Jazzing up your plots

Presented by Emi Tanaka
Department of Econometrics and Business Statistics

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Publication-ready plots
• **Modifiable**: ggplot object can be modified

• **Generalisable**: ggplot2 uses a cohesive and complex system under the hood to make many kinds of plots

• **Extensible**: the system can be extended to make specialised plots or add more features if the same "grammar" is adopted
The `mtcars` is from the datasets 📦 (loaded by default)

```r
cars_df <- mtcars %>% rownames_to_column("car")
glimpse(mtcars_df)
```
```
## Rows: 32
## Columns: 12
## $ car  <chr> "Mazda RX4", "Mazda RX4 Wag", "Datsun 710", "Hornet 4 Drive", "Ho...
## $ mpg  <dbl> 21.0, 21.0, 22.8, 21.4, 18.7, 18.1, 14.3, 24.4, 22.8, 19.2, 17.8, ...
## $ cyl  <dbl> 6, 6, 4, 6, 8, 6, 8, 6, 8, 8, 8, 8, 4, 4, 4, 8, 8, 8, 4, 4, 4, 8, 8, 8, ...
## $ disp <dbl> 160.0, 160.0, 108.0, 258.0, 360.0, 225.0, 360.0, 146.7, 140.8, 16...
## $ hp   <dbl> 110, 110, 93, 110, 175, 105, 245, 62, 95, 123, 123, 180, 180, 180, 180, ...
## $ drat <dbl> 3.90, 3.90, 3.85, 3.08, 3.15, 2.76, 3.21, 3.69, 3.92, 3.92, 3.92, ...
## $ wt   <dbl> 2.620, 2.875, 2.320, 3.215, 3.440, 2.25, 3.460, 3.570, 3.190, 3.150, ...
## $ qsec <dbl> 16.46, 17.02, 18.61, 19.44, 17.02, 20.22, 15.84, 20.00, 22.90, 18...
## $ vs   <dbl> 0, 0, 1, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 1, 1, 1, 0, ...
## $ am   <dbl> 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...
## $ gear <dbl> 4, 4, 4, 3, 3, 3, 3, 4, 4, 4, 4, 3, 3, 3, 3, 3, 3, 4, 4, 4, 3, 3, ...
## $ carb <dbl> 4, 4, 1, 1, 2, 1, 4, 2, 2, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 1, 2, 1 ...
```
There are many extension packages!

Themes
theme: modify the look of texts

```
extension

\texttt{element_text()}
```
ggplot(diamonds, aes(carat, price)) +
  geom_hex() +
  labs(title = "Diamond") +
  theme(axis.title.x = element_text(size = 30,
    color = "red",
    face = "bold",
    angle = 10,
    family = "Fira Code"),
    legend.title = element_text(size = 25,
      color = "#ef42eb",
      margin = margin(b = 5)),
    plot.title = element_text(size = 35,
      face = "bold",
      family = "Nunito",
      color = "blue"))
theme: modify the look of the lines

element_line()
ggplot(penguins, aes(bill_length_mm, bill_depth_mm)) +
  geom_point() +
  theme(axis.line.y = element_line(color = "black",
    size = 1.2,
    arrow = grid::arrow()),
  axis.line.x = element_line(linetype = "dashed",
    color = "brown",
    size = 1.2),
  axis.ticks = element_line(color = "red", size = 1.1),
  axis.ticks.length = unit(3, "mm"),
  panel.grid.major = element_line(color = "blue",
    size = 1.2),
  panel.grid.minor = element_line(color = "#0080ff",
    size = 1.2,
    linetype = "dotted"))
theme: modify the look of the rectangular regions

element_rect()
```r
ggplot(penguins, aes(bill_length_mm, bill_depth_mm)) +
geom_point(aes(color = species)) +
theme(
  legend.background = element_rect(fill = "#fff6c2",
                                     color = "black",
                                     linetype = "dashed"),
  legend.key = element_rect(fill = "grey", color = "brown"),
  panel.background = element_rect(fill = "#005F59",
                                   color = "red", size = 3),
  panel.border = element_rect(color = "black",
                              fill = "transparent",
                              linetype = "dashed", size = 3),
  plot.background = element_rect(fill = "#a1dce9",
                                 color = "black",
                                 size = 1.3),
  legend.position = "bottom")
```
ggplot(mtcars_df,
    aes(wt, mpg, shape = factor(vs), color = hp)) +
geom_point(size = 3) +
scale_color_continuous_sequential(palette = "Dark Mint") +
scale_shape_discrete(labels = c("V-shaped", "Straight")) +
labs(x = "Weight (1000 lbs)", y = "Miles per gallon",
    title = "Motor Trend Car Road Tests",
    shape = "Engine", color = "Horsepower") +
theme(text = element_text(size = 18, color = "white"),
    rect = element_rect(fill = "black"),
    panel.background = element_rect(fill = "black"),
    legend.key = element_rect(fill = "black"),
    axis.text = element_text(color = "white"),
    plot.title.position = "plot",
    plot.margin = margin(10, 10, 10, 10)) +
guides(shape =
    guide_legend(override.aes = list(color = "white")))
There are many existing themes (you can also make your own)

```r
g <- ggplot(mtcars_df, aes(wt, mpg)) + geom_point(size = 3) + labs(x = "Weight (1000 lbs)", y = "Miles per gallon")
g + theme_bw()
g + theme_classic()
g + theme_dark()
```
library(patchwork)

g1 <- ggplot(penguins, aes(bill_length_mm, body_mass_g, color = species)) +
  geom_point() + theme_bw(base_size = 18) +
  labs(tag = "(A)", x = "Bill length (mm)", y = "Body mass (g)", color = "Species")

g2 <- ggplot(penguins, aes(bill_length_mm, fill = species)) +
  geom_density() + theme_bw(base_size = 18) +
  labs(tag = "(B)", x = "Bill length (mm)", y = "Density", fill = "Species")

library(patchwork)
g1 + g2
devtools::session_info()

```r
## Session info ──────────────────────────────────────────────────
## hash: map of Japan, speaker medium volume, winking face with tongue
##
## setting  value
## version  R version 4.1.2 (2021-11-01)
## os       macOS Big Sur 10.16
## system   x86_64, darwin17.0
## ui       X11
## language (EN)
## collate  en_AU.UTF-8
## ctype    en_AU.UTF-8
## tz       Australia/Melbourne
## date     2021-11-30
## pandoc 2.11.4-2 /Applications/RStudio.app/Contents/MacOS/pandoc/ (via rmarkdown)
```