Flexible, Beautiful, Customizable Graphs

Understanding ggplot2’s Grammar

Kyle Nickodem
Monday, February 2nd, 2015
Take Home Points

1. Become aware of the various components that comprise a graph
2. Understand how ggplot2 uses these components to construct a plot
What is this graphic trying to tell us?
The Grammar of Graphics

Why is it necessary to understand the grammar?

1. ggplot2 operates using this grammar

2. It provides us with a process to think about the structure that underlies statistical graphics
- Data and aesthetic mapping
- Geometric objects
- Scales and coordinate system
- Plot annotations and themes
Flexible, Beautiful, Customizable Graphs

---

**Title**

- **A**
- **C**

---
How does this work in ggplot2?

```r
library(ggplot2)
head(diamonds)
```

```
##  carat cut  color    clarity  depth table price    x    y    z
##1  0.23  Ideal     E     SI2    61.5   55   326 3.95 3.98 2.43
##2  0.21  Premium   E     SI1    59.8   61   326 3.89 3.84 2.31
##3  0.23     Good     E     VS1    56.9   65   327 4.05 4.07 2.31
##4  0.29  Premium     I     VS2    62.4   58   334 4.20 4.23 2.63
##5  0.31     Good     J     SI2    63.3   58   335 4.34 4.35 2.75
##6  0.24 Very Good     J     VVS2    62.8   57   336 3.94 3.96 2.48
```
```
ggplot(data=diamonds, aes(x = x, y = carat)) +
geom_point()
```
ggplot(data=diamonds, aes(x = x, y = carat)) +
 geom_point()

ggplot() +
 layer(data = diamonds, mapping = aes(x = x, y = carat),
      geom = "point", stat = "identity", pos = "identity")
 scale_x_continuous() +
 scale_y_continuous() +
 coord_cartesian() +
 theme()

ggplot(diamonds, aes(x,carat)) +
 geom_point()
Quiz Time

What will this plot look like?

```r
ggplot(data = economics, aes(x = date, y = pop)) + geom_line()
```
ggplot(data = economics, aes(x = date, y = pop)) +
gem_line()
Question #2

ggplot(data = diamonds, aes(x = price)) +
geom_histogram()
ggplot(data = diamonds, aes(x = price)) + geom_histogram()
Add multiple geometric objects

```r
ggplot(data = diamonds, aes(x = price)) + geom_histogram(aes(y = ..density..)) + geom_density(color = "red")
```
Frequency of diamond clarity by cut?

ggplot(data=diamonds, aes(x = clarity, fill = cut)) + geom_bar()
Change color scheme

library(RColorBrewer)

ggplot(data=diamonds, aes(x = clarity, fill = cut)) +
  geom_bar() + scale_fill_brewer()
Flip the coordinate grid

```
ggplot(data=diamonds, aes(x = clarity, fill = cut)) + geom_bar() + scale_fill_brewer() + coord_flip()
```
**Dodged bar chart**

```r
ggplot(data=diamonds, aes(x = clarity, fill = cut)) +
geom_bar(position = "dodge") + scale_fill_brewer()
```
Facet

ggplot(data=diamonds, aes(x = clarity, fill = cut)) + geom_bar() + scale_fill_brewer() + facet_wrap(~cut)
Alter the theme

```r
ggplot(data=diamonds, aes(x = clarity, fill = cut)) + geom_bar() + scale_fill_brewer() + facet_wrap(~cut) + theme_bw()
```
Resources

- Hadley's ggplot2 documentation - docs.ggplot2.org
- ZevRoss ggplot2 cheatsheet
- R Graphics Cookbook
- R Color Brewer
Hadley's favorite pie chart

```r
ggplot(df, aes(x = "", y = value, fill = variable)) + geom_bar(width stat = "identity") + scale_fill_manual(values = c("red", "yellow")) + coord_polar("y", start = pi / 3) + labs(title = "Pac man")
```