Exploring Data

Prof. Wells

STA 209, 1/25/22

Outline

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- Investigate the structure of data
- Explore data frames in R
- Lab: Introduce RStudio

Section 1

Structure of Data

What is data?

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- When we use the word *data* in everyday converstation, what do we mean?
- Is there a difference between *data* and *information*?
- What is an example of data?
- What do *you* use data for?
- What do others use data about you for?
- Does data have to be numeric? If not, what are some examples?

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  - But all data must be gathered, collated, organized, classified, shaped.
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  - Data tells a story.

Data Frames

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- Example data frame:

Table 1: The Planets

name	type	diameter	distance	rings
Mercury	Terrestrial planet	0.382	0.390	FALSE
Venus	Terrestrial planet	0.949	0.723	FALSE
Earth	Terrestrial planet	1.000	1.000	FALSE
Mars	Terrestrial planet	0.532	1.524	FALSE
Jupiter	Gas giant	11.209	5.203	TRUE
Saturn	Gas giant	9.449	9.539	TRUE
Uranus	Gas giant	4.007	19.180	TRUE
Neptune	Gas giant	3.883	30.060	TRUE

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- What are the observations and variables in the preceding data set?

Tidy Data

Consider the following two data frames containing swim times for the prelims and finals races of the 400 yard indidividual medley in the 2008 Beijing Olympics.

swimmer	prelims	finals
Phelps	4:07.82	4:03.84
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- What are advantages of each form?

Observational Unit Example

Consider the following data frame. What are the observational units?

show_id	type	title	date_added	rating	duration	listed_in
s4230	Movie	Mortified Nation	February 1, 2018	TV-MA	84 min	Documentaries
s6918	Movie	The Surrounding Game	August 30, 2018	TV-14	98 min	Documentaries
s550	TV Show	Anthony Bourdain: Parts Unknown	NA	TV-PG	5 Seasons	Docuseries
s6063	Movie	The Adderall Diaries	July 15, 2018	R	87 min	Dramas, Thrillers
s1283	TV Show	Charlie's Colorforms City	March 22, 2019	TV-Y	1 Season	Kids' TV
s4803	TV Show	Pawn Stars	September 15, 2019	TV-14	1 Season	Reality TV
s1031	Movie	Bolt	July 22, 2018	PG	99 min	Children & Family Movies, Comedies
s1496	TV Show	Cooked with Cannabis	April 20, 2020	TV-MA	1 Season	Reality TV
s7220	TV Show	Trial By Media	May 11, 2020	TV-MA	1 Season	Crime TV Shows, Docuseries
s3968	TV Show	Marvel's Jessica Jones	June 14, 2019	TV-MA	3 Seasons	Crime TV Shows, TV Action & Adventure, TV Dramas
s1632	Movie	Dave Chappelle: Sticks & Stones	August 26, 2019	TV-MA	66 min	Stand-Up Comedy
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- This dataset consists of tv shows and movies available on Netflix as of 2021 The dataset is collected from Flixable which is a third-party Netflix search engine.

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- In some data frames, certain variables (called **identification variables**) uniquely specify each observation

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Label the variables in the following data frame as: quantitative, categorical, or id.

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  - How has the *proportion of films added* changed over the past 5 *years*?
  - Do the typical number of letters in a show's title vary by TV rating?
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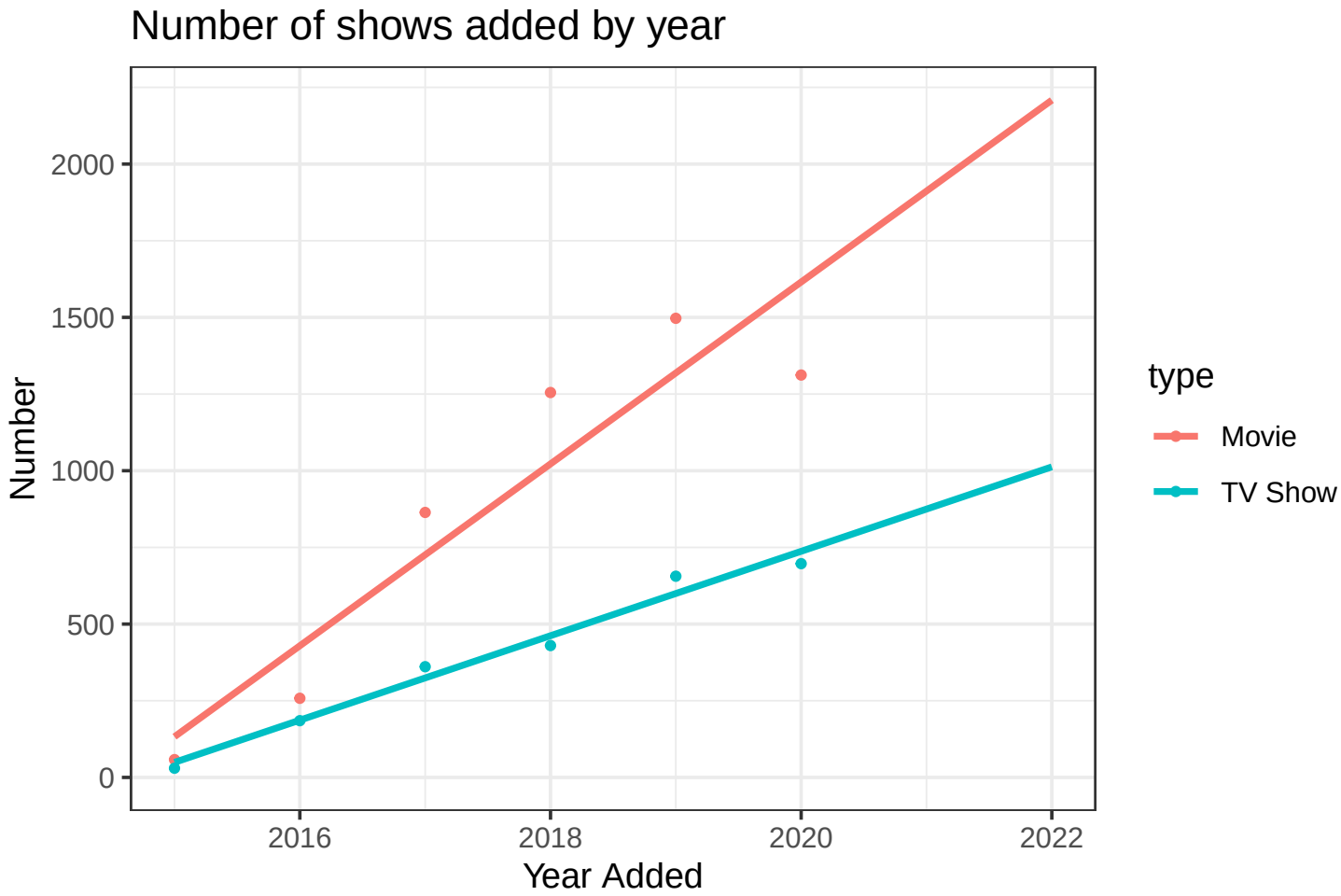
- To answer these questions, we'll need...
  - **data visualizations** that provide a holistic overview of the data
  - **summary statistics** that capture the essential attributes of data in a few numeric values
  - **statistical models** that allow us to predict the value of one variable given another

Data Visualization

Summary Statistics

```
## # A tibble: 15 x 4
##    rating   mean_number_letters first_quartile third_quartile
##    <chr>                  <dbl>          <dbl>          <dbl>
##  1 TV-Y7-FV                28             15.2           33.5
##  2 <NA>                    27.3           17.5           34.5
##  3 TV-Y7                   24.5           14.5           32.5
##  4 TV-Y                    23.5           13             32
##  5 TV-G                    21.6           14             27.8
##  6 G                       20.8           15             26
##  7 TV-PG                   19.1           11             24
##  8 PG                      18.6           11             25.5
##  9 NC-17                   17.7           14             22
## 10 UR                      17.6           13             23
## 11 TV-MA                   17.3           10             22
## 12 TV-14                   16.4           10             21
## 13 PG-13                   16.2           10             20
## 14 NR                      16.1            9             21
## 15 R                       14.7           10             18
```

Statistical Models



$$\text{Number of TV Shows Added} = 97 \cdot \text{ Years since 2015 } + 380$$