

Graphics with ggplot2

Fall 2022

September 19 2022

Layered Grammar of Graphics

- Essentials

- Data
- Aesthetic mappings
- Geometric objects

- Additional elements

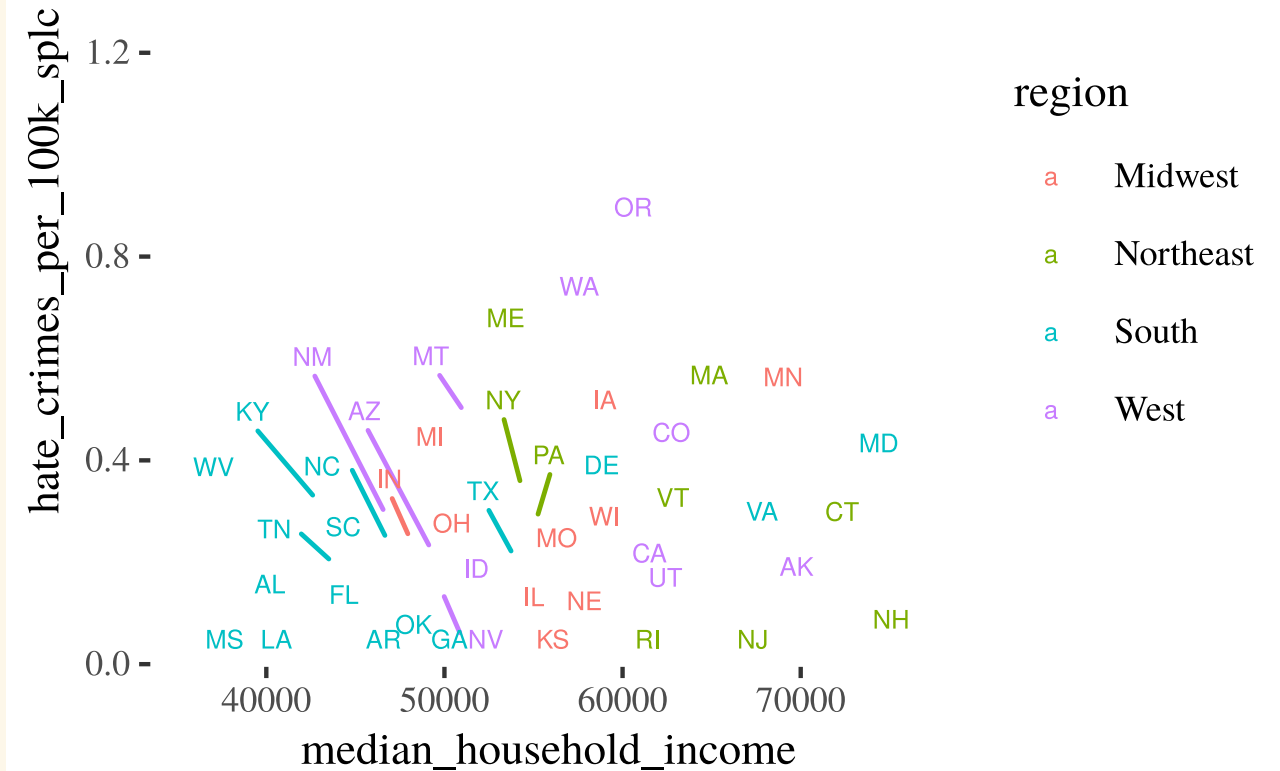
- Facets
- Coordinate system
- Statistical transformations
- Position adjustments
- Scales
- Theme

Common **ggplot2** options

```
ggplot(data) +      # data
  <geometry_funs>(aes(<variables>)) + # aesthetic variable mapping
  <label_funs> +    # add context
  <facet_funs> +    # add facets (optional)
  <coordinate_funs> + # play with coords (optional)
  <scale_funs> +    # play with scales (optional)
  <theme_funs> # play with axes, colors, etc (optional)
```

A better plot

```
base +  
  geom_text_repel(aes(label=state_code, color=region),  
    size = 2)
```



mpg dataset

```
glimpse(mpg)
```

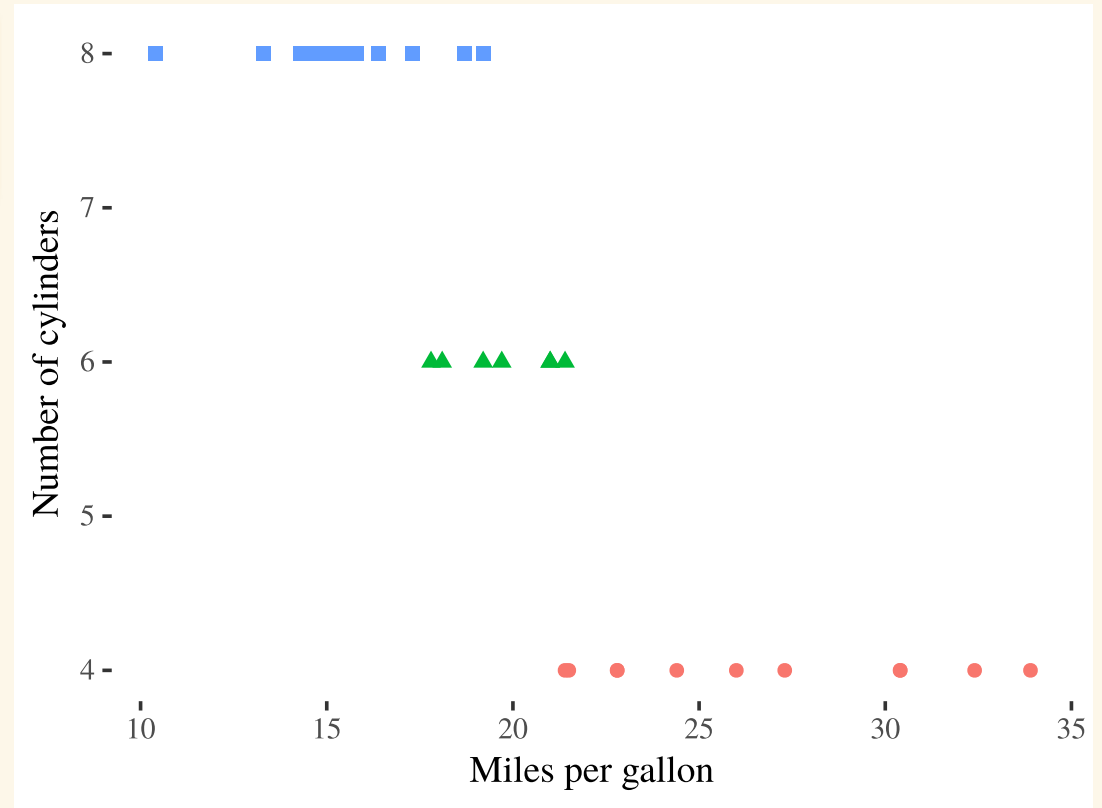
```
Rows: 234
```

```
Columns: 11
```

```
$ manufacturer <chr> "audi", "audi", "audi", "audi", "audi", "audi", "audi", "...  
$ model        <chr> "a4", "a4", "a4", "a4", "a4", "a4", "a4", "a4 quattro", "...  
$ displ        <dbl> 1.8, 1.8, 2.0, 2.0, 2.8, 2.8, 3.1, 1.8, 1.8, 2.0, 2.0, 2.0...  
$ year         <int> 1999, 1999, 2008, 2008, 1999, 1999, 2008, 1999, 1999, 200...  
$ cyl          <int> 4, 4, 4, 4, 6, 6, 6, 4, 4, 4, 4, 6, 6, 6, 6, 6, 6, 8, 8, ...  
$ trans        <chr> "auto(l5)", "manual(m5)", "manual(m6)", "auto(av)", "auto...  
$ drv          <chr> "f", "f", "f", "f", "f", "f", "f", "f", "4", "4", "4", "4", "4...  
$ cty          <int> 18, 21, 20, 21, 16, 18, 18, 18, 16, 20, 19, 15, 17, 17, 1...  
$ hwy          <int> 29, 29, 31, 30, 26, 26, 27, 26, 25, 28, 27, 25, 25, 25, 2...  
$ fl           <chr> "p", "p", "p", "p", "p", "p", "p", "p", "p", "p", "p", "p", "p...  
$ class        <chr> "compact", "compact", "compact", "compact", "compact", "c...
```

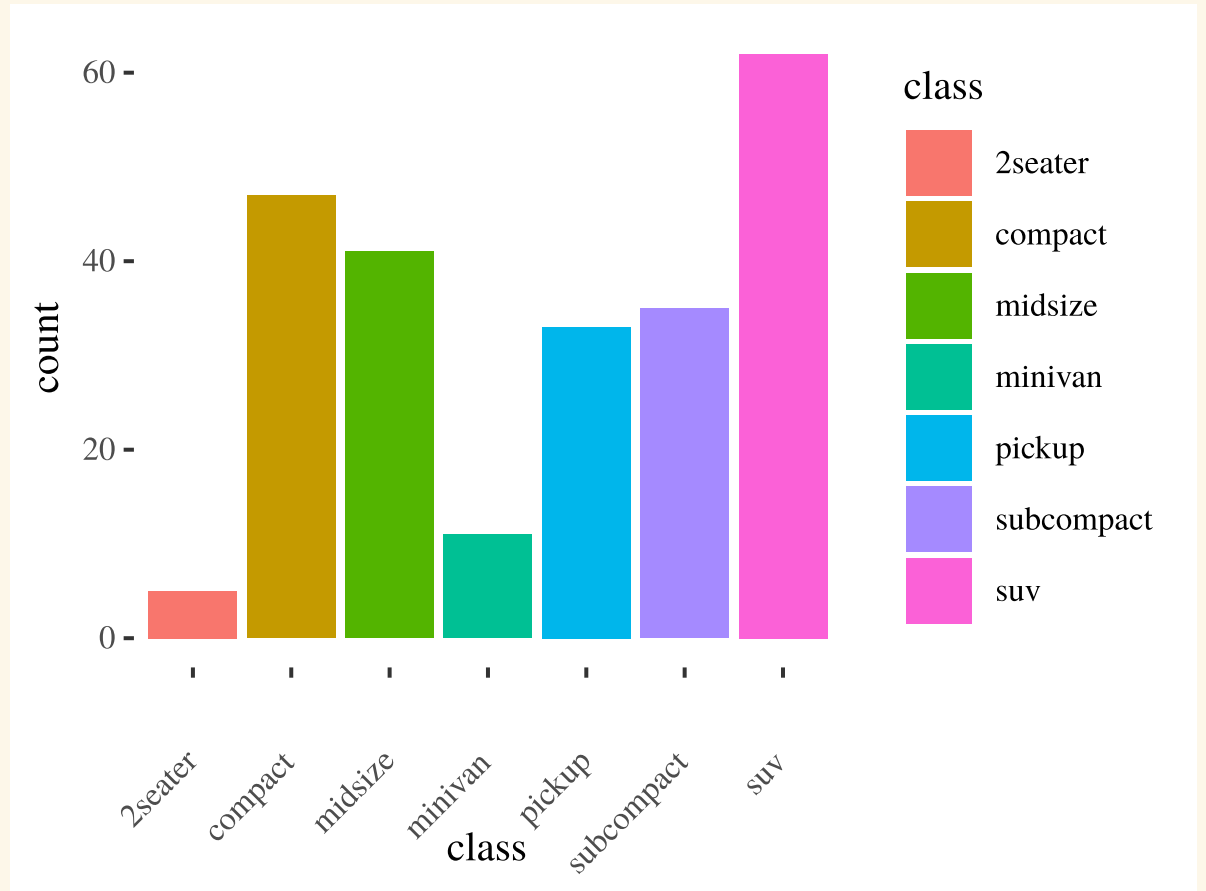
Plotting variables

```
ggplot(data = mtcars, aes(x=mpg, y=cyl)) +  
  geom_point(aes(col=as.factor(cyl), pch=as.factor(cyl))) +  
  labs(x='Miles per gallon', y='Number of cylinders') +  
  guides(col="none", pch="none")
```



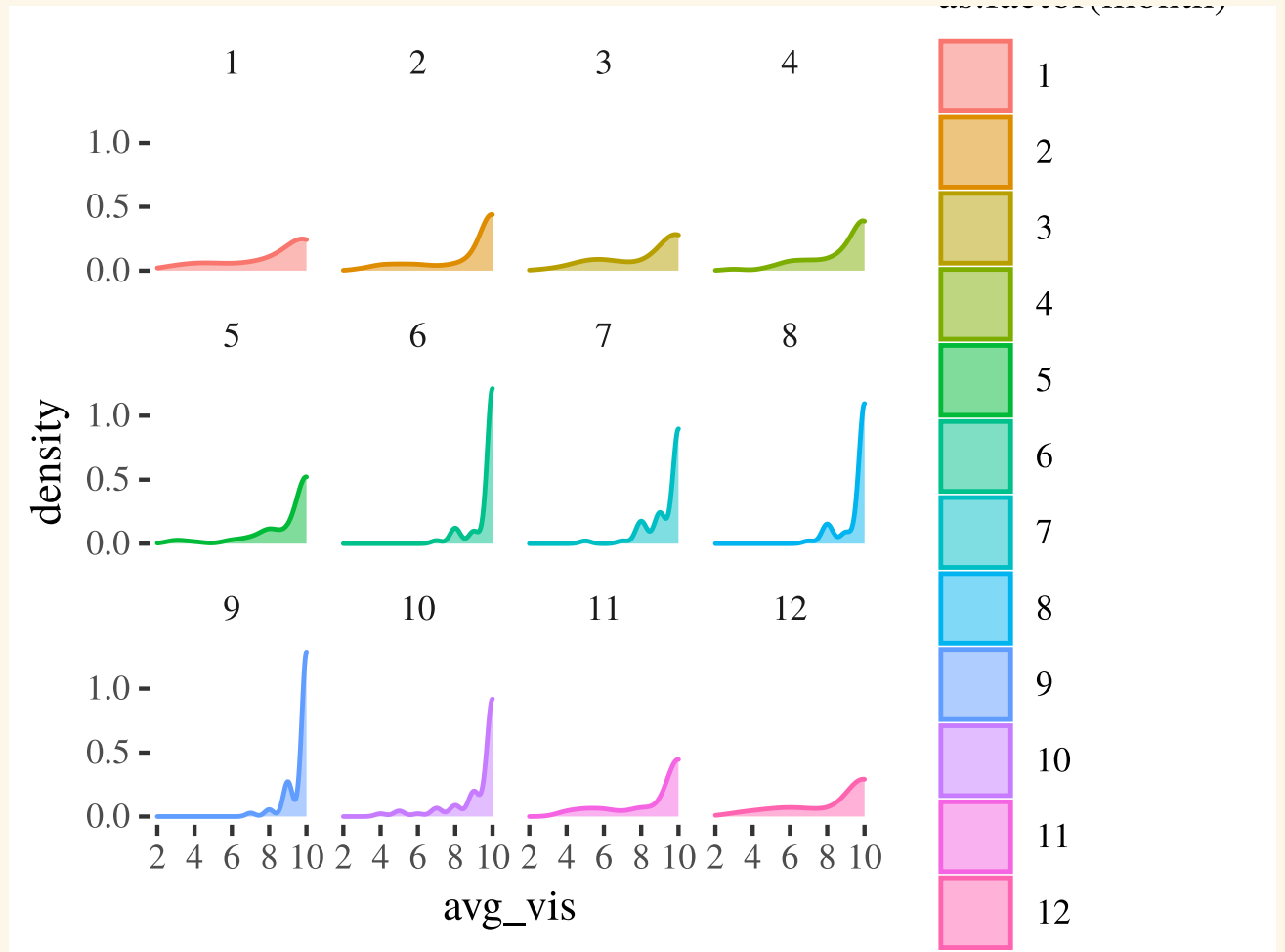
Barplots

```
ggplot(data = mpg) +  
  geom_bar(mapping = aes(x = class, fill = class )) +  
  theme(axis.text.x = element_text(angle = 45,  
                                     vjust = 0.5,  
                                     hjust=1))
```



Weather patterns

```
ggplot(Chicago, aes(x=avg_vis, group=month)) +  
  geom_density(aes(color=as.factor(month), fill=as.factor(month))) +  
  facet_wrap(~month, nrow=3)
```



Group Activity 1

10:00



- Let's go over to maize server/ local Rstudio and our class [moodle](#)
- Get the class activity 4 file
- Please work on the problems
- Ask me questions
- Any other hw questions?