AE 00: Bechdel + data visualization

Your name

> **!** Important
>
> Go to `ae-00-bechdel` and clone the repo in RStudio to get started.
>
> This AE is ungraded.

> **⚠** Warning
>
> `ae-00-bechdel` is hosted on GitHub.com because we have not configured your authentication method for Cornell's GitHub. **We will do this tomorrow in lab.**

In this mini analysis we work with the data used in the FiveThirtyEight story titled "The Dollar-And-Cents Case Against Hollywood's Exclusion of Women".

This analysis is about the Bechdel test, a measure of the representation of women in fiction.

Getting started

Packages

We start with loading the packages we'll use: **tidyverse** for majority of the analysis and **scales** for pretty plot labels later on.

```
library(tidyverse)
library(scales)
```

Data

The data are stored as a CSV (comma separated values) file in the `data` folder of your repository. Let's read it from there and save it as an object called `bechdel`.

```
bechdel <- read_csv("data/bechdel.csv")
```

Get to know the data

We can use the `glimpse` function to get an overview (or "glimpse") of the data.

```
# add code here
```

- What does each observation (row) in the data set represent?

Each observation represents a ___.

- How many observations (rows) are in the data set?

There are 1615 movies in the dataset.

- How many variables (columns) are in the data set?

There are ___ columns in the dataset.

Variables of interest

The variables we'll focus on are the following:

- `budget_2013`: Budget in 2013 inflation adjusted dollars.
- `gross_2013`: Gross (US and international combined) in 2013 inflation adjusted dollars.
- `roi`: Return on investment, calculated as the ratio of the gross to budget.
- `clean_test`: Bechdel test result:
  - `ok` = passes test
  - `dubious`
  - `men` = women only talk about men
  - `notalk` = women don't talk to each other
  - `nowomen` = fewer than two women
- `binary`: Bechdel Test PASS vs FAIL binary

We will also use the `year` of release in data prep and `title` of movie to take a deeper look at some outliers.

There are a few other variables in the dataset, but we won't be using them in this analysis.

Visualizing data with `ggplot2`

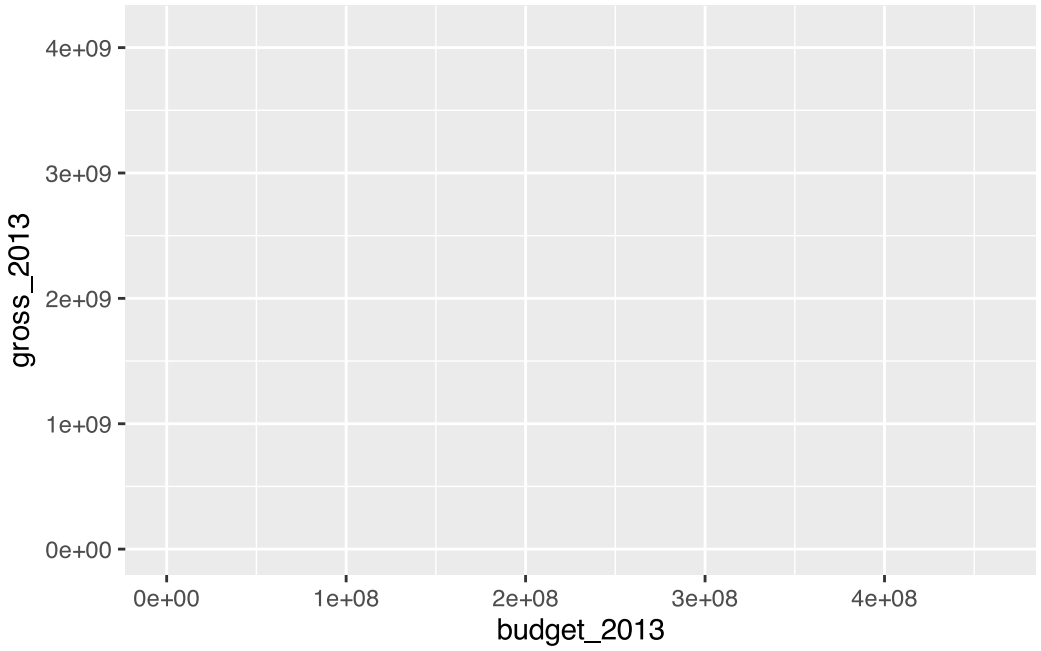
ggplot2 is the package and `ggplot()` is the function in this package that is used to create a plot.

- `ggplot()` creates the initial base coordinate system, and we will add layers to that base. We first specify the data set we will use with `data = bechdel`.

```
ggplot(data = bechdel)
```

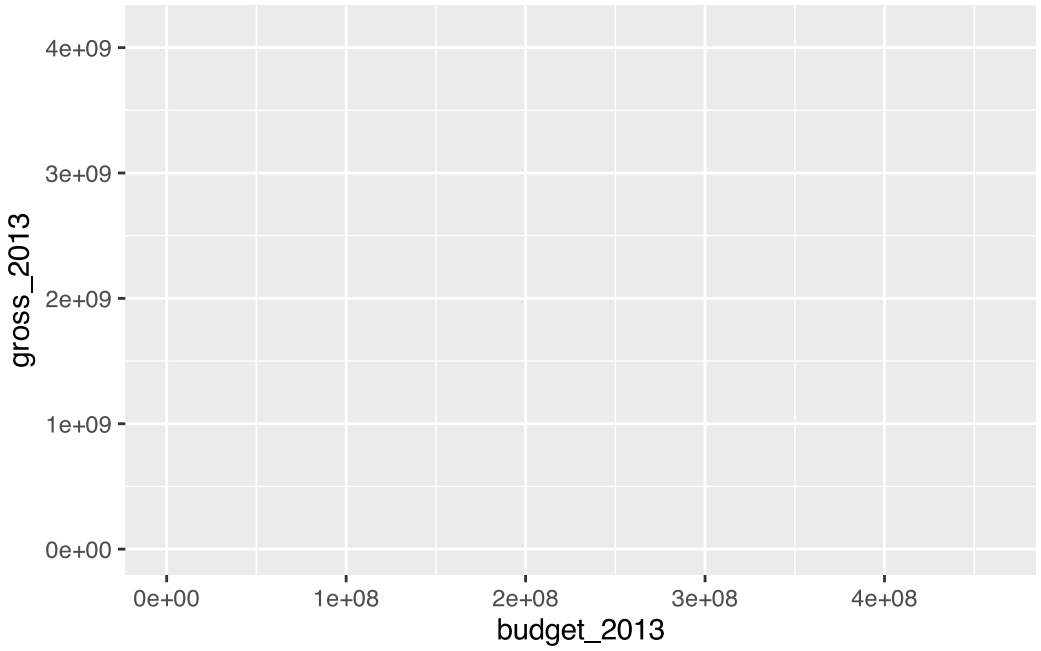
- The `mapping` argument is paired with an aesthetic (`aes()`), which tells us how the variables in our data set should be mapped to the visual properties of the graph.

```
ggplot(
  data = bechdel,
  mapping = aes(x = budget_2013, y = gross_2013)
)
```



As we previously mentioned, we often omit the names of the first two arguments in R functions. So you'll often see this written as:

```
ggplot(
  bechdel,
  aes(x = budget_2013, y = gross_2013)
)
```

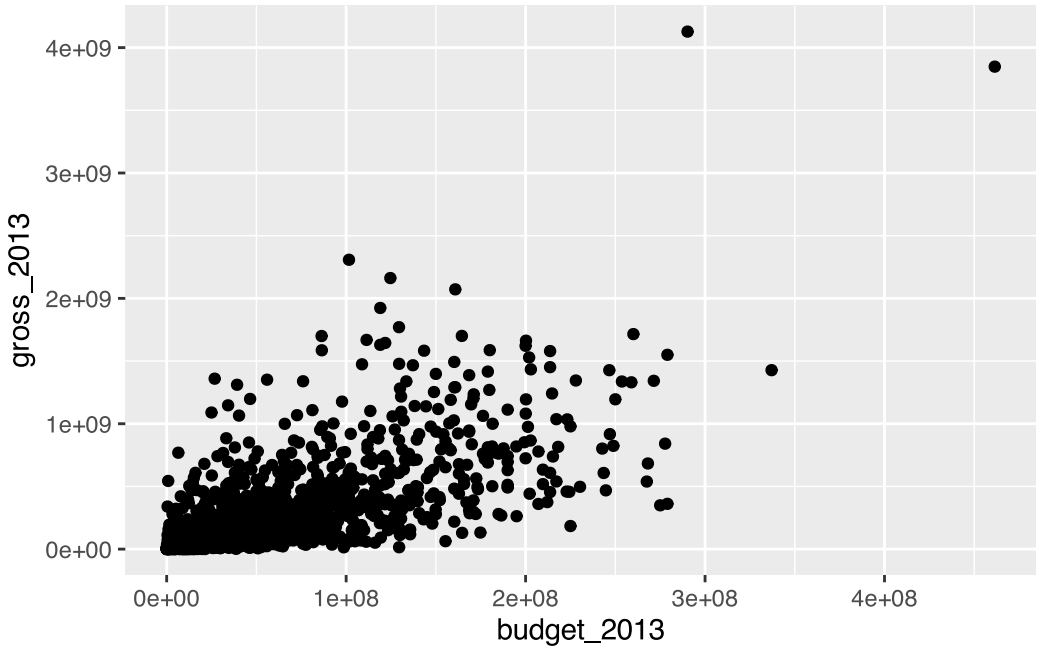


Note that the result is exactly the same.

- The `geom_xx` function specifies the type of plot we want to use to represent the data. In the code below, we use `geom_point` which creates a plot where each observation is represented by a point.

```
ggplot(
  bechdel,
  aes(x = budget_2013, y = gross_2013)
) +
  geom_point()
```

```
Warning: Removed 15 rows containing missing values or values outside the scale
range
(`geom_point()`).
```



Note that this results in a warning as well. What does the warning mean?

Budget vs. gross revenue

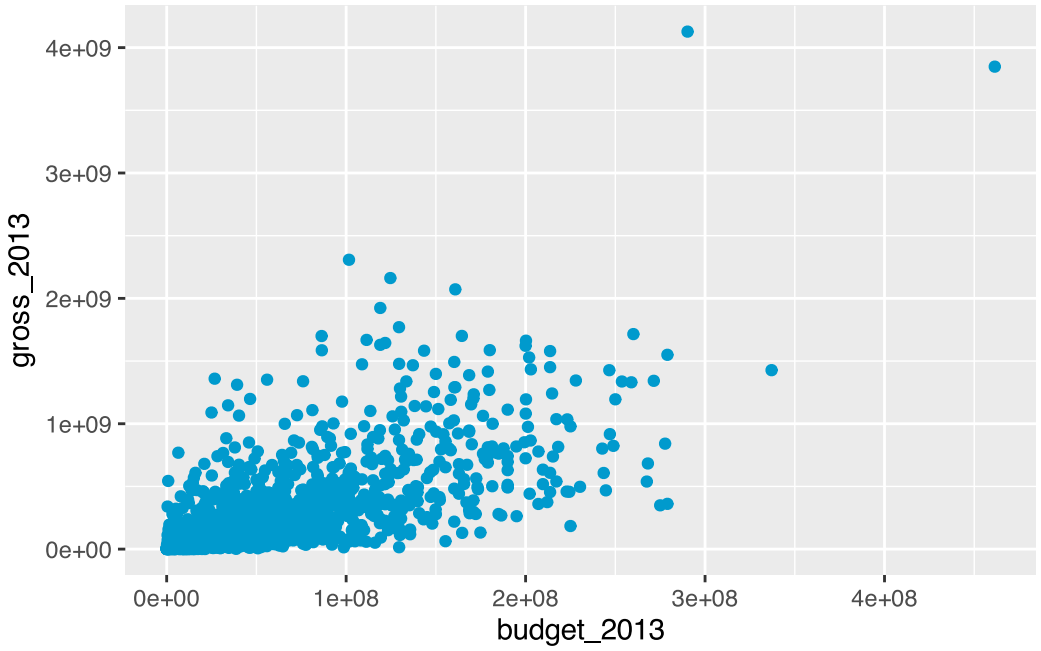
Step 1 - Your turn

Modify the following plot to change the color of all points to a different color.

> **Tip**
>
> See http://www.stat.columbia.edu/~tzheng/files/Rcolor.pdf for many color options you can use by name in R or use the hex code for a color of your choice.

```
ggplot(
  bechdel,
  aes(x = budget_2013, y = gross_2013)
) +
  geom_point(color = "deepskyblue3")
```

```
Warning: Removed 15 rows containing missing values or values outside the scale
range
(`geom_point()`).
```

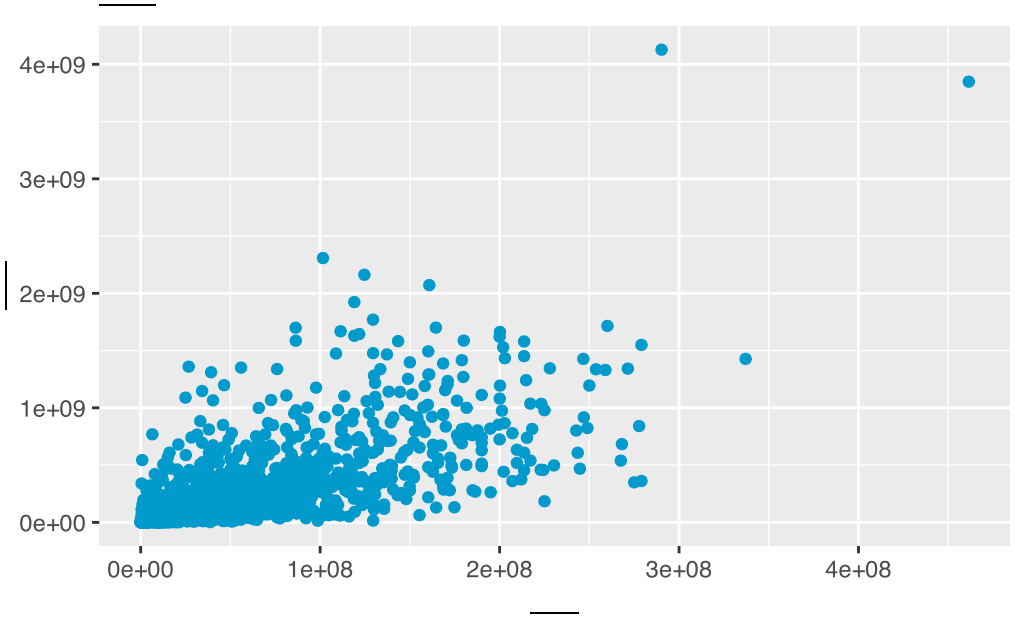


Step 2 - Your turn

Add labels for the title and x and y axes.

```
ggplot(
  bechdel,
  aes(x = budget_2013, y = gross_2013)
) +
  geom_point(color = "deepskyblue3") +
  labs(
    x = "___",
    y = "___",
    title = "___"
  )
```

```
Warning: Removed 15 rows containing missing values or values outside the scale
range
(`geom_point()`).
```



Step 3 - Your turn

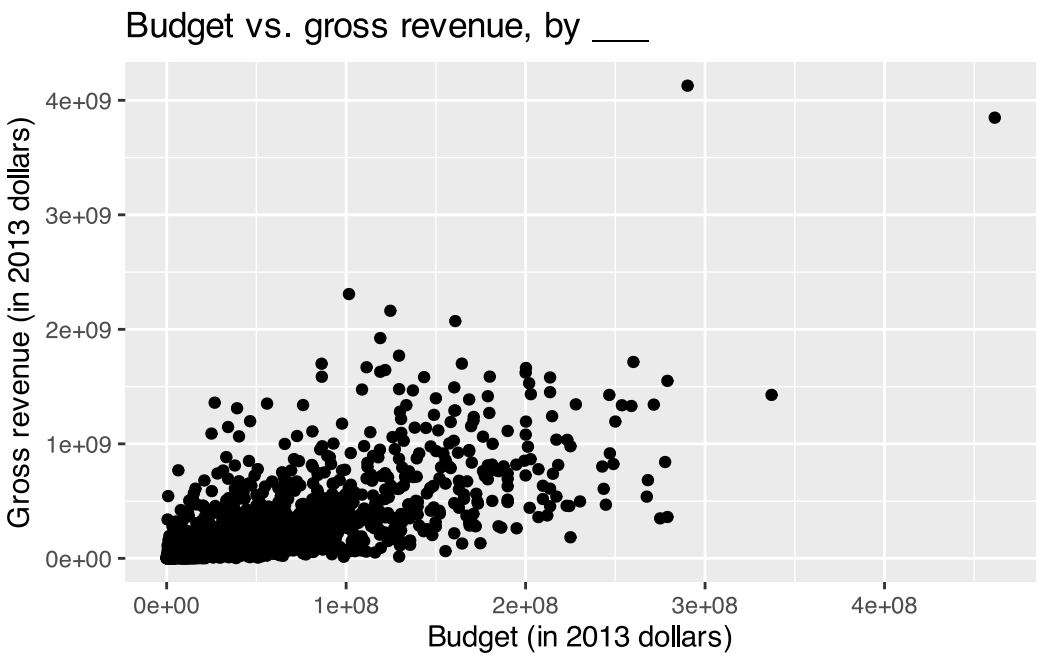
An `aesthetic` is a visual property of one of the objects in your plot. Commonly used aesthetic options are:

- color
- fill
- shape
- size
- alpha (transparency)

Modify the plot below, so the `color` of the points is based on the variable `binary`.

```
ggplot(
  bechdel,
  aes(x = budget_2013, y = gross_2013)
) +
  geom_point() +
  labs(
    x = "Budget (in 2013 dollars)",
    y = "Gross revenue (in 2013 dollars)",
    title = "Budget vs. gross revenue, by ___"
  )
```

```
Warning: Removed 15 rows containing missing values or values outside the scale
range
(`geom_point()`).
```



Step 4 - Your turn

Expand on your plot from the previous step to make the size of your points based on `roi`.

```
# add code here
```

Step 5 - Your turn

Expand on your plot from the previous step to make the transparency (`alpha`) of the points 0.5.

```
# add code here
```

Step 6 - Your turn

Expand on your plot from the previous step by using `facet_wrap` to display the association between budget and gross for different values of `clean_test`.

```
# add code here
```

Step 7 - Demo

Improve your plot from the previous step by making the x and y scales more legible.

> Tip
>
> Make use of the **scales** package, specifically the `scale_x_continuous()` and `scale_y_continuous()` functions.

```
# add code here
```

Step 8 - Your turn

Expand on your plot from the previous step by using `facet_grid` to display the association between budget and gross for different combinations of `clean_test` and `binary`. Comment on whether this was a useful update.

```
# add code here
```

Add comment here...

Step 9 - Demo

What other improvements could we make to this plot?

```
# add code here
```

Return-on-investment

Finally, let's take a look at return-on-investment (ROI).

Step 1 - Your turn

Create side-by-side box plots of `roi` by `clean_test` where the boxes are colored by `binary`.

```
# add code here
```

What are those movies with *very* high returns on investment?

```
bechdel |>
  filter(roi > 400) |>
  select(title, roi, budget_2013, gross_2013, year, clean_test)
```

```
# A tibble: 3 × 6
  title                    roi budget_2013 gross_2013  year clean_test
  <chr>                  <dbl>       <dbl>      <dbl> <dbl> <chr>
1 Paranormal Activity     671.      505595  339424558  2007 dubious
2 The Blair Witch Project  648.      839077  543776715  1999 ok
3 El Mariachi              583.       11622    6778946  1992 nowomen
```

Step 2 - Demo

Expand on your plot from the previous step to zoom in on movies with `roi < ___` to get a better view of how the medians across the categories compare.

```
# add code here
```

What does this plot say about return-on-investment on movies that pass the Bechdel test?