Visualization - Aesthetic Mapping

A visualization:

- is a geometry object (a geom)
- whose aesthetics
- represents variables
- from a data set

Aesthetics mean

- “something you can see”.

Examples include:

- position (i.e., on the x and y axes)
- color (“outside” color)
- fill (“inside” color)
- shape (of points)
- size

Aesthetics Mapping

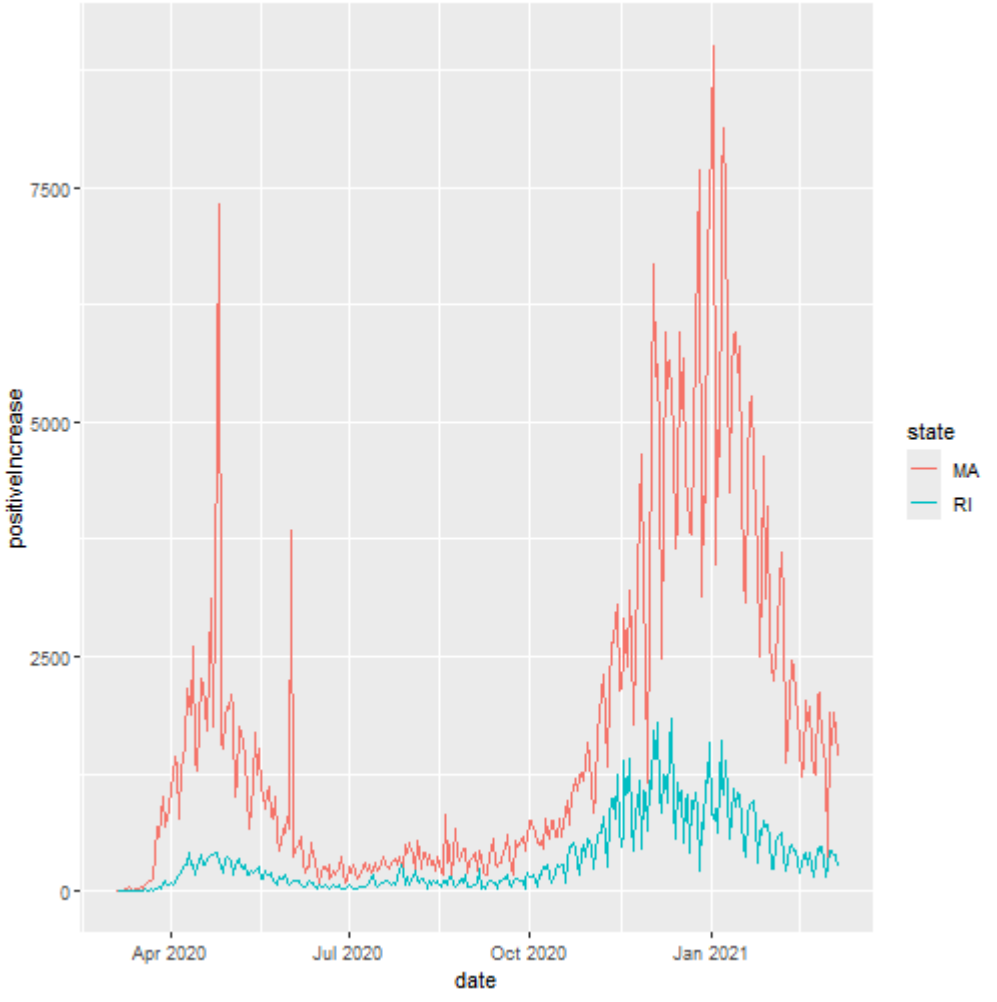
- map
- variables
- to aesthetics

Examples

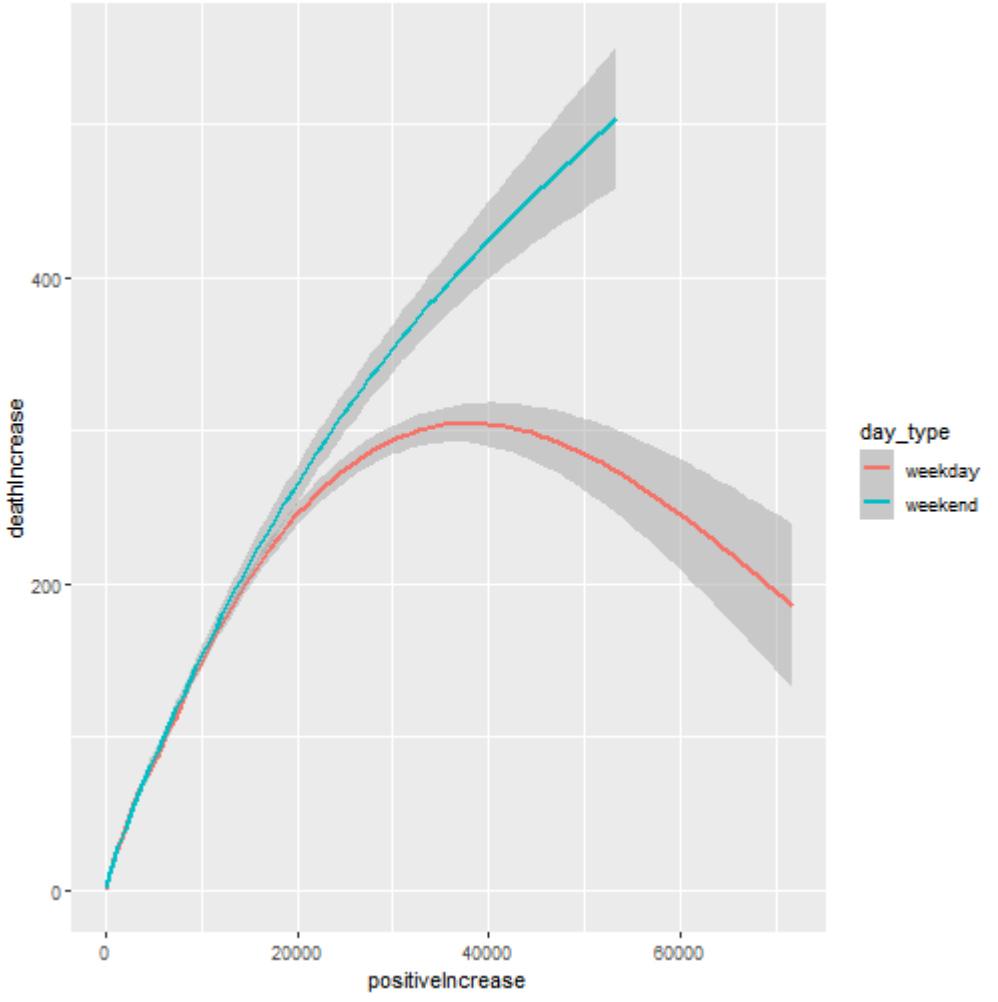
```r
library(tidyverse)
library(knitr)    # For knitting document and include_graphics funct
df <- read_csv('https://bryantstats.github.io/math421/data/all-states
library(lubridate)

df <- df %>%
    filter(positiveIncrease>0) %>%
    mutate(year = year(date),
           quarters = quarters(date),
           month = month(date),
           day = wday(date),
           day_type = case_when(day < 6 ~ 'weekday',
                                TRUE~'weekend'))
```

```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date,
                           y = positiveIncrease,
                           color = state))
```

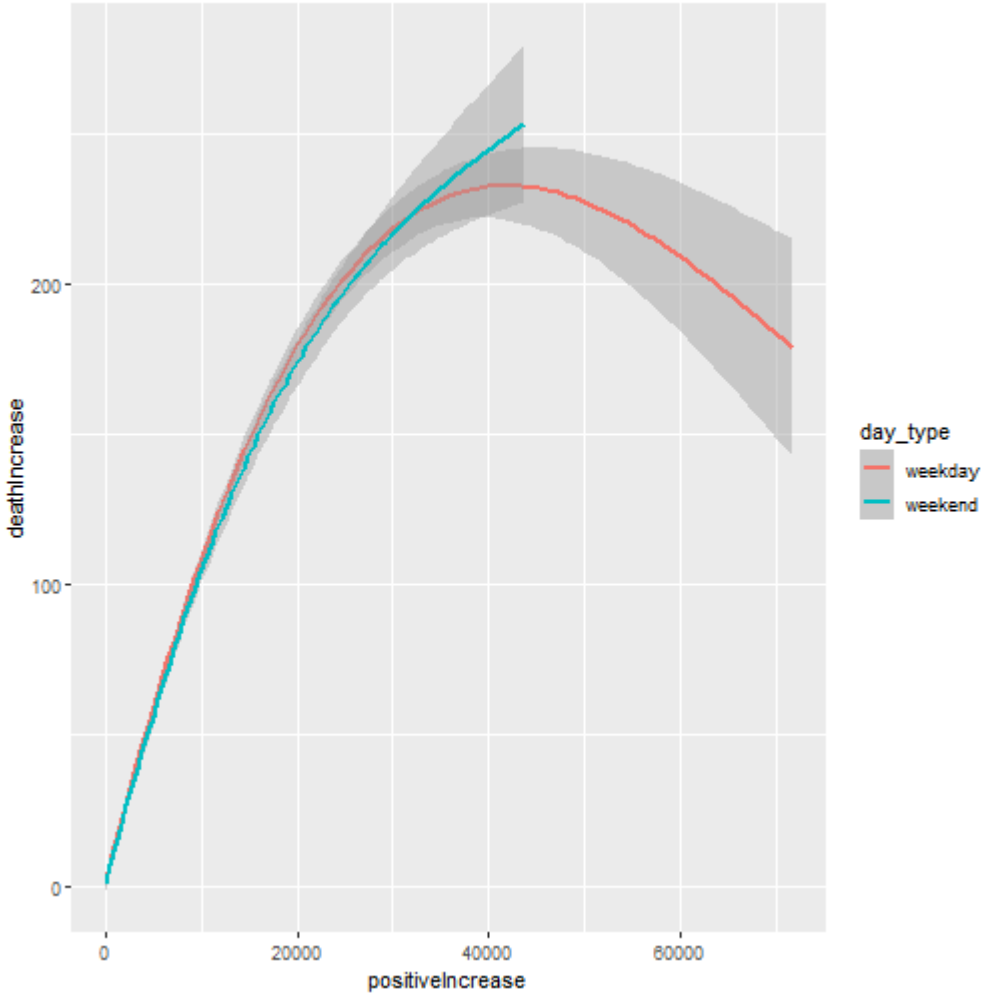
```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_line(mapping = aes(x = date,
                          y = positiveIncrease,
                          color = state))
```



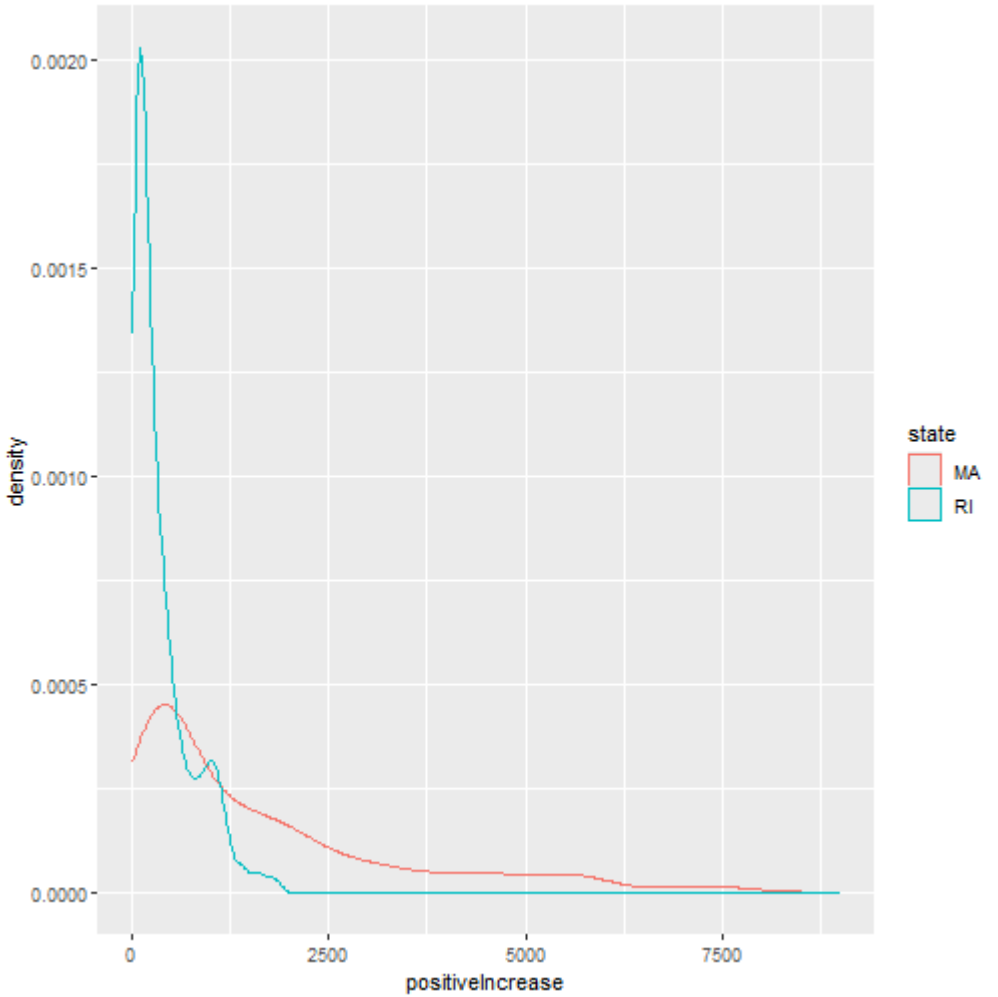
```
df %>% ggplot()+
  geom_smooth(mapping = aes(x = positiveIncrease,
                            y = deathIncrease,
                            color = day_type))
```



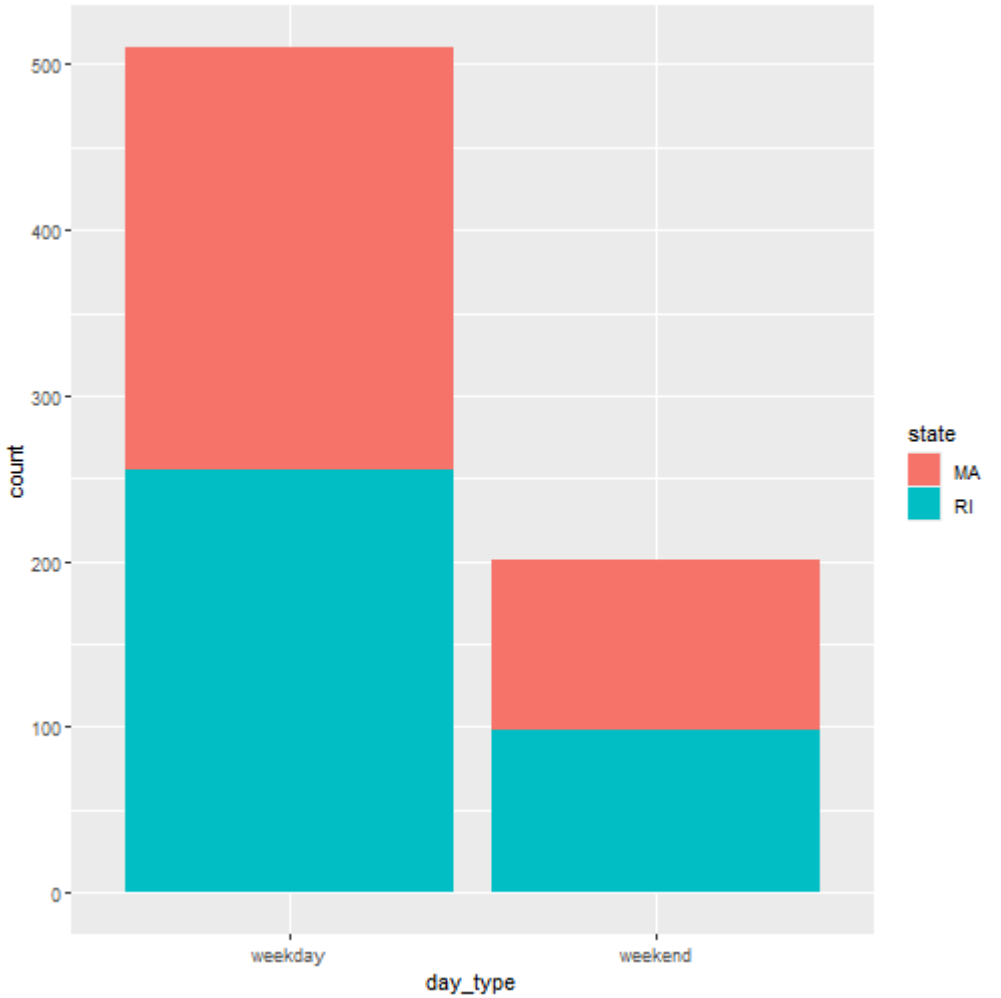
```
df %>% filter(month >8, year==2020) %>% ggplot()+
  geom_smooth(mapping = aes(x = positiveIncrease,
                            y = deathIncrease,
                            color = day_type))
```



```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_density(mapping = aes(x = positiveIncrease,
                             color = state))
```



```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_bar(mapping = aes(x = day_type,
                         fill = state))
```



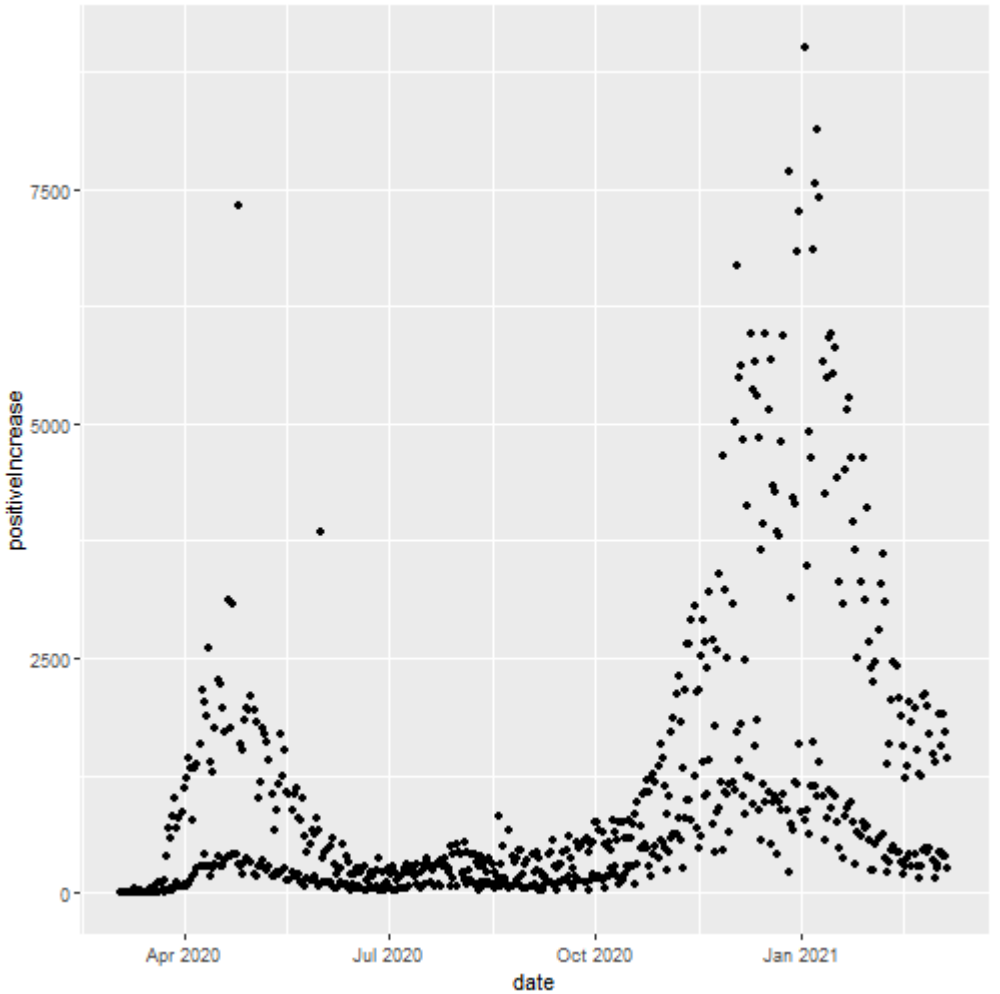
Aesthetic of a geom

- A geom has its list of own aesthetics
- Use `?geom_point()` to check for the list of `geom_point`
- Some aesthetics are required, some are not

Required Aesthetics

```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date,
                           y = positiveIncrease,
                           color = state))
```

```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date, y = positiveIncrease))
```



```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date))
```

- Will produce an error since `y` aesthetic is required for `geom_point`.

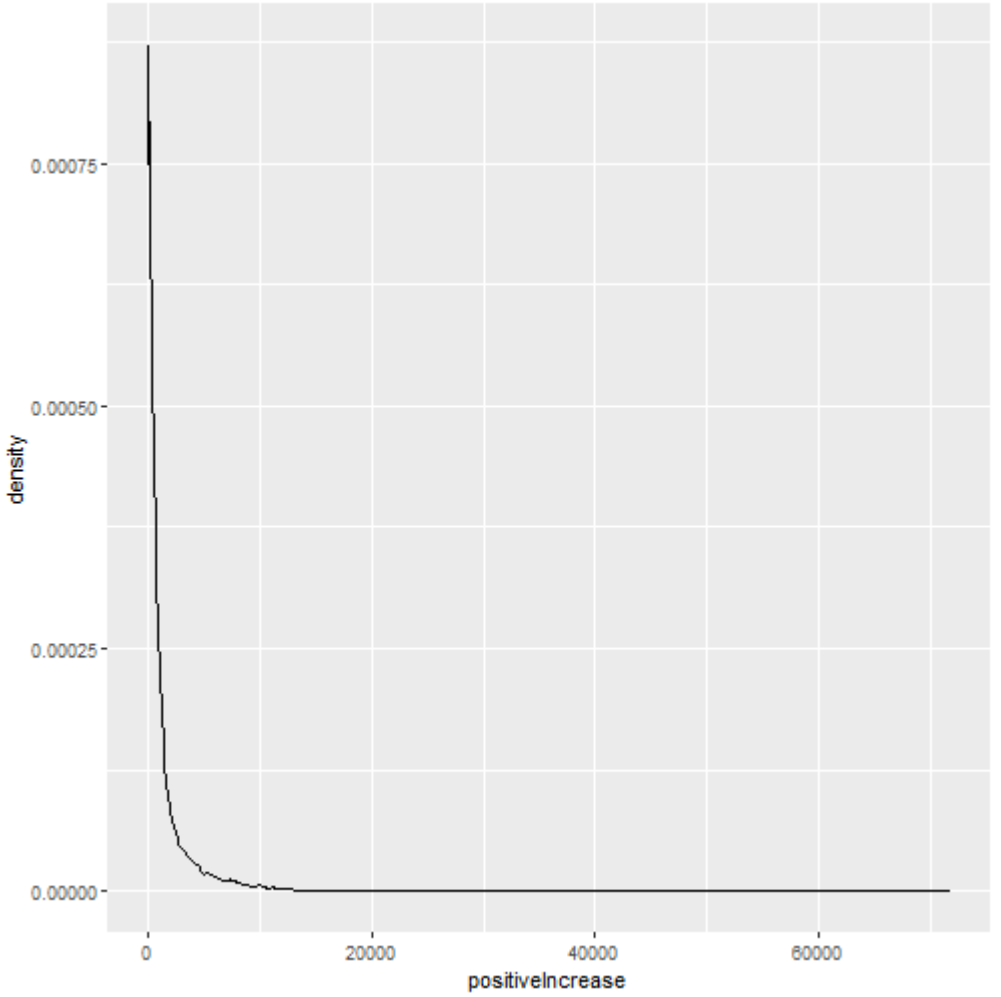
Common Visualization Practices

One Continuous Variable

- Density: `geom_density`
- Histogram: `geom_histogram`
- Boxplot: `geom_boxplot`

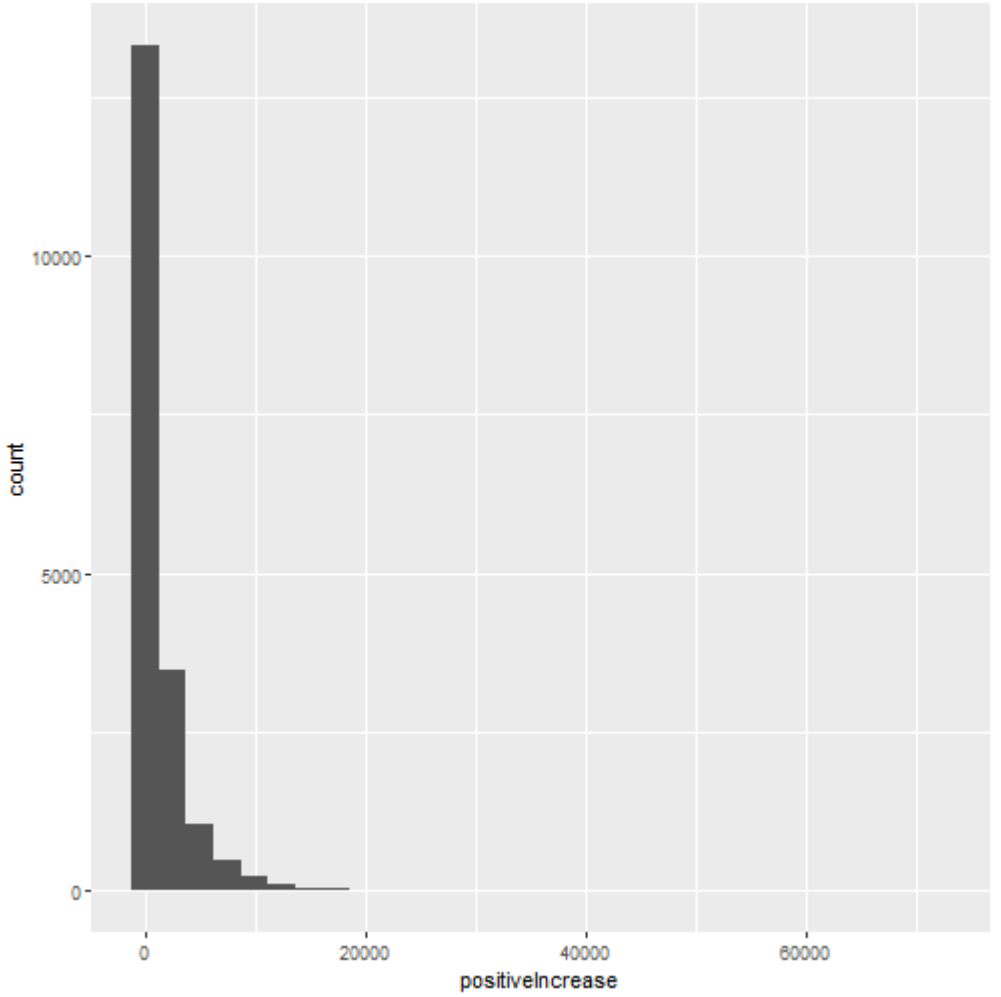
One Continuous Variable: Density

```
df %>% ggplot()+
  geom_density(mapping = aes(x = positiveIncrease))
```



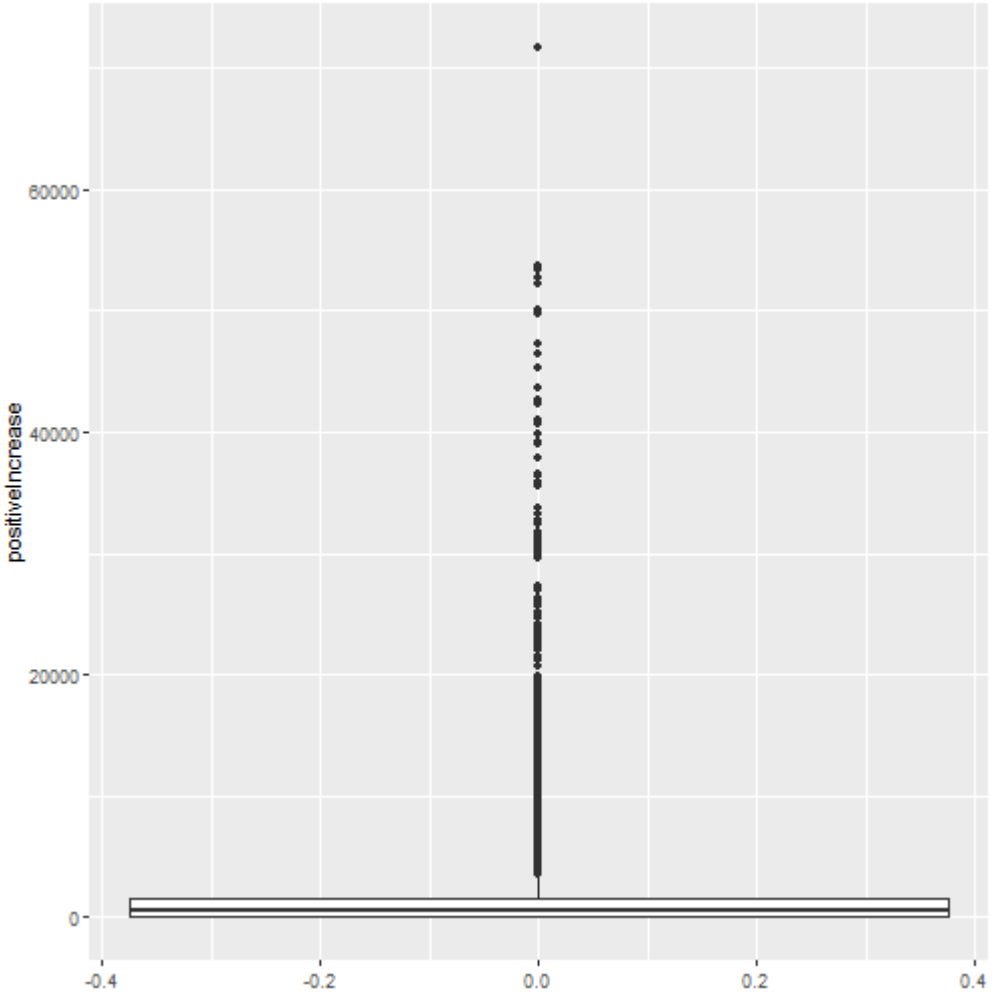
One Continuous Variable: Histogram

```
df %>% ggplot()+
  geom_histogram(mapping = aes(x = positiveIncrease))
```



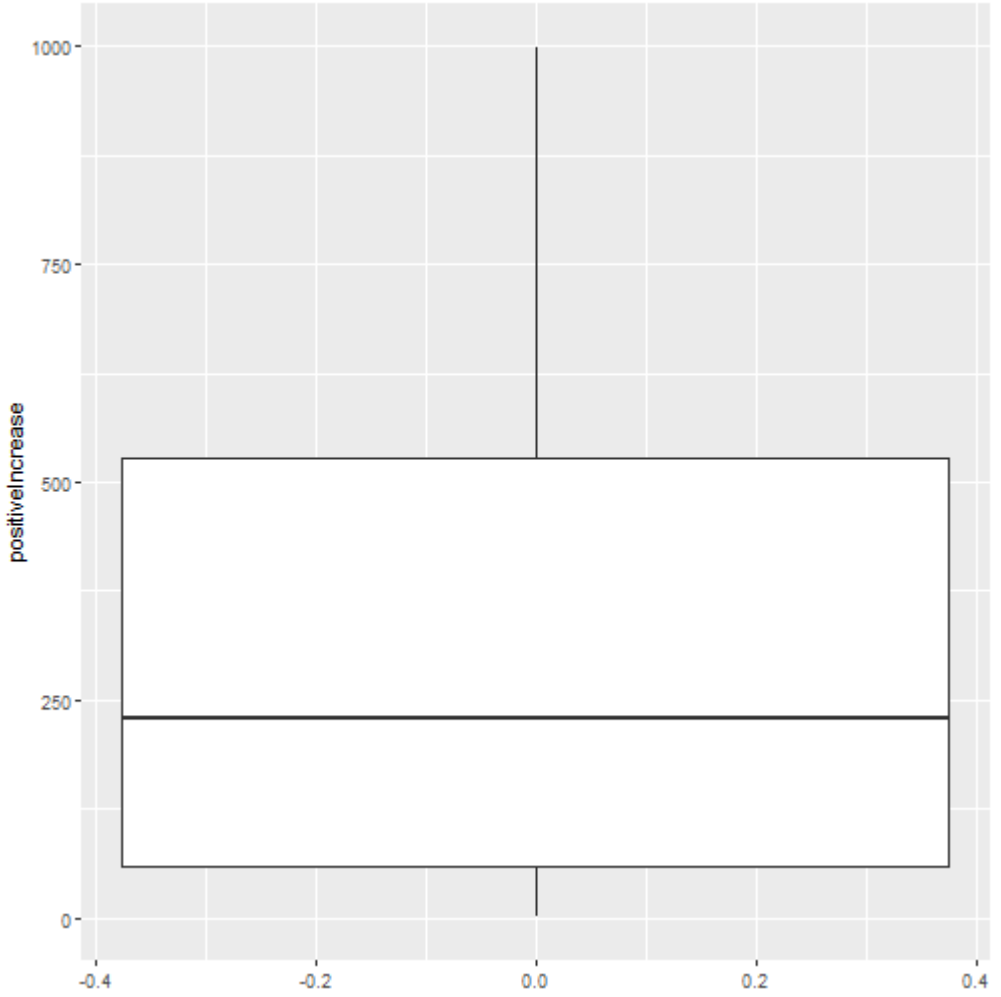
One Continuous Variable: Boxplot

```
df %>% ggplot()+
  geom_boxplot(mapping = aes(y = positiveIncrease))
```



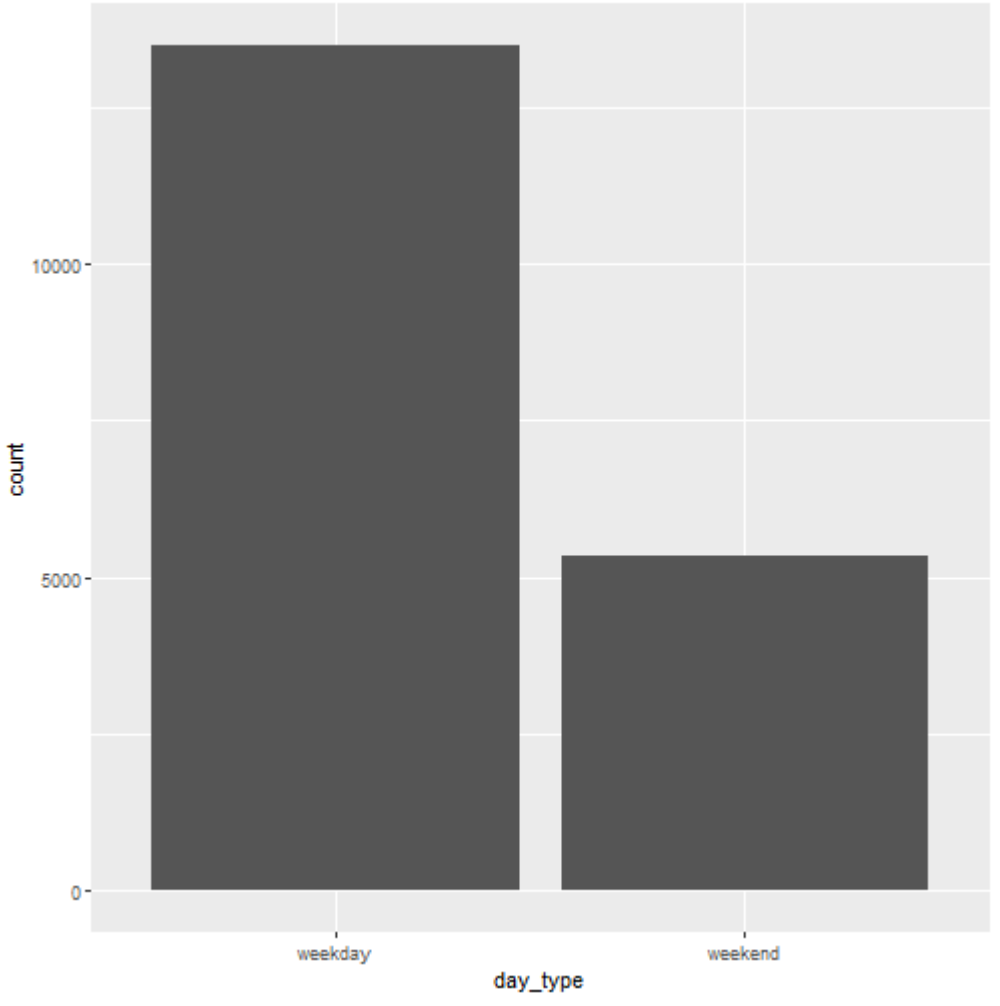
One Continuous Variable: Boxplot

```
df %>% filter(positiveIncrease<1000) %>% ggplot()+
  geom_boxplot(mapping = aes(y = positiveIncrease))
```



One Categorical Variable: Bar chart

```
df %>% ggplot()+
  geom_bar(mapping = aes(x = day_type))
```



Two Continuous Variables

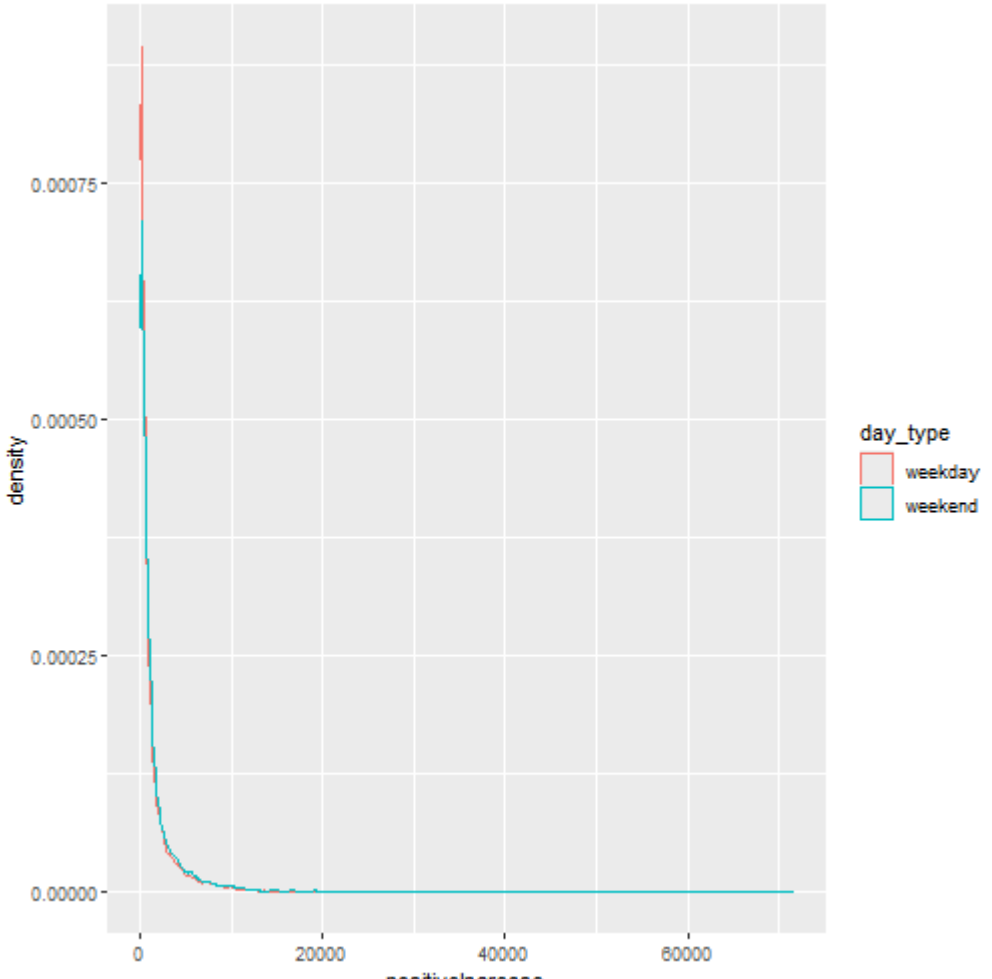
- Scatter Plot: `geom_point`
- Line Plot: `geom_line`
- Smooth Plot: `geom_smooth`

One Continuous Variable + One Categorical Variable

- Density
- BoxPlot

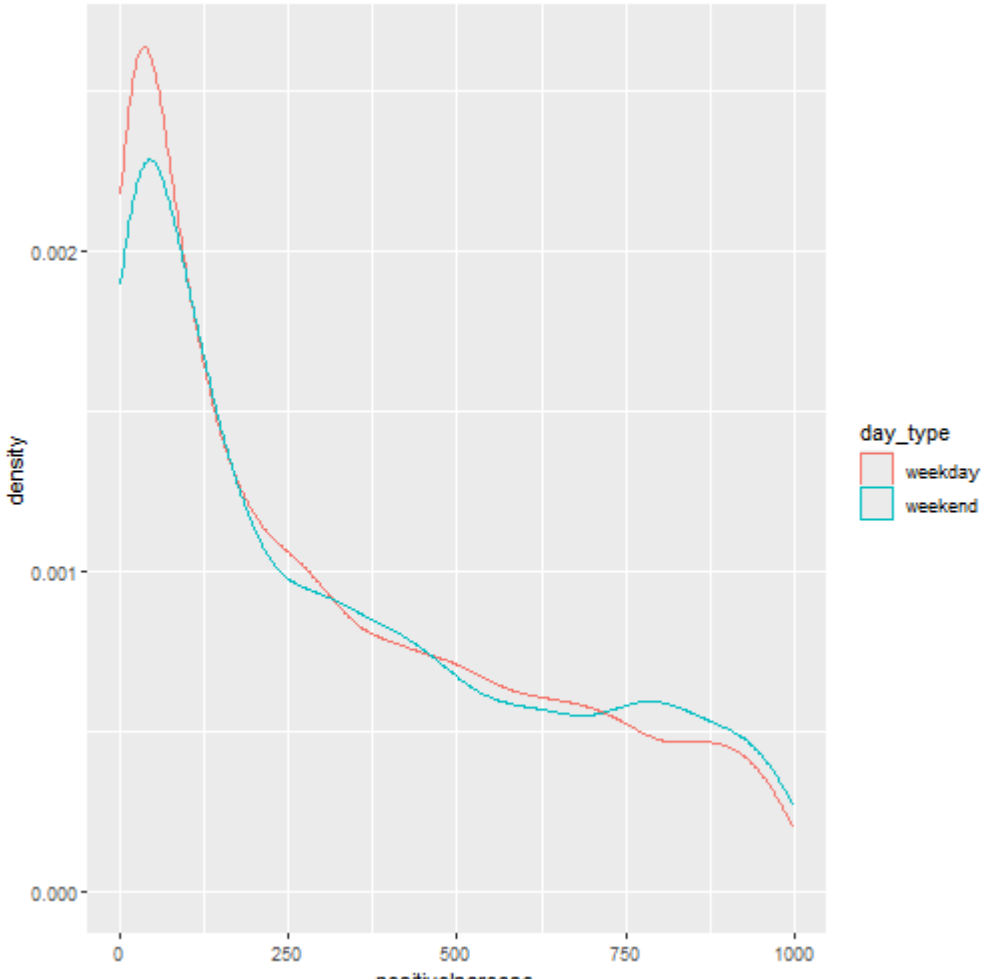
One Continuous + One Categorical: Density

```
df %>% ggplot()+
  geom_density(mapping = aes(x = positiveIncrease, color = day_type))
```



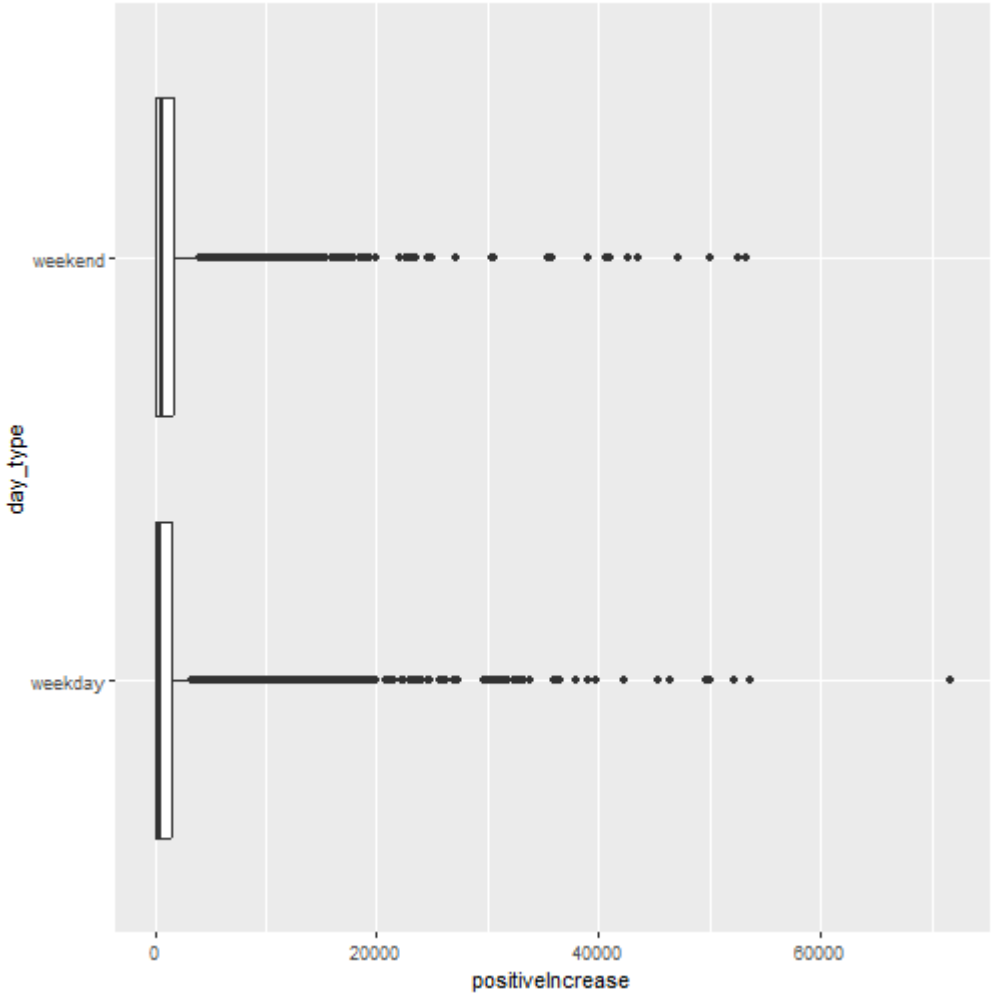
One Continuous + One Categorical: Density

```
df %>% filter(positiveIncrease<1000) %>% ggplot()+
  geom_density(mapping = aes(x = positiveIncrease, color = day_type))
```



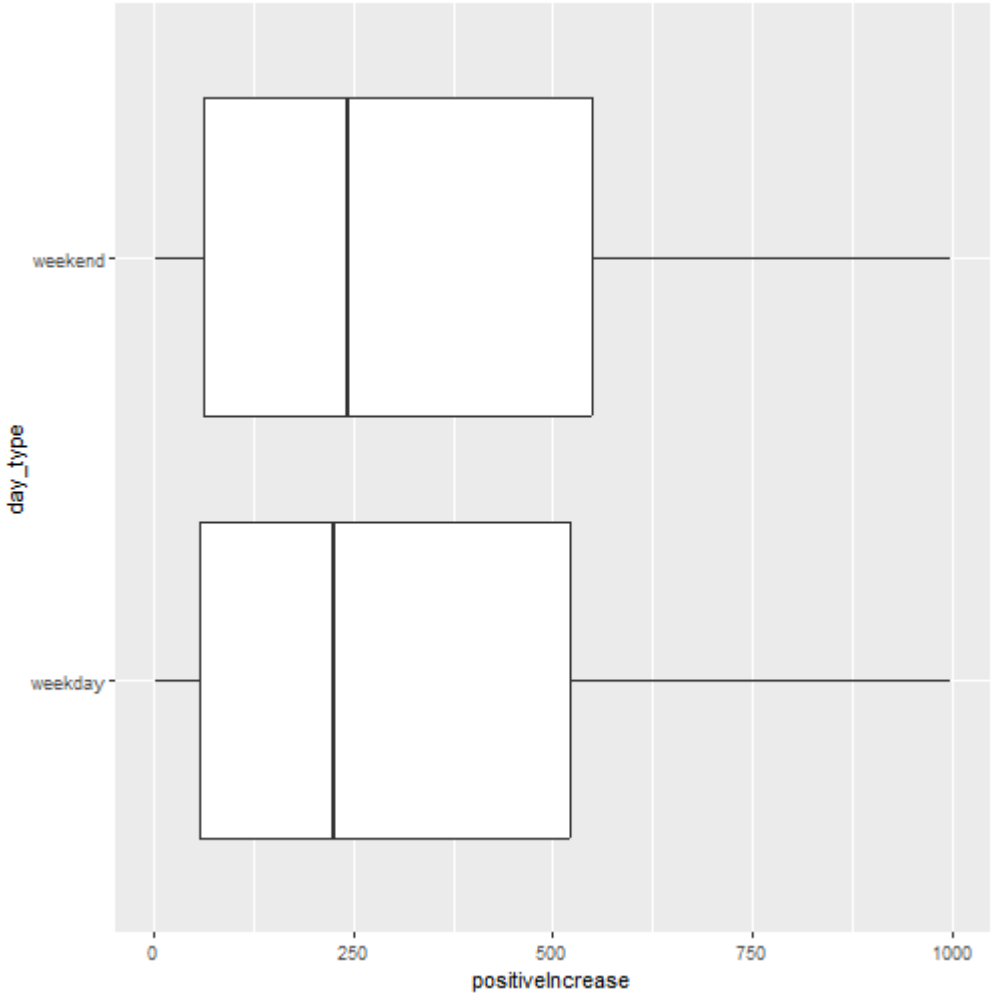
One Continuous + One Categorical: Boxplot

```
df %>% ggplot()+
  geom_boxplot(mapping = aes(x = positiveIncrease, y = day_type))
```



One Continuous + One Categorical: Boxplot

```
df %>% filter(positiveIncrease<1000) %>% ggplot()+
  geom_boxplot(mapping = aes(x = positiveIncrease, y = day_type))
```

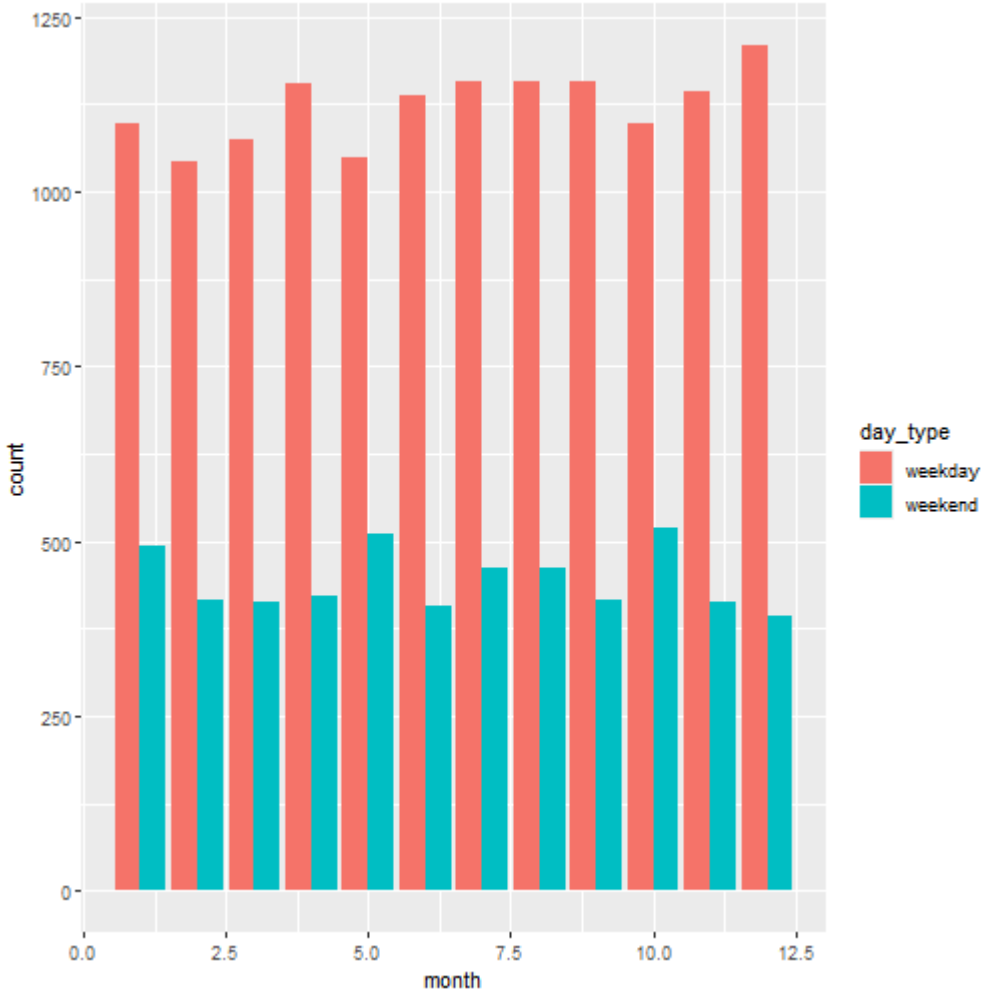


One Categorical Variable + One Categorical Variable

- Barplot

One Categorical + One Categorical: Barplot

```
df %>% ggplot()+
  geom_bar(mapping=aes(x=month, fill=day_type), position='dodge')
```



More

- ggplot cheat sheet, or backup