MSCS 264: Homework #13

Due Tues Nov 20 at 11:59 PM

You should submit a knitted pdf file on Moodle, but be sure to show all of your R code, in addition to your output, plots, and written responses.

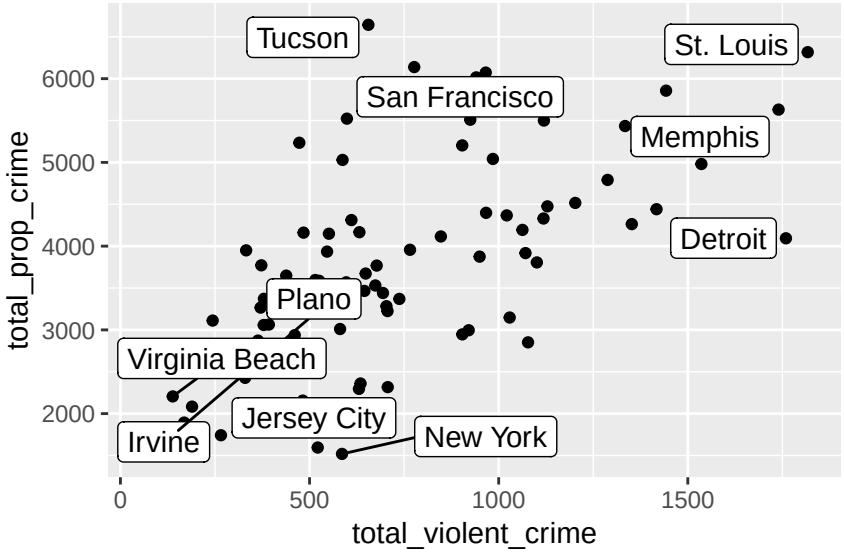
Web scraping

1. Read in the table of data found at https://en.wikipedia.org/wiki/List_of_United_States_cities_by_crime_rate and create a plot showing violent crime rate (total violent crime) vs. property crime rate (total property crime). Identify outlier cities (those with "extreme" values for `VCrate` and/or `PCrate`) by feeding a data set of outliers into `geom_label_repel()`.

```
url <- "http://en.wikipedia.org/wiki/List_of_United_States_cities_by_crime_rate"

data <- read_html(url)
tables <- html_nodes(data, css = "table")
crimes <- html_table(tables, header = TRUE, fill = TRUE)[[2]]

crimes2 <- as.data.frame(crimes)[c(1:13)]

crimes3 <- as.tibble(crimes2)

crimes4 <- crimes3 %>%
  rename(`total_violent_crime` = `Violent Crime`,
         `murder/manslaughter` = `Violent Crime.1`,
         `rape` = `Violent Crime.2`, `robbery` = `Violent Crime.3`,
         `agg_assault` = `Violent Crime.4`, `total_prop_crime` = `Property Crime`,
         `burglary` = `Property Crime.1`, `larceny` = `Property Crime.2`,
         `gta` = `Property Crime.3`)%>%
  slice(2:n())%>%
  mutate(`total_violent_crime` = as.numeric(`total_violent_crime`),
         `murder/manslaughter` = as.numeric(`murder/manslaughter`),
         `rape` = as.numeric(`rape`), `robbery` = as.numeric(`robbery`),
         `agg_assault` = as.numeric(`agg_assault`), `total_prop_crime` = as.numeric(`total_prop_crime`),
         `burglary` = as.numeric(`burglary`), `larceny` = as.numeric(`larceny`),
         `gta` = as.numeric(`gta`), Population = parse_number(Population))

outliers <- crimes4 %>%
  filter(total_prop_crime<1600 | total_prop_crime>6100)
outliers1 <- crimes4 %>%
  filter(total_violent_crime<160| total_violent_crime>1700)
fin_outliers <- full_join(outliers, outliers1)
```

```
## Joining, by = c("State", "City", "Population", "total_violent_crime", "murder/manslaughter", "rape",
```

```
ggplot(crimes4, aes(x = total_violent_crime, y = total_prop_crime))+
  geom_jitter()+
  geom_label_repel(aes(label = City), data = fin_outliers)
```



Hints:

- after reading in the table using `html_table()`, create a data frame with just the columns you want, using a command such as: `crimes3 <- as.data.frame(crimes2)[,c(LIST OF COLUMN NUMBERS)]`. Otherwise, R gets confused since it appears as if several columns all have the same column name.
- then, turn `crimes3` into a tibble with `as.tibble(crimes3)` and do necessary tidying: get rid of unneeded rows, parse columns into proper format, etc.

Answer: I didn't really know what exactly to have as my outliers so I set some maximums and minimums for property crime and violent crime and labelled cities exceeding those limits. Outliers in terms of property crim include: Tuscon, San Francisco, and St Louis, Irvine, New York, and Jersey City. Outliers in terms of violent crime are St Louis, Detroit, and Memphis, Irvine, Virginia Beach, and Plano.

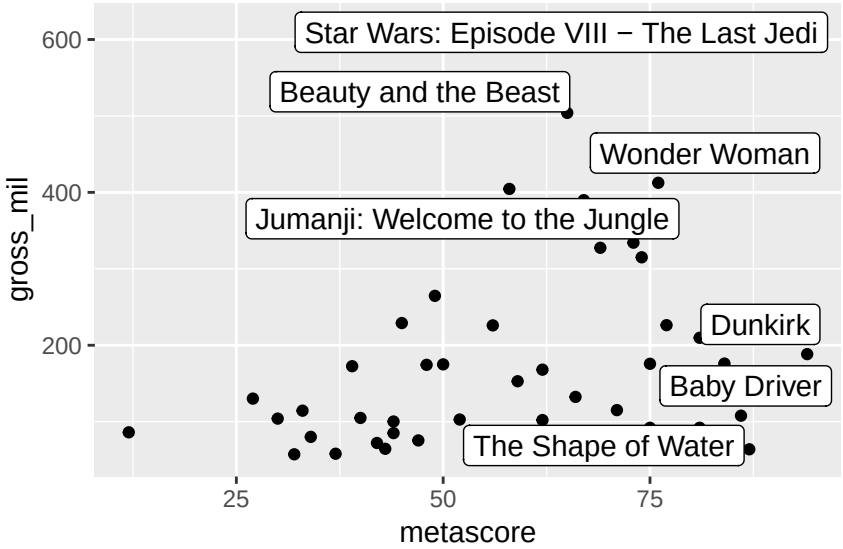
2. As we did in class, use the `rvest` package to pull off data from imdb's top grossing films released in 2017 at https://www.imdb.com/search/title?year=2017&title_type=feature&sort=boxoffice_gross_us,desc. Create a tibble that contains the title, gross, imdbscore, and metascore for the top 50 films. Then generate a scatterplot of one of the ratings vs. gross, labelling outliers as in Question 1 with the title of the movie.

```
url <- "https://www.imdb.com/search/title?year=2017&title_type=feature&sort=boxoffice_gross_us,desc"

movies <- read_html(url)
movies2 <- html_nodes(movies, '.ratings-metascore , strong , .ghost~ .text-muted+ span , .lister-item-h
movies3 <- html_text(movies2)
movies4 <- c()

for(i in 7:206) {
  movies4[i-6] <- movies3[i]
}

movie_table4 <- tibble(title = character(), gross = double(), imdb_score = double(), metascore = double

for(i in 1:49) {
  movie_table4[i,1] <- movies4[4*i-3]
  movie_table4[i,3] <- movies4[4*i-2]
  movie_table4[i,4] <- movies4[4*i-1]
  movie_table4[i,2] <- movies4[4*i]
}
```

```
movie_table4 <- movie_table4 %>%
  mutate(gross_mil = parse_number(gross),
         imdb_score = parse_number(imdb_score),
         metascore = parse_number(metascore))%>%
  select(title, gross_mil, imdb_score, metascore)

outliers2 <- movie_table4 %>%
  filter(gross_mil>400)
outliers3 <- movie_table4 %>%
  filter(metascore>85)
fin_outliers2 <- full_join(outliers2, outliers3)
```

```
## Joining, by = c("title", "gross_mil", "imdb_score", "metascore")
```

```
ggplot(movie_table4, aes(x = metascore, y = gross_mil))+
  geom_point()+
  geom_label_repel(aes(label = title), data = fin_outliers2)
```



Answer: outliers in terms of metascore are: dunkirk, baby driver, and the shape of water. outliers in terms of gross income are: jumanji, wonder woman, beauty and the beast, and star wars.

3. 5 points if you push your Rmd file with HW13 solutions along with the knitted pdf file to your MSCS264-HW13 repository in your GitHub account. So that I can check, make your repository private (good practice when doing HW), but add me (username = proback) as a collaborator under Settings > Collaborators.

Factors

Read Chapter 15 on factors and attempt the following problems:

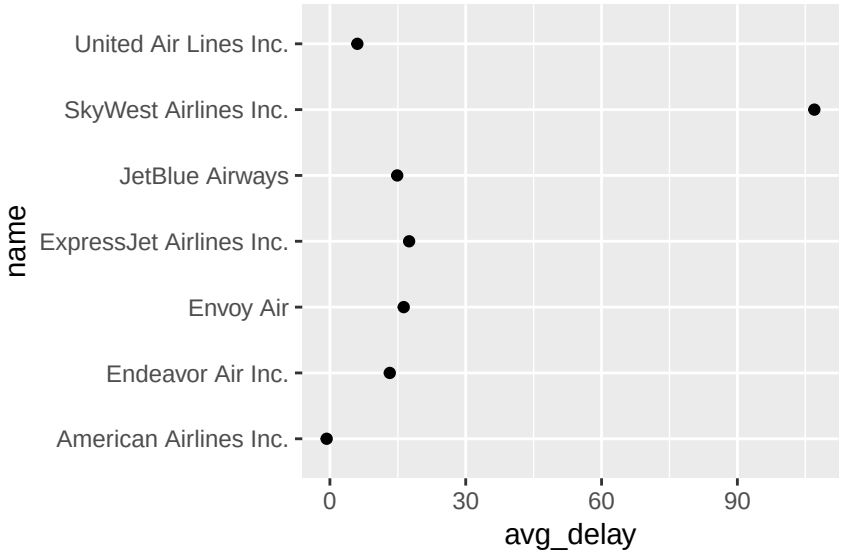
4. In the `nycflights13` data, just consider flights to O'Hare (dest=="ORD"), and summarize the mean arrival delay by carrier (actually use the entire name of the carrier after merging carrier names into `flights`). Then use `geom_point` to plot mean arrival delay vs. carrier - first without reordering carrier names, and second after reordering carrier names by mean arrival delay.

```
ohare <- flights %>%
  filter(dest == "ORD") %>%
  group_by(carrier)%>%
```

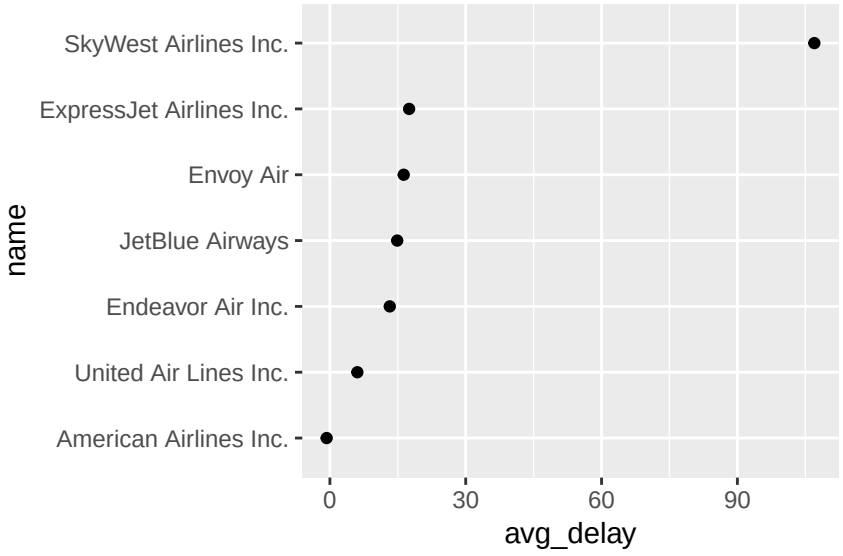
```
  summarise(avg_delay = mean(arr_delay, na.rm = TRUE))%>%
  left_join(airlines)
```

```
## Joining, by = "carrier"
```

```
ggplot(ohare, aes(x = avg_delay, y = name))+
  geom_point()
```




```
ohare2 <- ohare %>%
  mutate(name = fct_reorder(name, avg_delay))

ggplot(ohare2, aes(x = avg_delay, y = name))+
  geom_point()
```



5. Again considering only flights to O'Hare, create a new factor variable which differentiates national carriers (American and United) from regional carriers (all others which fly to O'Hare). Then create a violin plot comparing arrival delays for all flights to O'Hare from those two groups (you might want to exclude arrival delays over a certain level).

```
ohare3 <- flights %>%
  filter(dest == "ORD") %>%
  group_by(carrier)%>%
  summarise(avg_delay = mean(arr_delay, na.rm = TRUE))%>%
  left_join(airlines)%>%
  mutate(vg_delay = ifelse(avg_delay<0, 0, avg_delay),
    airline_type = as.factor(ifelse(name == "United Air Lines Inc." | name == "American Airlines Inc.",
  filter(avg_delay <30)
```

```
## Joining, by = "carrier"
```

```
ggplot(ohare3, aes(x = airline_type, y = avg_delay))+
  geom_violin()
```