us_states
usa<- mutate(usa, pop_density= (total_pop_10)/as.numeric(AREA))
class(usa)
```

```
## [1] "sf"         "data.frame"
```

```
usa<- filter(usa, NAME != "District of Columbia")
```

Summary

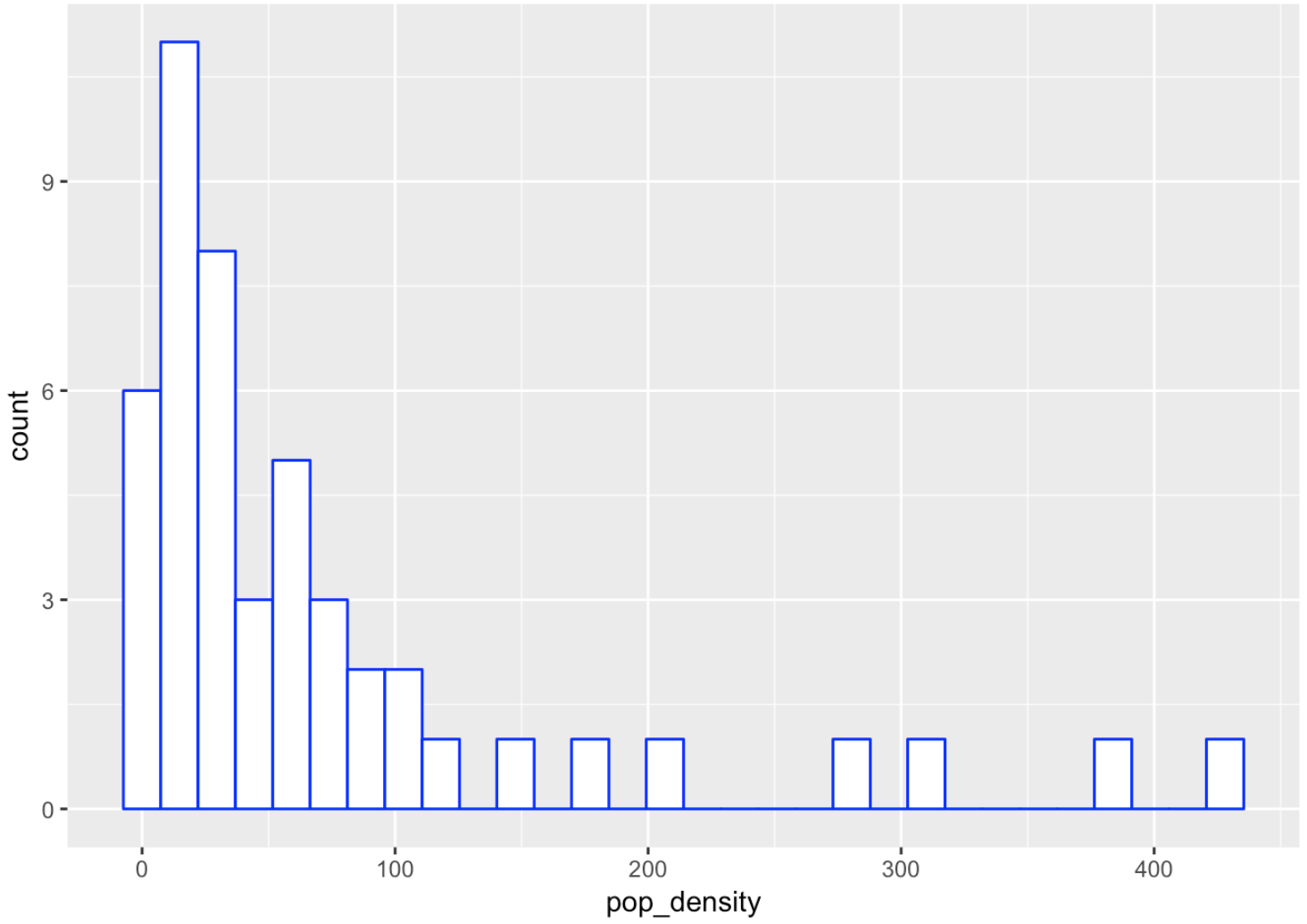
```
summary(usa)
```

```
##     GEOID                NAME                  REGION       AR
EA
##  Length:48          Length:48          Norteast: 9   Min.
:  2743
##  Class :character   Class :character   Midwest :12   1st Qu.
:101756
##  Mode  :character   Mode  :character   South   :16   Median
:145349
##                                        West    :11   Mean
:162643
##                                                      3rd Qu.
:213906
##                                                      Max.
:687714
##   total_pop_10       total_pop_15       pop_density
geometry
##  Min.   :  545579   Min.   :  579679   Min.   :  2.154   MUL
TIPOLYGON :48
##  1st Qu.: 1970042   1st Qu.: 2030429   1st Qu.: 17.478   eps
g:4269    : 0
##  Median : 4470684   Median : 4701414   Median : 35.780   +pr
oj=long...: 0
##  Mean   : 6278252   Mean   : 6535997   Mean   : 73.253
##  3rd Qu.: 6881411   3rd Qu.: 7303256   3rd Qu.: 77.623
##  Max.   :36637290   Max.   :38421464   Max.   :430.192
```

Non-spatial figure

Create a historgram

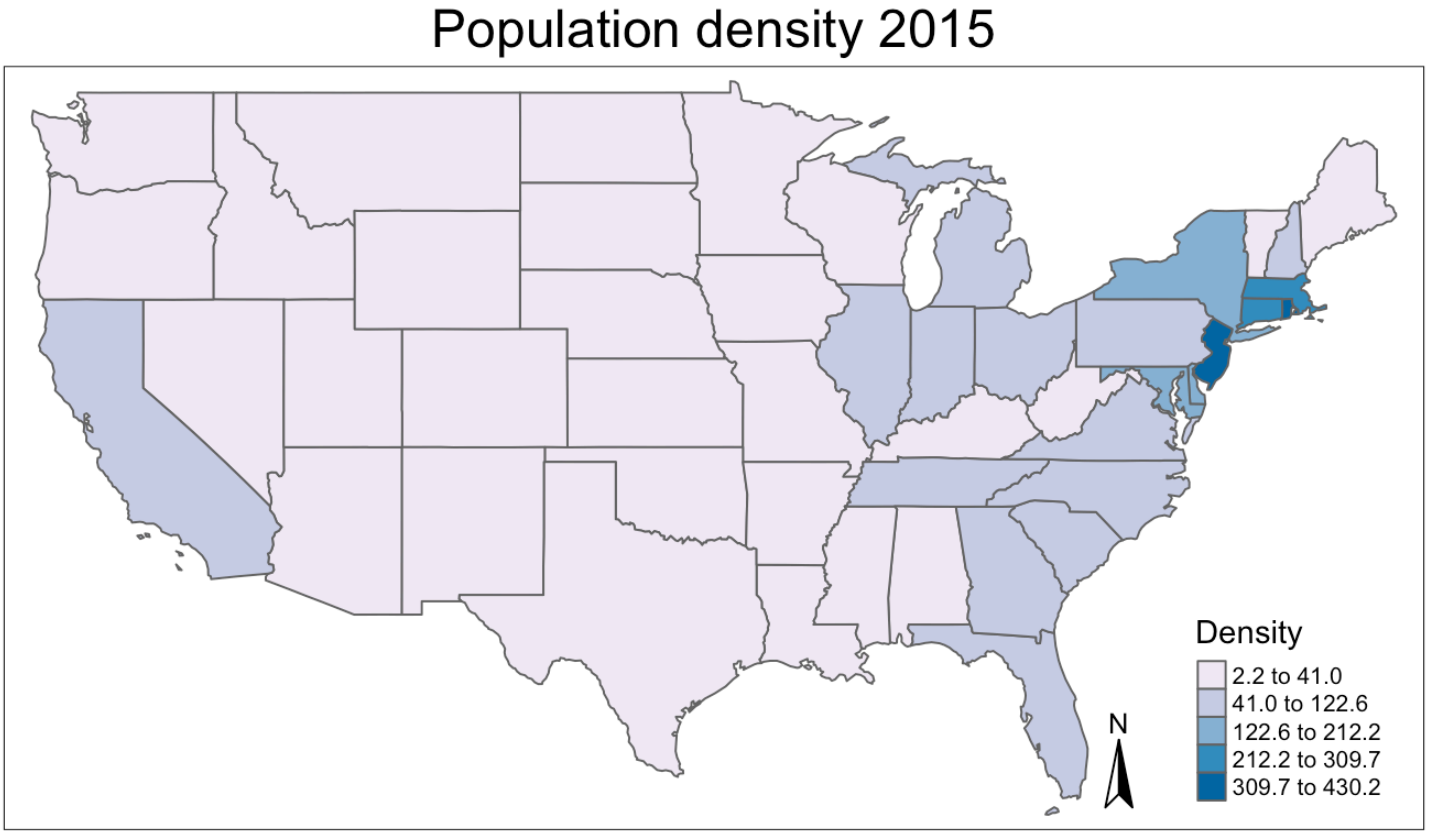
```
ggplot<- ggplot(usa, aes(x=pop_density))+geom_histogram(color="
blue", fill="white", bins=30)
ggplot
```



Map

Create a map

```
tm_shape(usa)+tm_fill("pop_density", style= "jenks", palette =
"PuBu", title="Density")+ tm_borders()+tm_layout(main.title="Po
pulation density 2015",legend.position = c("right", "bottom"),
legend.text.size = .66, main.title.position = "center")+tm_comp
ass()
```



Data Sourcs

- us_states data set by Bivand, Jakub Nowosad, Robin Lovelace, available at https://github.com/Nowosad/spData/blob/master/data/us_states.rda (https://github.com/Nowosad/spData/blob/master/data/us_states.rda)