

SEDSI 2022

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Chapter 1

SEDSI 2022

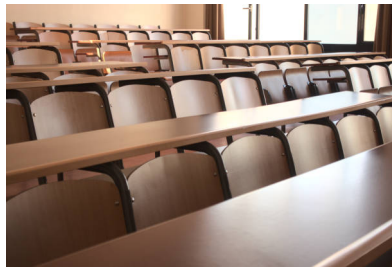


Reproducible Data and RMarkdown Tobin Turner

Chapter 2

Motivation

A COVID Classroom



A Learning Management System Nightmare



Concise, Precisely Organized, Frequently Revised Assignments and Schedules

Date	Topic
Wednesday, February 16, 2022	SEDSI in Jacksonville
Thursday, February 17, 2022	Present at 2:45 PM
Friday, February 18, 2022	Celebrate a successful DASI Session

Chapter 3

Real life example

It's nice to know exactly what you did when your original data requires wrangling.

Conflicts and students honors...

```
#>
#> Attaching package: 'dplyr'
#> The following objects are masked from 'package:stats':
#>
#>   filter, lag
#> The following objects are masked from 'package:base':
#>
#>   intersect, setdiff, setequal, union
#>
#>      NAME TOTAL.HOURS PC.HOURS
#> 1   Greer, Patrick Sterling      3.0      3.0
#> 2   Greer, Patrick Sterling    144.0    123.0
#> 3 Thompson, Charleston Hannah      0.0      0.0
#> 4 Thompson, Charleston Hannah    142.0    122.0
#> 5 Melvin, Victor Richard-Scorsese  132.0    100.0
#> 6  Roberson, States Taylor      126.0     99.0
#> 7   Allen, Kaylee Michelle     125.0     68.0
#> 8   Phelps, Payton Elliott     117.0    114.0
#> 9  Rowley, Ella Marie Dorothy    121.0    121.0
#> 10   Smith, Michael Leston     112.0    112.0
#> 11   Taylor, Darrell Tyrese      78.0     78.0
#> 12   Wright, Alexandra Ruby     116.0    116.0
#> 13           Adu, Tyler         80.0     80.0
#> 14   Armell, James Richard       90.0     87.0
#> 15   Bell, Carrie Abigail      120.5     99.5
#>   ADMIT.TERM
```

```

#> 1      201101
#> 2      201101
#> 3      201201
#> 4      201201
#> 5      201202
#> 6      201301
#> 7      201601
#> 8      201701
#> 9      201701
#> 10     201701
#> 11     201701
#> 12     201701
#> 13     201801
#> 14     201801
#> 15     201801
#>
#>                                NAME TOTAL.HOURS PC.HOURS
#> 20      Drake, John Chapman           94      94
#> 21  Edwards, Nicholas Graham          101      83
#> 22      Ham, Ethan Ross                90      90
#> 23  Harmon, Luke Elliott              91      91
#> 24  Humphries, Lillian Kristine        87      78
#> 25      Julien, Christina             101      89
#> 26  Klimpel, Jake Frederick            103      97
#> 27      Leeman, Jessica Kate           92      92
#> 28      Martin, Caroline Grace         101      95
#> 29  Matthews, William McGill           96      81
#> 30  McCutchen, Caroline Louise        118      94
#>  ADMIT.TERM
#> 20      201801
#> 21      201801
#> 22      201801
#> 23      201801
#> 24      201801
#> 25      201801
#> 26      201801
#> 27      201801
#> 28      201801
#> 29      201801
#> 30      201801

```

Chapter 4

Some Options

This is just a cool place to put stuff¹.

Like a schedule, for example:

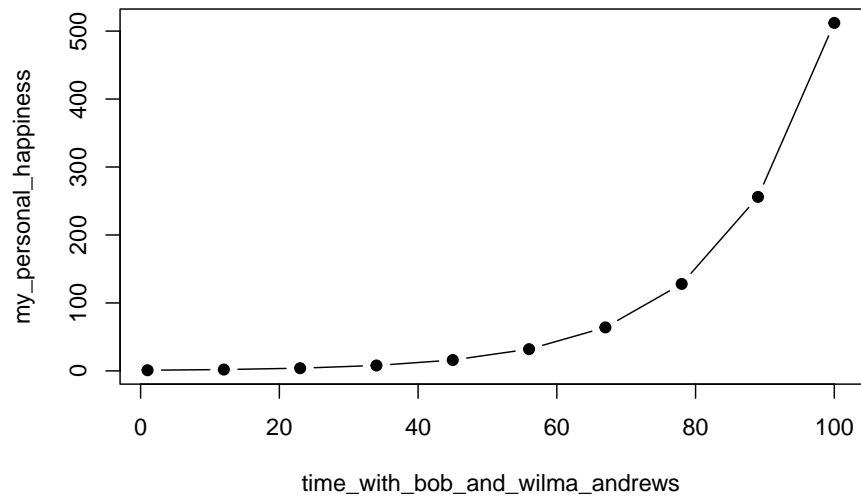
Footnotes are put inside the square brackets after a caret ². Like this one.¹

4.1 Spring 2022

Date	Topic
Monday, January 10, 2022	R basics and install
Wednesday, January 12, 2022	R basics and workflows
Friday, January 14, 2022	QUIZ 1
Monday, January 17, 2022	MLK Holiday
Wednesday, January 19, 2022	Objects, Vectors, and Arithmetic
Friday, January 21, 2022	QUIZ 2
Monday, January 24, 2022	Summaries and Subscripting

¹Footnotes are always neat. And useful. Like this one!
²

4.2 Or a figure



4.3 Or an Image

4.3.1 Hero 1



4.3.2 Hero 2



Table 4.2: A table of the first 10 rows of the mtcars data.

	mpg	cyl	disp	hp	drat	wt	qsec	vs
Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	0
Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	0
Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1
Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	1
Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	0
Valiant	18.1	6	225.0	105	2.76	3.460	20.22	1
Duster 360	14.3	8	360.0	245	3.21	3.570	15.84	0
Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	1
Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	1
Merc 280	19.2	6	167.6	123	3.92	3.440	18.30	1

4.4 Or an Equation

Here is a **fun** equation for my SEDSI DASI friends:

$$f(k) = \binom{n}{k} p^k (1-p)^{n-k} \quad (4.1)$$

4.5 Or a table of something

4.5.1 Fun example table

Chapter 5

Workflow Summary

5.1 R (engine) and Rstudio (IDE)



5.2 bookdown package



5.3 github



5.4 netlify



netlify

Chapter 6

Lab 3: coronavirus visualization, data wrangling, and dates

6.1 Overview

The package is available on GitHub [here](#) and is updated daily.

I use the `coronavirus` package and use the `coronavirus::update_data()` function to keep the data current. This also has the dates preformatted which can be nice.

6.2 Let's look like Applied Analytics Superstars and make some neat visuals.

```
coronavirus::update_dataset()
#> Rows: 627405 Columns: 15
#> -- Column specification -----
#> Delimiter: ","
#> chr  (8): province, country, type, iso2, iso3, combined_...
#> dbl  (6): lat, long, cases, uid, code3, population
#> date (1): date
#>
#> i Use `spec()` to retrieve the full column specification for this data.
```

```
#> i Specify the column types or set `show_col_types = FALSE` to quiet this message.
#> No updates are available
```

```
library(coronavirus)
library(dplyr)
library(ggplot2)
```

I'd recommend you always start by trying to understand a bit about the data.

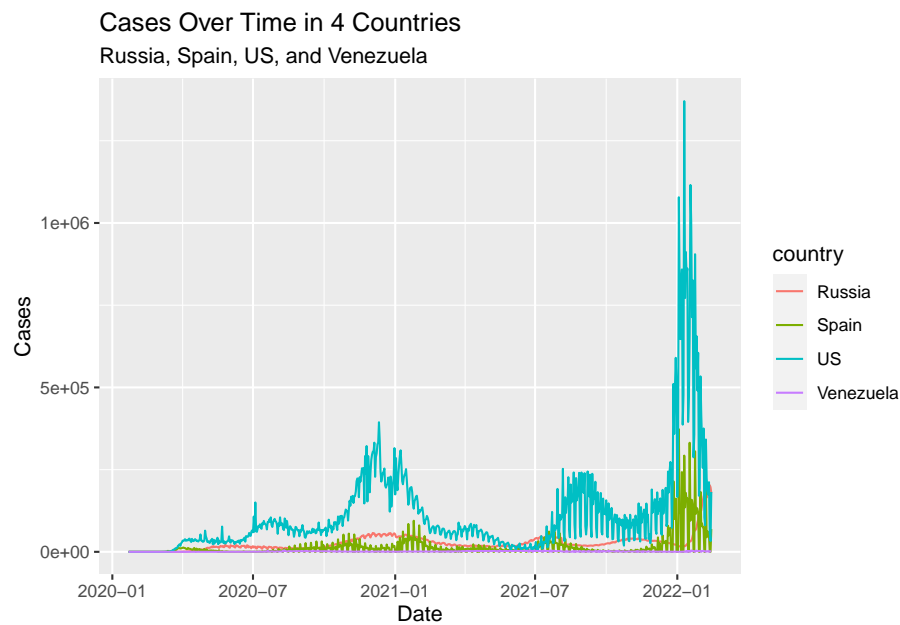
```
head(coronavirus)
#>      date province country    lat    long    type
#> 1 2020-01-22  Alberta  Canada 53.9333 -116.5765 confirmed
#> 2 2020-01-23  Alberta  Canada 53.9333 -116.5765 confirmed
#> 3 2020-01-24  Alberta  Canada 53.9333 -116.5765 confirmed
#> 4 2020-01-25  Alberta  Canada 53.9333 -116.5765 confirmed
#> 5 2020-01-26  Alberta  Canada 53.9333 -116.5765 confirmed
#> 6 2020-01-27  Alberta  Canada 53.9333 -116.5765 confirmed
#>   cases   uid iso2 iso3 code3   combined_key population
#> 1     0 12401  CA  CAN   124 Alberta, Canada    4413146
#> 2     0 12401  CA  CAN   124 Alberta, Canada    4413146
#> 3     0 12401  CA  CAN   124 Alberta, Canada    4413146
#> 4     0 12401  CA  CAN   124 Alberta, Canada    4413146
#> 5     0 12401  CA  CAN   124 Alberta, Canada    4413146
#> 6     0 12401  CA  CAN   124 Alberta, Canada    4413146
#>   continent_name continent_code
#> 1 North America              NA
#> 2 North America              NA
#> 3 North America              NA
#> 4 North America              NA
#> 5 North America              NA
#> 6 North America              NA
```

For example, what does this summary let us know?

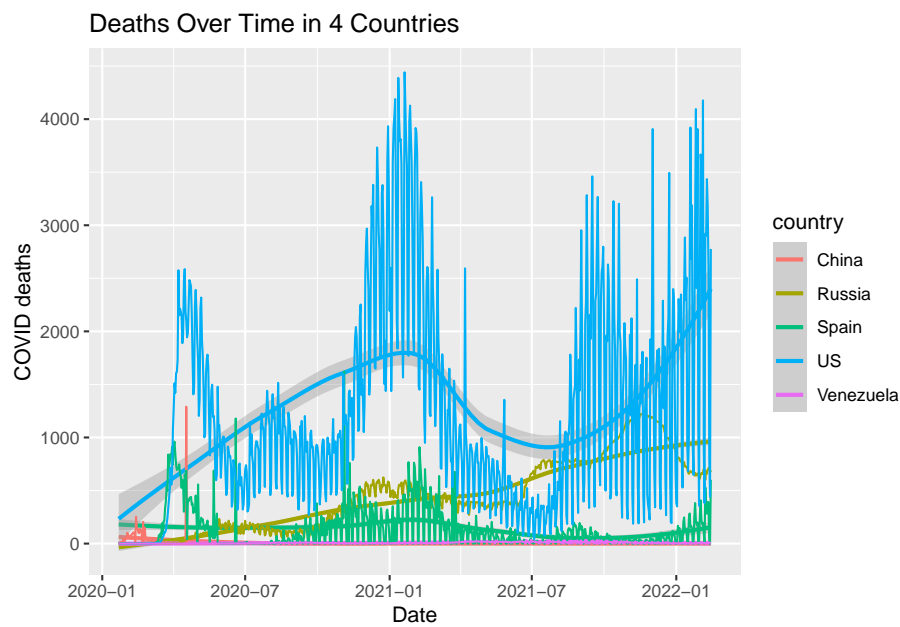
```
summary(coronavirus$cases)
#>      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
#> -30974748         0         0      668        30   1368563
```

1. Can you create a visual showing the cases over time for Russia, Spain, US, and Venezuela? Also, why might `filter(cases >= 0)` be worth using?

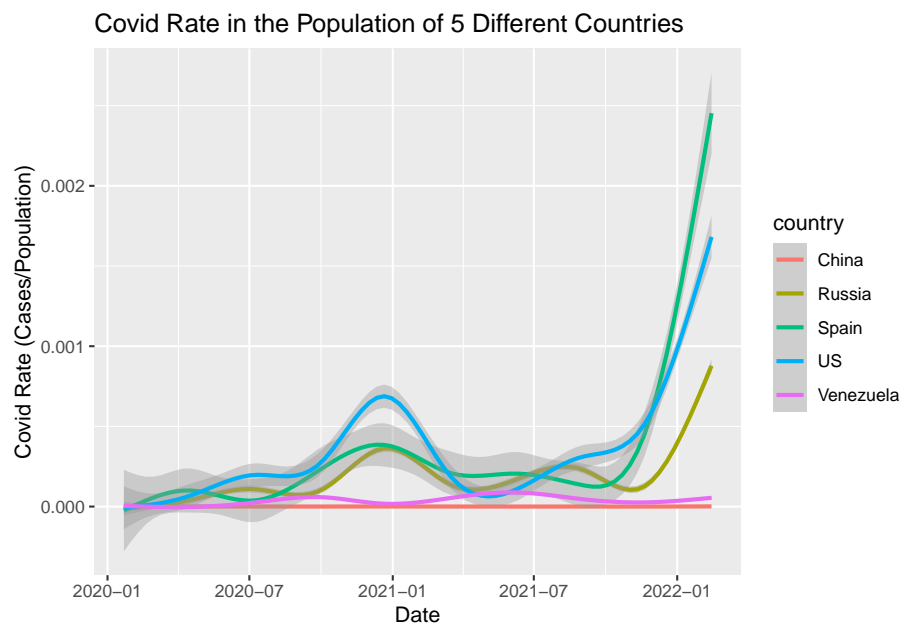
6.2. LET'S LOOK LIKE APPLIED ANALYTICS SUPERSTARS AND MAKE SOME NEAT VISUALS.21



2. Can you show deaths over time for Russia, Spain, US, and Venezuela?
And can you play with your geoms and make something neat?



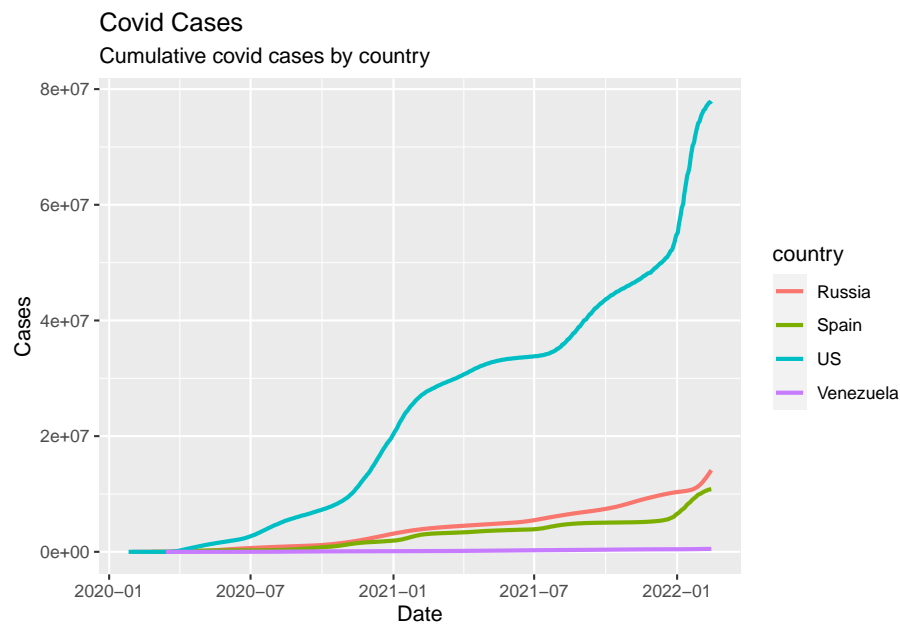
3. Now let's do a plot of COVID rate ($\#$ confirmed cases / population).
Something like this.



4. What is and **is not** useful about the previous illustration?

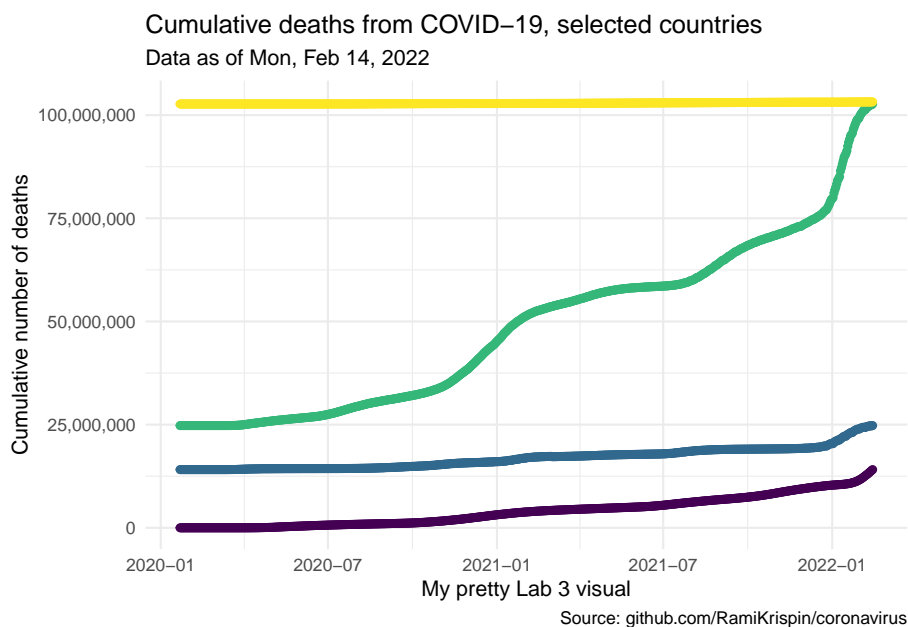
5. Make a chart with cumulative cases. Something like this:

6.2. LET'S LOOK LIKE APPLIED ANALYTICS SUPERSTARS AND MAKE SOME NEAT VISUALS.23



6. With a little more time and a few extra packages, we **could** make a graph prettier. Try.

```
library(scales)
library(ggrepel)
library(glue)
library(lubridate)
```



7. Now let's **really** have some fun. Let's illustrate death rates relative to confirmed cases. Why is this more challenging than anything we've done so far in this lab? We're going to have to make this data **tidy**.

One way to play this game.

Let's make a little table of just date, country, and deaths (with a meaningful variable name), and then count observations by country just to make sure everything looks nice.

```
#>      date country deaths
#> 1 2020-01-22  Russia      0
#> 2 2020-01-23  Russia      0
#> 3 2020-01-24  Russia      0
#> 4 2020-01-25  Russia      0
#> 5 2020-01-26  Russia      0
#> 6 2020-01-27  Russia      0
#>      country  n
#> 1   Russia 755
#> 2   Spain 752
#> 3    US 755
#> 4 Venezuela 754
```

Let's make a little table of just confirmed cases.

6.2. LET'S LOOK LIKE APPLIED ANALYTICS SUPERSTARS AND MAKE SOME NEAT VISUALS.25

```
#>      date country confirmed
#> 1 2020-01-22  Russia         0
#> 2 2020-01-23  Russia         0
#> 3 2020-01-24  Russia         0
#> 4 2020-01-25  Russia         0
#> 5 2020-01-26  Russia         0
#> 6 2020-01-27  Russia         0
#>      country  n
#> 1    Russia 755
#> 2    Spain 755
#> 3      US 755
#> 4 Venezuela 755
```

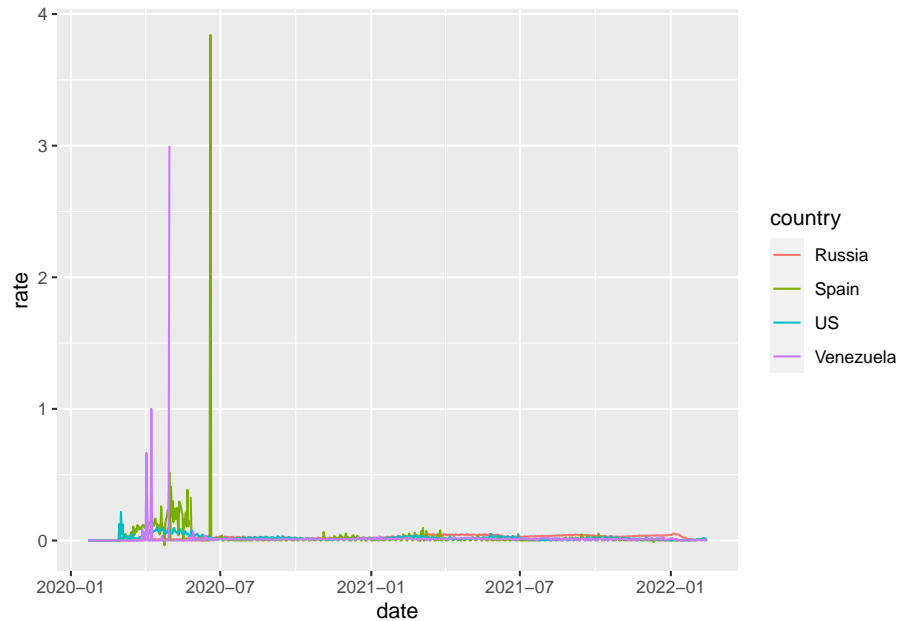
Let's join these together. I use `left_join`.

```
#>      date country deaths confirmed
#> 1 2020-01-22  Russia     0         0
#> 2 2020-01-23  Russia     0         0
#> 3 2020-01-24  Russia     0         0
#> 4 2020-01-25  Russia     0         0
#> 5 2020-01-26  Russia     0         0
#> 6 2020-01-27  Russia     0         0
#>      country  n
#> 1    Russia 755
#> 2    Spain 755
#> 3      US 755
#> 4 Venezuela 755
```

Let's add some cumulative statistics as well.

```
#>      date country deaths confirmed cumulative_cases
#> 1 2020-01-22  Russia     0         0             0
#> 2 2020-01-23  Russia     0         0             0
#> 3 2020-01-24  Russia     0         0             0
#> 4 2020-01-25  Russia     0         0             0
#> 5 2020-01-26  Russia     0         0             0
#> 6 2020-01-27  Russia     0         0             0
#>      cumulative_deaths rate
#> 1                0    0
#> 2                0    0
#> 3                0    0
#> 4                0    0
#> 5                0    0
#> 6                0    0
```

Now we can plot some more fun stuff.



```
#>      date      country      deaths
#> Min.   :2020-01-22 Length:3020 Min.   : 0.0
#> 1st Qu.:2020-07-28 Class :character 1st Qu.:  5.0
#> Median :2021-02-02 Mode  :character Median : 125.5
#> Mean   :2021-02-02 Mean   : 451.2
#> 3rd Qu.:2021-08-10 3rd Qu.: 637.5
#> Max.   :2022-02-14 Max.   :4442.0
#>                                     NA's   :4
#> confirmed cumulative_cases cumulative_deaths
#> Min.   : -74937.0 Min.   : 0 Min.   : 0
#> 1st Qu.:  458.2 1st Qu.: 14102736 1st Qu.: 16922
#> Median :  7785.5 Median : 24775642 Median : 99049
#> Mean   :  34172.4 Mean   : 43119360 Mean   :134411
#> 3rd Qu.:  27947.2 3rd Qu.:102694694 3rd Qu.:246397
#> Max.   :1368563.0 Max.   :103200641 Max.   :362845
#>                                     NA's   :2141
#>      rate
#> Min.   :-0.036576
#> 1st Qu.: 0.004568
#> Median : 0.012754
#> Mean   : 0.021708
#> 3rd Qu.: 0.023302
#> Max.   : 3.840391
```

6.2. LET'S LOOK LIKE APPLIED ANALYTICS SUPERSTARS AND MAKE SOME NEAT VISUALS.27

```
#> NA's :4
```

