L07 Scales, Axes & Legends

Data Visualization (STAT 302)

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Contents


```
library(knitr)
opts_chunk$set(warning = FALSE, message = FALSE, comment = FALSE, dpi = 300)
```

Overview

The goal of this lab is to explore ways to manage and manipulate scales, axes, and legends within `ggplot2`.

Datasets

We'll be using the `tech_stocks.rda`, `corruption.rda`, `cdc.txt`, and a toy dataset.

```
# Load package(s)
library(tidyverse)
library(ggplot2)
library(skimr)
library(scales)
library(lubridate)
library(ggrepel)



# Load datasets
load(file = "data/tech_stocks.rda")
load(file = "data/corruption.rda")



# Read in the cdc dataset
cdc <- read_delim(file = "data/cdc.txt", delim = "|") %>%
  mutate(genhlth = factor(genhlth,
    levels = c("excellent", "very good", "good", "fair", "poor")
  ))

# Set seed
set.seed(7531246)

# Selecting a random subset of size 100
```

```r
cdc_small <- cdc %>% slice_sample(n = 100)

# Generating toy dataset for exercise 2
toy_data <- tibble(
  theta = seq(0, 2 * pi, length.out = 100),
  obs = rnorm(100, sin(theta), 0.1),
  larger_than = ifelse(abs(obs) > abs(sin(theta)), "1", "0")
)
```

Exercises

Complete the following exercises.

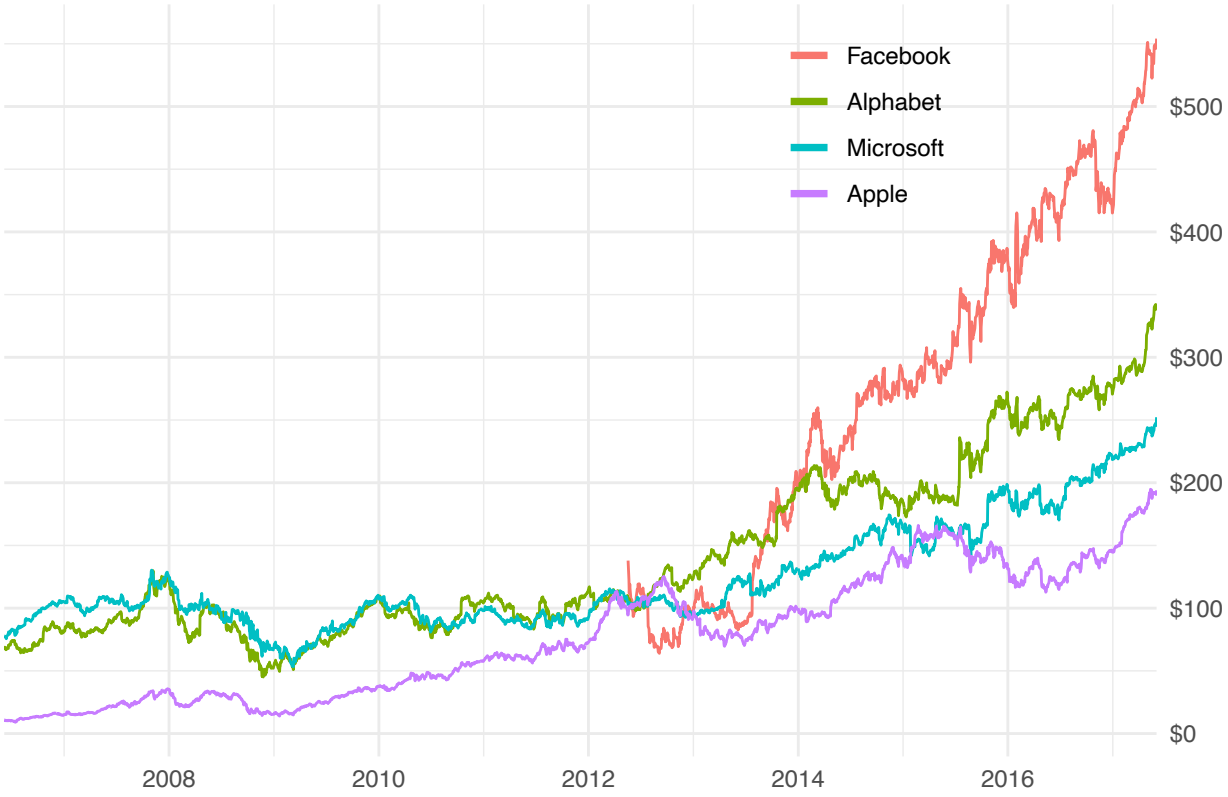
Exercise 1

Using the `tech_stocks` dataset, recreate the following graphic as precisely as possible.

Hints:

- Size of lines in legend is 1.3
- 0.75 and 0.85 will be useful
- Eliminated extra space in horizontal direction
- `key_glyph`

```r
tech_stocks %>%
  ungroup() %>%


ggplot(aes(date, price_indexed
        #order by final values in rainbow order
        , color = fct_reorder2(company, date, price_indexed))) +

  theme_minimal() +
  geom_line() +
  #legend size is 1.3
  guides(color = guide_legend(override.aes = list(size = 1.3))) +
  scale_y_continuous(
      name = NULL, breaks = seq(0, 500, 100), labels = scales::dollar, position = "right") +

  scale_color_discrete(
      name = NULL) +

  theme(legend.position = c(0.75, 0.85)) +
  scale_x_date(
      name = NULL, expand = c(0, 0)) +

  ggtitle("Stock price, indexed")
```



Exercise 2

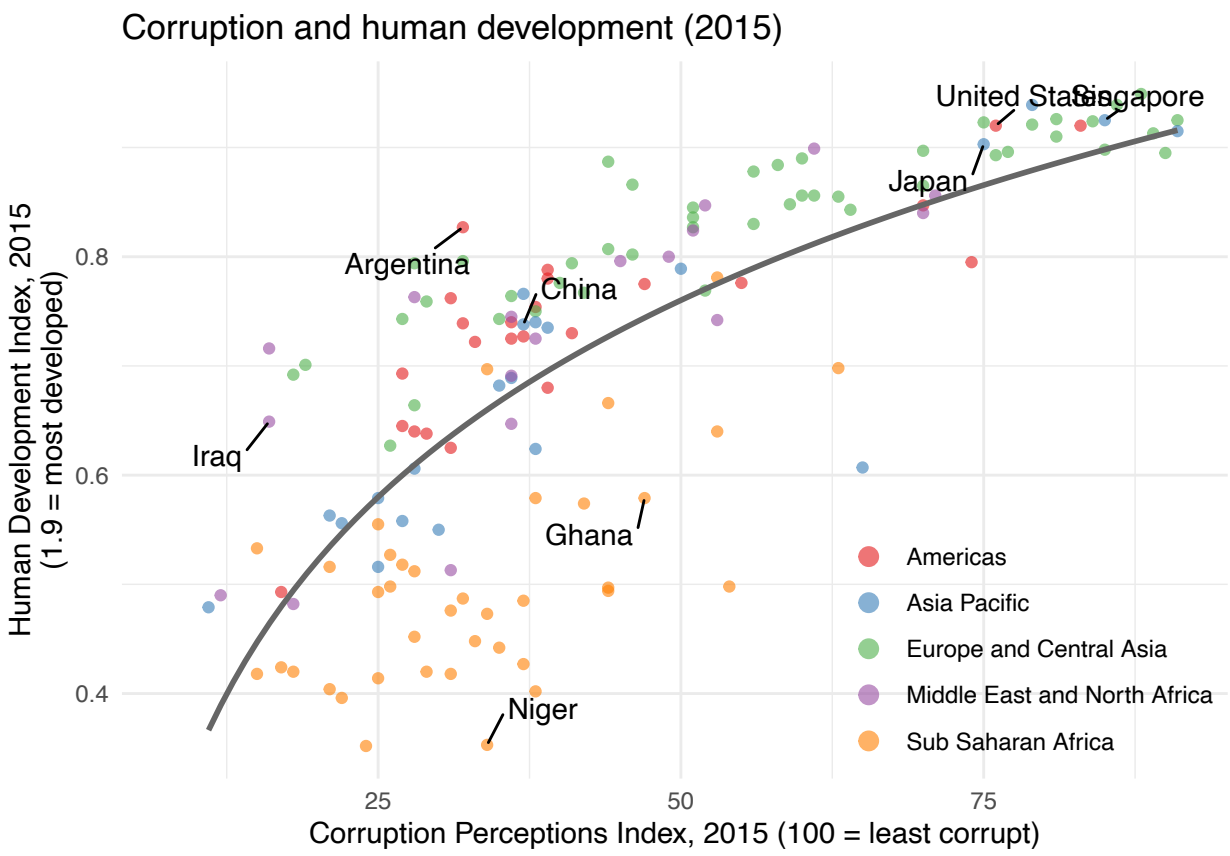
Using `corruption.rda` dataset, recreate the following graphic as precisely as possible.

Hints:

- Transparency is 0.6
- Only use 2015 data
- Point size is 3 in legend
- Color used is `grey40` & color palette `"Set1"`
- `"y ~ log(x)"` (method `"lm"`)
- Package `ggrepel`
- `box.padding` is 0.6
- Minimum segment length is 0
- seed is 9876

```
#isolate 2015 data
corruption_2015 <- corruption %>%
  #remove countries missing cpi or hdi values
  drop_na(cpi, hdi) %>%
  #filter to 2015 data
  filter(year == 2015)


#the contries we want to label
Select_countries <- corruption %>%
  filter(year == 2015) %>%
  filter(country %in% c(
```

```
    "Singapore"
  , "United States"
  , "Japan"
  , "Chlie"
  , "Ghana"
  , "Argentina"
  , "China"
  , "Iraq"
  , "Niger"))


corruption %>%
  filter(year == 2015) %>%
  ggplot(aes(x = cpi, y = hdi)) +
  geom_point(aes(color = region), alpha = .6) +
  geom_smooth(formula = y ~ log(x), method = 'lm', se = F, color = 'grey40') +
  #labels
  labs(x = 'Corruption Perceptions Index, 2015 (100 = least corrupt)',
       y = 'Human Development Index, 2015\n(1.9 = most developed)',
       title = 'Corruption and human development (2015)') +
  theme_minimal() +
  scale_color_brewer(palette = 'Set1') +
  geom_text_repel(data = Select_countries,
                  aes(label = country),
                  box.padding = 0.6,
                  min.segment.length = 0,
                  seed = 9876) +
  theme(legend.position = c(1, 0),
        legend.justification = c("right", "bottom"),
        legend.title = element_blank()) +
  guides(color = guide_legend(override.aes = list(size = 3)))
```



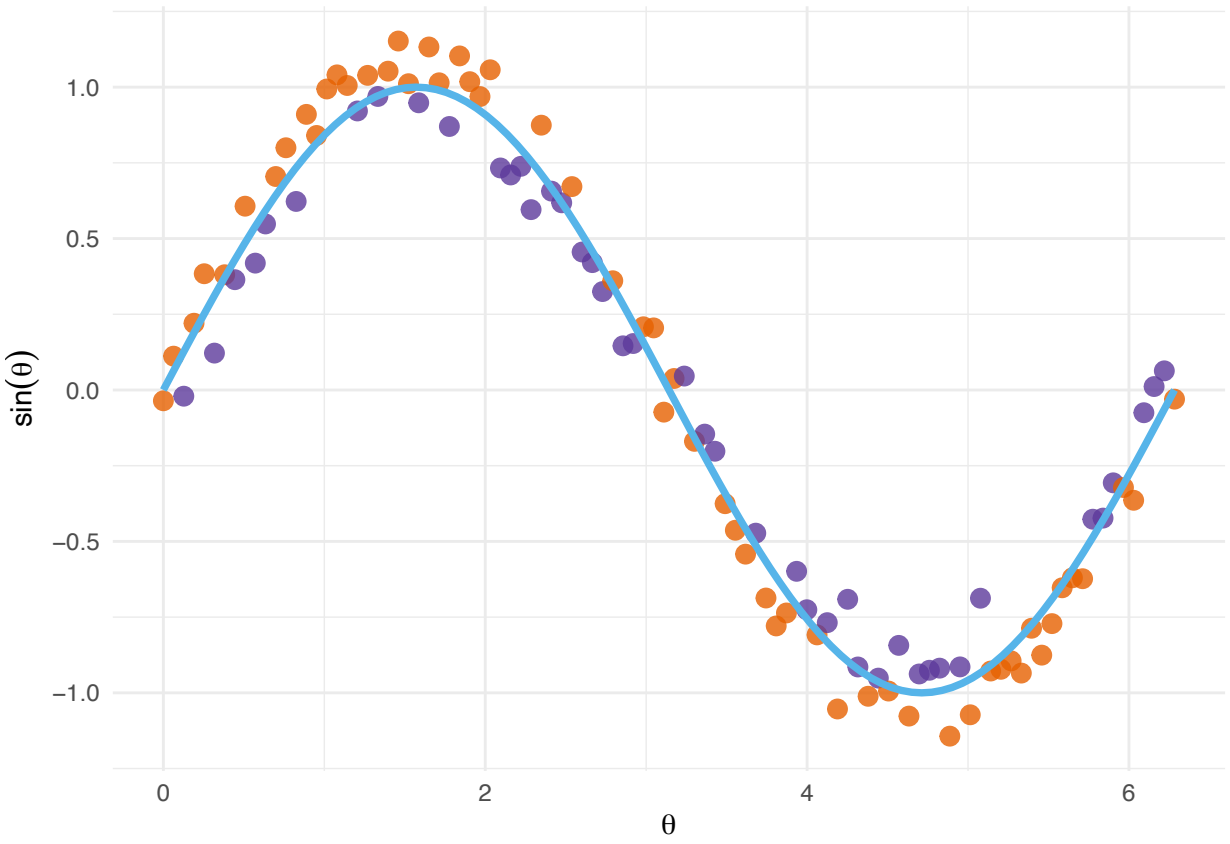
Exercise 3

Use `toy_data` to recreate the following graphic as precisely as possible.

Hints:

- Sizes used 3 (points) and 1.3 (line)
- Transparency 0.8
- Colors: `#56B4E9`, `#E66100`, `#5D3A9B`
- `stat_function()` will be useful

```
toy_data %>%
  ggplot(aes(x = theta, y = obs, color = larger_than)) +
  geom_point(size = 3, alpha = 0.8) + #given size and transparency
  geom_function(fun = function(x) sin(x), color = '#56B4E9', size = 1.3) +
  labs(x = quote(theta), y = quote(sin(theta))) + #label axes

  theme_minimal() +
  theme(legend.position = 'none') +
  #set given colors
  scale_color_manual(values = c('0' = '#5D3A9B', '1' = '#E66100'))
```



Exercise 4

Using `cdc_small`construct a scatterplot of `weight` by `height` with the following requirements:

- Size of plotting characters should be 3.
- Color and shape should both identify `genhlth`.
- One legend for both color and shape.
- Legend title should be "General Health?" with a newline starting after general.
- Legend categories should be ordered from excellent (top) to poor (bottom) with each word in category capitalized in the legend.
- Legend should be placed in the lower right-hand corner of the plotting area.
- Color should follow the `"Set1"` palette.
- Shape should have a solid triangle (17) for excellent, solid circle (19) for very good, an `x` (4) for poor, an hollow rotated square with an `x` in it (9) for fair, and a solid square (15) for good.
- `height` values should be limited between 55 and 80.
- `height` axis should display every 5th number between 55 and 80 and be appropriately labeled (i.e. `55 in`, `60 in`, ..., `80 in`). No axis title is necessary.
- `weight` values should be limited between 100 and 300.
- `weight` axis should be on log base 10 scale, but still display weights in pounds starting at 100 and displaying every 25 pounds until 300. Must be appropriately labeled (i.e. `100 lbs`, `125 lbs`, ..., `300 lbs`). No axis title is necessary.
- Graph title should be `CDC BRFSS: Weight by Height`.
- Minimal theme.

```
cdc_small %>%
  ggplot(aes(x = height, y = weight)) + #plot height by weight
  geom_point(aes(color = genhlth, shape = genhlth), size = 3) +
  theme_minimal() +
```

```
scale_shape_manual(values = c(17, 19, 15, 9, 4),
                   labels = c('Excellent', 'Very Good', 'Good', 'Fair', 'Poor'),
                   name = 'General\nHealth?') +

theme(#legend.title = 'General\nHealth?',
  legend.position = c(1, 0),
  legend.justification = c(1, 0)) +

scale_color_brewer(palette = 'Set1',
                   name = 'General\nHealth?',
                   labels = c('Excellent', 'Very Good', 'Good', 'Fair', 'Poor')) +

labs(x = NULL, y = NULL, title = 'CDC BRFSS: Weight by Height') +
scale_y_log10(breaks = c(100, 125, 150, 175, 200, 225, 250, 275, 300),
              limits = c(100, 300),
              labels = c('100 lbs', '125 lbs', '150 lbs', '175 lbs', '200 lbs', '225 lbs', '250 lbs',

scale_x_continuous(breaks = c(55, 60, 65, 70, 75, 80),
                   limits = c(55, 80),
                   labels = c('55 in', '60 in', '65 in', '70 in', '75 in', '80 in'))
```