

Data Scientist Role Play: Profiling and Analyzing the Yelp Dataset Coursera Worksheet

This is a 2-part assignment. In the first part, you are asked a series of questions that will help you profile and understand the data just like a data scientist would. For this first part of the assignment, you will be assessed both on the correctness of your findings, as well as the code you used to arrive at your answer. You will be graded on how easy your code is to read, so remember to use proper formatting and comments where necessary.

In the second part of the assignment, you are asked to come up with your own inferences and analysis of the data for a particular research question you want to answer. You will be required to prepare the dataset for the analysis you choose to do. As with the first part, you will be graded, in part, on how easy your code is to read, so use proper formatting and comments to illustrate and communicate your intent as required.

For both parts of this assignment, use this "worksheet." It provides all the questions you are being asked, and your job will be to transfer your answers and SQL coding where indicated into this worksheet so that your peers can review your work. You should be able to use any Text Editor (Windows Notepad, Apple TextEdit, Notepad ++, Sublime Text, etc.) to copy and paste your answers. If you are going to use Word or some other page layout application, just be careful to make sure your answers and code are lined appropriately.

In this case, you may want to save as a PDF to ensure your formatting remains intact for you reviewer.

Part 1: Yelp Dataset Profiling and Understanding

1. Profile the data by finding the total number of records for each of the tables below:

Part 1: Yelp Dataset Profiling and Understanding

1. Profile the data by finding the total number of records for each of the tables below:

i.	Attribute table =	10000
ii.	Business table =	10000
iii.	Category table =	10000
iv.	Checkin table =	10000
v.	elite_years table =	10000
vi.	friend table =	10000
vii.	hours table =	10000
viii.	photo table =	10000
ix.	review table =	10000
x.	tip table =	10000
xi.	user table =	10000

2. Find the total number of distinct records for each of the keys listed below:

i.	Business =	10000	(id)
ii.	Hours =	1562	(business_id)
iii.	Category =	2643	(business_id)
iv.	Attribute =	1115	(business_id)
v.	Review =	10000	(id), 8090 (business_id), 9581 (user_id)
vi.	Checkin =	493	(business_id)
vii.	Photo =	10000	(id), 6493 (business_id)
viii.	Tip =	537	(user_id), 3979 (business_id)
ix.	User =	10000	(id)
x.	Friend =	11	(user_id)
xi.	Elite_years =	2780	(user_id)

3. Are there any columns with null values in the Users table? Indicate "yes," or "no."

Answer: No

SQL code used to arrive at answer:

```
select id, name, review_count, yelping_since,
useful, funny, cool, fans, average_stars,
        compliment_hot, compliment_more,
compliment_profile, compliment_cute, compliment_list,
        compliment_note, compliment_plain,
compliment_cool, compliment_funny, compliment_writer,
compliment_photos
from user
where    id is null
        or name is null
        or review_count is null
        or yelping_since is null
        or useful is null
        or funny is null
        or cool is null
        or fans is null
        or average_stars is null
        or compliment_hot is null
        or compliment_more is null
        or compliment_profile is null
        or compliment_cute is null
        or compliment_list is null
        or compliment_note is null
        or compliment_plain is null
        or compliment_cool is null
        or compliment_funny is null
        or compliment_writer is null
        or compliment_photos is null
```

4. Find the minimum, maximum, and average value for the following fields:

i. Table: Review, Column: Stars

min: 1	max: 5	avg: 3.7082
--------	--------	-------------

- ii. Table: Business, Column: Stars
min: 1.0 max: 5.0 avg: 3.6549
- iii. Table: Tip, Column: Likes
min: 0 max: 2 avg: 0.0144
- iv. Table: Checkin, Column: Count
min: 1 max: 53 avg: 1.9414
- v. Table: User, Column: Review_count
min: 0 max: 2000 avg: 24.2995

5. List the cities with the most reviews in descending order:

SQL code used to arrive at answer:
 select city, sum(review_count)
 from business
 group by city
 order by sum(review_count) desc

Copy and Paste the Result Below:

city	sum(review_count)
Las Vegas	82854
Phoenix	34503
Toronto	24113
Scottsdale	20614
Charlotte	12523
Henderson	10871
Tempe	10504
Pittsburgh	9798
Montr��al	9448
Chandler	8112
Mesa	6875
Gilbert	6380

Cleveland	5593
Madison	5265
Glendale	4406
Mississauga	3814
Edinburgh	2792
Peoria	2624
North Las Vegas	2438
Markham	2352
Champaign	2029
Stuttgart	1849
Surprise	1520
Lakewood	1465
Goodyear	1155

6. Find the distribution of star ratings to the business in the following cities:

i. Avon

SQL code used to arrive at answer:

```
select stars as [Star Rating], count(stars) as
[Count]
from business b
where city = 'Avon'
group by stars
```

Copy and Paste the Resulting Table Below (2 columns - star rating and count):

Star Rating	Count
1.5	1
2.5	2
3.5	3
4.0	2
4.5	1
5.0	1

ii. Beachwood

SQL code used to arrive at answer:

```
select stars as [Star Rating], count(stars) as  
[Count]  
from business b  
where city = 'Beachwood'  
group by stars
```

Copy and Paste the Resulting Table Below (2
columns - star rating and count):

Star Rating	Count
2.0	1
2.5	1
3.0	2
3.5	2
4.0	1
4.5	2
5.0	5

7. Find the top 3 users based on their total number of
reviews:

SQL code used to arrive at answer:

```
select name, review_count  
from user  
order by review_count desc  
limit 3
```

Copy and Paste the Result Below:

name	review_count
Gerald	2000

Sara	1629	
Yuri	1339	
+-----+	+-----+	+-----+

8. Does posing more reviews correlate with more fans?
- No

Please explain your findings and interpretation of the results:

- N/A

SQL code:

```
select name, review_count, fans
from user
order by fans desc
limit 10
```

Results:

+-----+	+-----+	+-----+
name	review_count	fans
+-----+	+-----+	+-----+
Amy	609	503
Mimi	968	497
Harald	1153	311
Gerald	2000	253
Christine	930	173
Lisa	813	159
Cat	377	133
William	1215	126
Fran	862	124
Lissa	834	120
+-----+	+-----+	+-----+

9. Are there more reviews with the word "love" or with the word "hate" in them?

Answer: more reviews with the word "love"

SQL code used to arrive at answer:

```
select (select count(text)
        from review
        where text like "%love%") as love_text,

(select count(text)
 from review
 where text like "%hate%") as hate_text
```

Results:

+	-----+	-----+
	love_text	hate_text
+	-----+	-----+
	1780	232
+	-----+	-----+

OR:

```
SELECT 'love' Word, COUNT(text) [Total Count]
FROM review
WHERE text LIKE '%love%'
UNION
SELECT 'hate' Word, COUNT(text) [Total Count]
FROM review
WHERE text LIKE '%hate%'
```

+	-----+	-----+
	Word	Total Count
+	-----+	-----+
	hate	232
	love	1780
+	-----+	-----+

10. Find the top 10 users with the most fans:

SQL code used to arrive at answer:


```

select name, fans
from user
order by fans desc
limit 10

```

Copy and Paste the Result Below:

name	fans
Amy	503
Mimi	497
Harald	311
Gerald	253
Christine	173
Lisa	159
Cat	133
William	126
Fran	124
Lissa	120

11. Is there a strong correlation between having a high number of fans and being listed as "useful" or "funny?"

SQL code used to arrive at answer:

```

select name, fans, useful, funny
from user
order by fans desc, useful desc, funny desc
limit 20

```

Copy and Paste the Result Below:

name	fans	useful	funny
Amy	503	3226	2554
Mimi	497	257	138
Harald	311	122921	122419
Gerald	253	17524	2324

Christine	173	4834	6646
Lisa	159	48	13
Cat	133	1062	672
William	126	9363	9361
Fran	124	9851	7606
Lissa	120	455	150
Mark	115	4008	570
Tiffany	111	1366	984
bernice	105	120	112
Roanna	104	2995	1188
.Hon	101	7850	5851
Angela	101	158	164
Ben	96	1180	1155
Linda	89	3177	2736
Christina	85	158	34
Jessica	84	2161	2091

Part 2: Inferences and Analysis

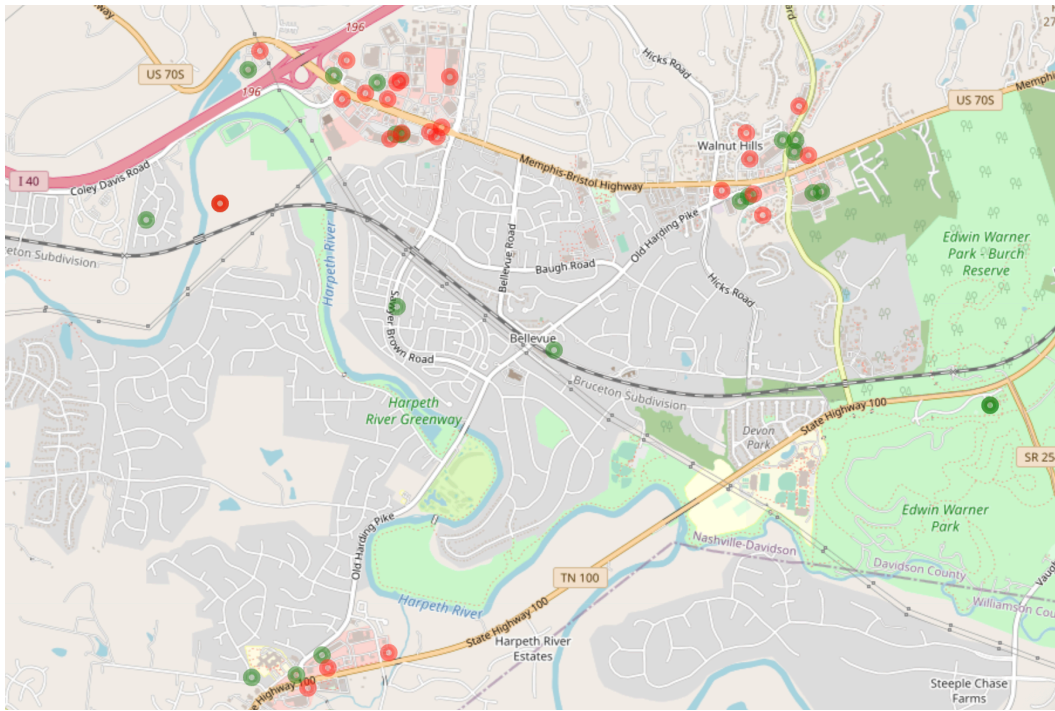
1. Pick one city and category of your choice and group the businesses in that city or category by their overall star rating. Compare the businesses with 2-3 stars to the businesses with 4-5 stars and answer the following questions. Include your code.

Nashville TN Zip Code 37221

i. Do the two groups you chose to analyze have a different distribution of hours? NO

ii. Do the two groups you chose to analyze have a different number of reviews? YES - More for 4-5 star reviews

iii. Are you able to infer anything from the location data provided between these two groups? Explain. No. The locations are very tightly clustered in shopping regions. Red are 2-3 star rated. Green are 4-5 star rated.



Caption

Executive Summary:

The TNBus dataset contains information on 12,056 businesses in Tennessee, including variables such as name, address, city, state, zip code, latitude, longitude, rating, and review count. The data was extracted from the [Yelp Academic Dataset](#). To better understand the differences between top-rated (4-5 stars) and bottom-rated (2-3 stars) businesses, we conducted an analysis focusing on the zip code 37221.

I first extracted businesses located in the 37221 zip code and then categorized them into two groups: the top 25 businesses and the bottom 25 businesses based on their ratings. The top 25 businesses had an average rating of 4-5 stars, while the bottom 25 businesses had an average rating of 2-3 stars.

Upon examining the mean values of the numeric columns for both groups, I found that top-rated businesses tended to have a higher number of reviews on average. This could be an indication of better customer engagement and overall satisfaction. The comparison of mean longitude and latitude values did not reveal any significant geographic clustering of top or bottom-rated businesses within the 37221 zip code.

To further explore differences between the top and bottom-rated businesses, we examined the textual data from the `categories` column. We identified the top 10 words used to describe each group, which provided insights into the type of businesses and services offered by each group.

In conclusion, our analysis of the TNBus dataset has shown that there are notable differences between top and bottom-rated businesses in the 37221 zip code, particularly in terms of review count and types of businesses. However, it is important to note that other factors not included in the dataset, such as specific attributes or services, could also impact business ratings. Further analysis of these additional factors could provide a more comprehensive understanding of the differences between top and bottom-rated businesses.

Find the GitHub Code and More Information Here <https://github.com/BethMara/YelpUsers>

```
# Import necessary libraries
library(tidyverse) library(leaflet) # Import Business and TNBus datasets
Business <- read.csv("yelp_business.csv") TNBus <- read.csv("tnbus.csv") # Rename the column names in TNBus
to match those in Business
colnames(TNBus) [1] <- "ID" colnames(TNBus) [2] <- "name" colnames(TNBus) [6] <- "zip" colnames(TNBus) [7] <-
"lat" colnames(TNBus) [8] <- "long" # Join the Business and TNBus datasets based on ID
merged_data <- merge(Business, TNBus, by = "ID") # Filter merged_data to only include businesses in zip code
37221
zip_37221 <- merged_data %>% filter(zip == "37221") # Create a new dataframe with only the top 25 rated
businesses in zip code 37221
top_25 <- zip_37221 %>% arrange(
  desc(rating)
) %>% # sort by descending rating
select
(
  name, rating, review_count, attributes,
  open
) %>% # select specific columns
head(25) # only take top 25 businesses

# Display the structure of the dataframe
str(TNBus)

# Provide a summary of the dataframe
summary(TNBus)

# Return the column names of the dataframe
names(TNBus)

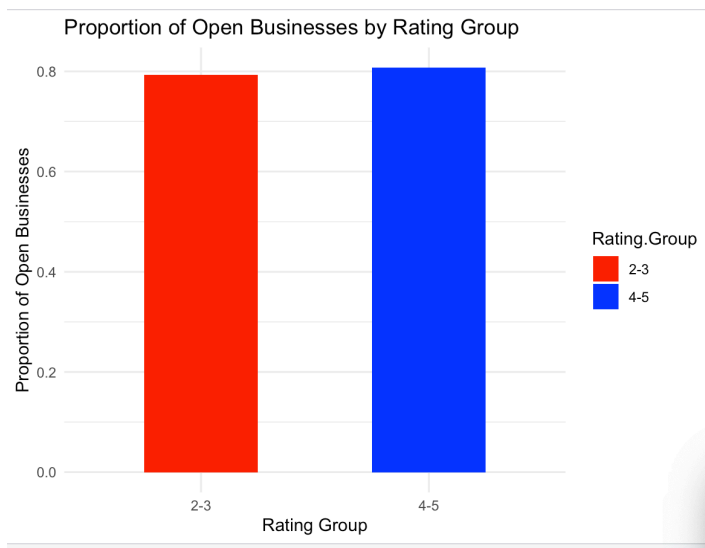
# Open the dataframe in a spreadsheet-like view within RStudio
View(TNBus)

# Open the dataframe in a spreadsheet-like view within RStudio
> View(TNBus)
>
> # Create separate data frames for businesses with ratings 2-3 and 4-5
> TNBus_2to3 <- subset(TNBus, rating >= 2 & rating <= 3)
> TNBus_4to5 <- subset(TNBus, rating >= 4 & rating <= 5)
>
> # Calculate the proportion of open businesses in each group
> open_2to3 <- sum(TNBus_2to3$open == "1") / nrow(TNBus_2to3)
> open_4to5 <- sum(TNBus_4to5$open == "1") / nrow(TNBus_4to5)
>
> # Create a summary table
> summary_table <- data.frame(Rating.Group = c("2-3", "4-5"),
+                               Proportion.Open = c(open_2to3, open_4to5))
>
> # Print the summary table
> print(summary_table)
```

```

Rating.Group Proportion.Open
1      2-3      0.7936508
2      4-5      0.8072045
>
> # Install ggplot2 if not already installed
> if (!requireNamespace("ggplot2", quietly = TRUE)) {
+   install.packages("ggplot2")
+ }
>
> # Load ggplot2
> library(ggplot2)
>
> # Create a histogram
> ggplot(summary_table, aes(x = Rating.Group, y = Proportion.Open, fill = Rating.Group)) +
+   geom_bar(stat = "identity", width = 0.5) +
+   scale_fill_manual(values = c("2-3" = "red", "4-5" = "blue")) +
+   labs(title = "Proportion of Open Businesses by Rating Group",
+        x = "Rating Group",

```



```

+   There is negligible difference between Low and High rated businesses remaining open.
+   theme_minimal()

```

```

> # Create a new dataframe with businesses in zip code 37221
> zip_37221 <- subset(TNBus, zip == "37221")
>
> # Order the dataframe by rating, ascending
> zip_37221_ordered <- zip_37221[order(zip_37221$rating),]
>
> # Select the bottom 25 rated businesses
> bottom_25 <- head(zip_37221_ordered, 25)
> print(bottom_25)

> # Print the names, rating, and the number of ratings for the bottom 25 businesses
> print(bottom_25[, c("name", "rating", "review_count")])
      name rating review_count
6787  Captain D's    1.0         7
8155   Eco Movers    1.0        13
10694  AT&T Store    1.0         5
2681  Vue at Warner Park  1.5        13

```

4606	Sonic Drive-In	1.5	11	
5256	AT&T Internet	1.5	30	
6745	Pizza Hut	1.5	13	
9580	KFC	1.5	19	
9621	Bar Louie	1.5	5	
10799	Pizza Hut	1.5	24	
11679	Southeast Financial	1.5	55	
11973	Shoneys	1.5	14	
2277	Microtel Inn & Suites by Wyndham Nashville	2.0	22	
2342	Chili's	2.0	91	
2825	Walgreens	2.0	17	
3027	Sears Auto Center	2.0	6	
3069	Papa John's Pizza	2.0	44	
3559	Baskin Robbins	2.0	15	
5107	Arby's	2.0	17	
5432	AMC Classic Bellevue 8	2.0	29	
5871	Harpeth Cleaners	2.0	7	
6504	Applebee's	2.0	18	
6779	Nail Time & Spa By Hollywood Nails	2.0	34	
7084	Michaels	2.0	6	
7415	Wendy's	2.0	21	

```
> # Print the names, rating, and the number of ratings for the top 25 businesses
> print(top_25[, c("name", "rating", "review_count")])
```

	name	rating	review_count
848	Nashville Pet Products	5.0	19
1745	Franklin Juice Company	5.0	5
3079	The Pilates Place	5.0	6
5910	Bedzzz Express	5.0	7
6100	Jeanette Wirz Permanent Cosmetics & Microblading	5.0	10
6264	Neko Press Art Studios	5.0	7
7323	MyEyeDr	5.0	6
9867	Bellevue 1st Plumbers	5.0	
9952	Beautiful eyebrows threading spa	5.0	
10723	Dental Partners - Bellevue	5.0	
10953	Bellevue Coin Laundry	5.0	
11120	Warner Parks	5.0	
11434	JB Custom Tailoring	5.0	
11786	Nashville Smiles	5.0	
11827	The Vapor Route	5.0	
168	Red Spirits & Wine	4.5	
212	Nashville Hypnosis	4.5	
572	Royal Range	4.5	
675	Iroquois Wine & Spirits	4.5	
751	Percy Warner Park	4.5	
1463	Workout Anytime Bellevue	4.5	
1604	Edwin Warner Park	4.5	
1667	Sakura Japanese Cuisine	4.5	
1851	Bellevue Smiles	4.5	
2027	Harpeth Valley Animal Hospital PC	4.5	

```

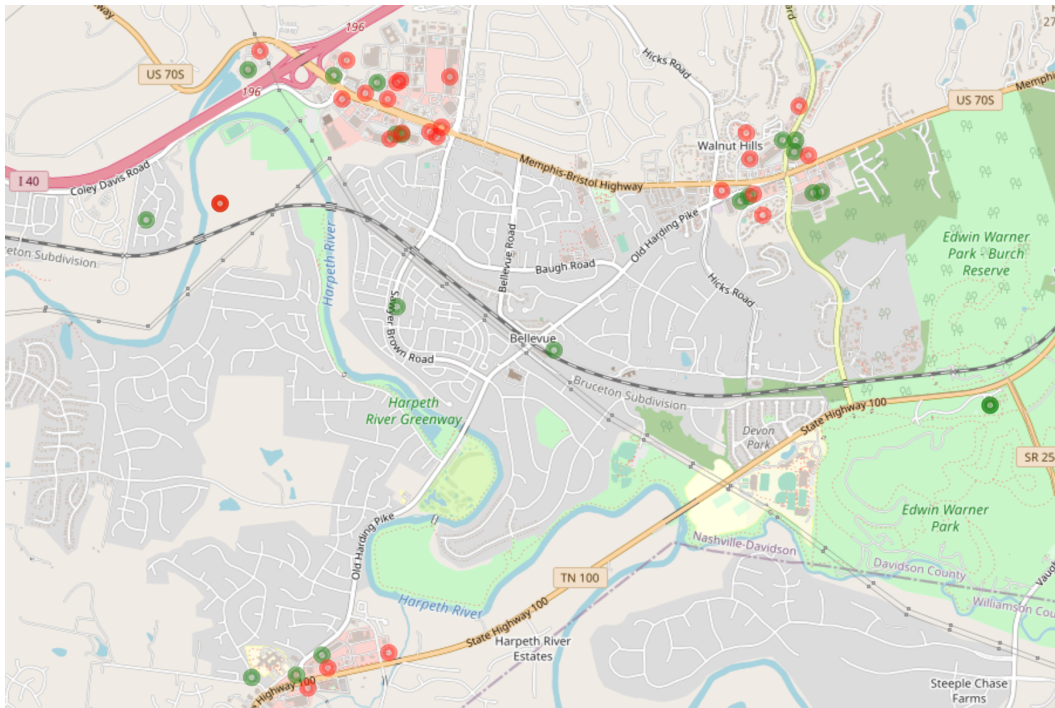
9867      6
9952      7
10723     10
10953     26
11120      7
11434     21
11786     13
11827      9
168       62
212       6
572       61
675       16
751      112
1463      11
1604      45
1667     114
1851       5
2027     20
>

```

```

> # Install and load the leaflet package
> if (!requireNamespace("leaflet", quietly = TRUE)) {
+   install.packages("leaflet")
+ }
> library(leaflet)
>
> # Create the map
> map <- leaflet() %>%
+   addTiles() %>%
+   addCircleMarkers(
+     data = top_25,
+     lng = ~as.numeric(long),
+     lat = ~as.numeric(lat),
+     color = "green",
+     popup = ~name,
+     label = ~name,
+     radius = 5
+   ) %>%
+   addCircleMarkers(
+     data = bottom_25,
+     lng = ~as.numeric(long),
+     lat = ~as.numeric(lat),
+     color = "red",
+     popup = ~name,
+     label = ~name,
+     radius = 5
+   )
>
> # Print the map
> map
>> # Calculate means for numeric columns in top_25 and bottom_25 dataframes
> top_means <- top_25 %>%
+   summarize(
+     mean_rating = mean(rating),
+     mean_review_count = mean(as.numeric(review_count)),
+     mean_longitude = mean(as.numeric(longitude)),
+     mean_latitude = mean(as.numeric(latitude))
+   )

```



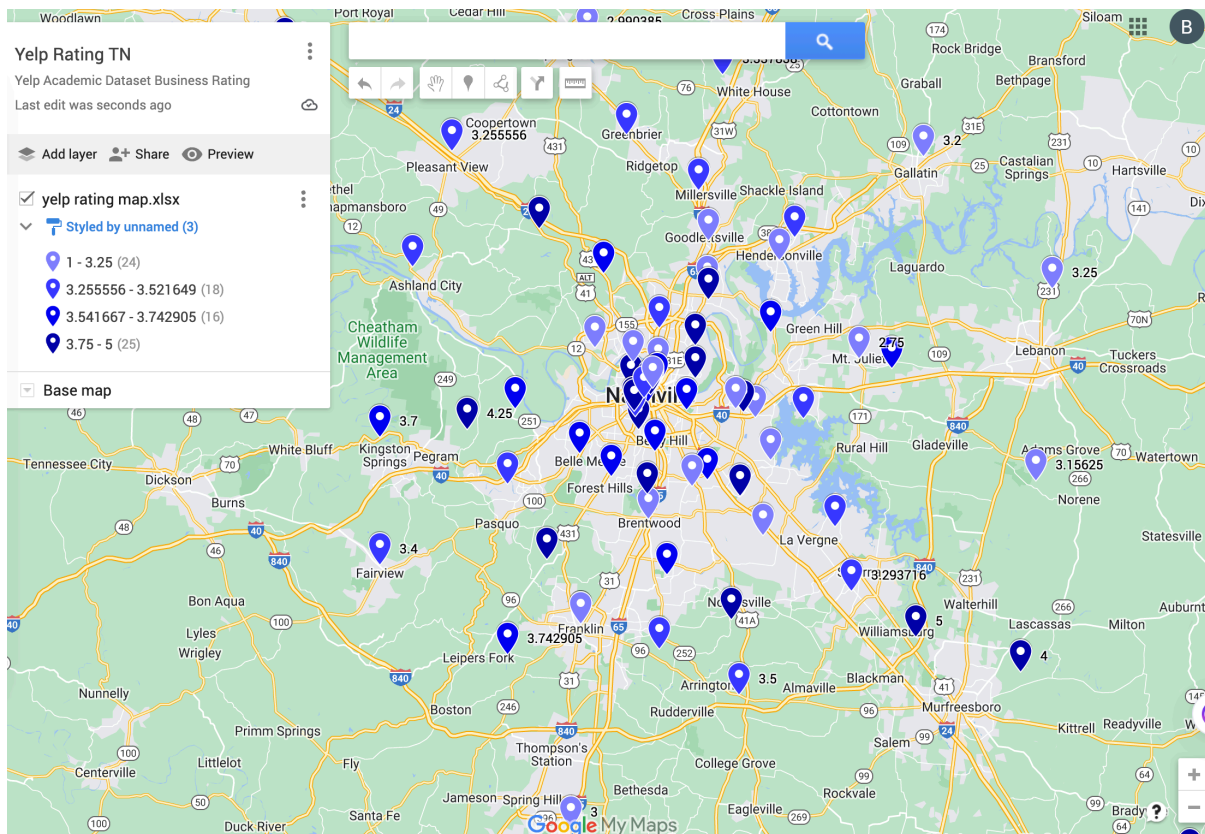
Caption

```

+ )
>
> bottom_means <- bottom_25 %>%
+   summarize(
+     mean_rating = mean(rating),
+     mean_review_count = mean(as.numeric(review_count)),
+     mean_longitude = mean(as.numeric(longitude)),
+     mean_latitude = mean(as.numeric(latitude))
+   )
>
> # Combine the means into a single table
> mean_comparison <- bind_rows(
+   mutate(top_means, group = "Top 25"),
+   mutate(bottom_means, group = "Bottom 25")
+ )
>
> # Print the table
> mean_comparison
  mean_rating mean_review_count mean_longitude mean_latitude
1      4.8      24.44      -86.93059      36.07157
2      1.7      21.44      -86.94376      36.07325
  group
1 Top 25
2 Bottom 25

```

For a bit of extra fun, I also made a Google Map of the businesses in TN that were ranked 2-3 stars vs 4-5 stars.



Interactive Map <https://www.google.com/maps/d/u/0/edit?mid=1jHg1D3pN-3ar7RcQOrAFMUITsDGHL94&usp=sharing>

This is the same code run thru `SQLFormatter` which some people may find easier to read

```
# Import necessary libraries
library(tidyverse) library(leaflet) # Import Business and TNBus
datasets
Business <- read.csv("yelp_business.csv") TNBus <-
read.csv("tnbus.csv") # Rename the column names in TNBus to
match those in Business
colnames(TNBus) [1] <- "ID" colnames(TNBus) [2] <- "name"
colnames(TNBus) [6] <- "zip" colnames(TNBus) [7] <- "lat"
colnames(TNBus) [8] <- "long" # Join the Business and TNBus
datasets based on ID
merged_data <- merge(Business, TNBus, by = "ID") # Filter
merged_data to only include businesses in zip code 37221
```

```

zip_37221 <- merged_data %>% filter(zip == "37221") # Create a
new dataframe with only the top 25 rated businesses in zip code
37221
top_25 <- zip_37221 %>% arrange(
  desc(rating)
) %>% # sort by descending rating
select
(
  name, rating, review_count, attributes,
  open
) %>% # select specific columns
head(25) # only take top 25 businesses
# Display the structure of the dataframe
str(TNBus) # Provide a summary of the dataframe
summary(TNBus) # Return the column names of the dataframe
names(TNBus) # Open the dataframe in a spreadsheet-like view
within RStudio
View(TNBus) # Open the dataframe in a spreadsheet-like view
within RStudio
> View(TNBus) > > # Create separate data frames for businesses
with ratings 2-3 and 4-5
> TNBus_2to3 <- subset(TNBus, rating >= 2 & rating <= 3) >
TNBus_4to5 <- subset(TNBus, rating >= 4 & rating <= 5) > > #
Calculate the proportion of open businesses in each group
> open_2to3 <- sum(TNBus_2to3$open == "1") / nrow(TNBus_2to3)
> open_4to5 <- sum(TNBus_4to5$open == "1") / nrow(TNBus_4to5) >
> # Create a summary table
> summary_table <- data.frame(
  Rating.Group = c("2-3", "4-5"),
  + Proportion.Open = c(open_2to3, open_4to5)
) > > # Print the summary table
> print(summary_table)
  Rating.Group Proportion.Open
1 2 - 3
0.7936508
2 4 - 5
0.8072045
> > # Install ggplot2 if not already
installed
> if (
  ! requireNamespace("ggplot2", quietly = TRUE)
) { + install.packages("ggplot2") + } > > # Load ggplot2
> library(ggplot2) > > # Create a histogram
> ggplot(
  summary_table,
  aes(
    x = Rating.Group, y = Proportion.Open,
    fill = Rating.Group
  )
) + + geom_bar(stat = "identity", width = 0.5) + +
scale_fill_manual(

```

```

values
  = c("2-3" = "red", "4-5" = "blue")
) + + labs(
  title = "Proportion of Open Businesses by Rating Group",
  + x = "Rating Group",
  + There is negligible difference between Low
  and High rated businesses remaining open.theme_minimal() > #
Create a new dataframe with businesses in zip code 37221
> zip_37221 <- subset(TNBus, zip == "37221") > > # Order the
dataframe by rating, ascending
> zip_37221_ordered <- zip_37221[order(zip_37221$rating),
] > > # Select the bottom 25 rated businesses
> bottom_25 <- head(zip_37221_ordered, 25) >
print(bottom_25) > # Print the names, rating, and the number of
ratings for the bottom 25 businesses
> print(
  bottom_25[,
  c("name", "rating", "review_count") ]
) name rating review_count 6787 Captain D 's 1.0
7
8155 Eco Movers 1.0
13
10694 AT&T Store 1.0
5
2681 Vue at Warner Park 1.5
13
4606 Sonic Drive-In 1.5
11
5256 AT&T Internet 1.5
30
6745 Pizza Hut 1.5
13
9580 KFC 1.5
19
9621 Bar Louie 1.5
5
10799 Pizza Hut 1.5
24
11679 Southeast Financial 1.5
55
11973 Shoneys 1.5
14
2277 Microtel Inn & Suites by Wyndham Nashville 2.0
22

```

```

2342 Chili' s 2.0 91 2825
Walgreens 2.0 17 3027 Sears Auto Center 2.0 6 3069 Papa John 's
Pizza 2.0 44
3559 Baskin Robbins 2.0
15
5107 Arby' s 2.0 17 5432
AMC Classic Bellevue 8 2.0 29 5871 Harpeth Cleaners 2.0 7 6504
Applebee 's 2.0 18
6779 Nail Time & Spa By Hollywood Nails 2.0
34
7084 Michaels 2.0
6
7415 Wendy' s 2.0 21 > #
Print the names, rating, and the number of ratings for the top
25 businesses
> print(
    top_25[
        c("name", "rating", "review_count") ]
    )
name rating 848 Nashville Pet Products 5.0 1745 Franklin
Juice Company 5.0 3079 The Pilates Place 5.0 5910 Bedzzz Express
5.0 6100 Jeanette Wirz Permanent Cosmetics & Microblading 5.0
6264 Neko Press Art Studios 5.0 7323 MyEyeDr 5.0 9867 Bellevue
1st Plumbers 5.0 9952 Beautiful eyebrows threading spa 5.0 10723
Dental Partners – Bellevue 5.0 10953 Bellevue Coin Laundry 5.0
11120 Warner Parks 5.0 11434 JB Custom Tailoring 5.0 11786
Nashville Smiles 5.0 11827 The Vapor Route 5.0 168 Red Spirits &
Wine 4.5 212 Nashville Hypnosis 4.5 572 Royal Range 4.5 675
Iroquois Wine & Spirits 4.5 751 Percy Warner Park 4.5 1463
Workout Anytime Bellevue 4.5 1604 Edwin Warner Park 4.5 1667
Sakura Japanese Cuisine 4.5 1851 Bellevue Smiles 4.5 2027
Harpeth Valley Animal Hospital PC 4.5 review_count 848 19 1745 5
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