CIS9760_Project2_Yaheng Wu(Phoebe)

Analysis of Yelp Business Intelligence Data

Big Idea:
In this project, I analyzed a subset of the Yelp's business, reviews and user data to answer the following three questions:

- Do Yelp Reviews Skew Negative?
- Should the Elite be Trusted?
- What is the Most Recommended Restaurant?

Data Source:
The three datasets originally come from Kaggle and they have been uploaded into an S3 bucket for the use of this project.

- s3://yelpreviewdataset/yelp_academic_dataset_business.json
- s3://yelpreviewdataset/yelp_academic_dataset_review.json
- s3://yelpreviewdataset/yelp_academic_dataset_user.json

Part I: Installation and Initial Setup

1. Install Packages

In [1]:
```
from pyspark.sql import SparkSession
my_spark = SparkSession.builder.getOrCreate()
sc.install_pypi_package("pandas==1.0.3")
sc.install_pypi_package("matplotlib==3.2.1")
sc.install_pypi_package("seaborn==0.10.0")
sc.install_pypi_package("wordcloud==1.8.1")
sc.list_packages()
```

```
Starting Spark application
```

ID	YARN Application ID	Kind	State	Spark UI	Driver log	Current session?
0	application_1606577942836_0001	pyspark	idle	Link	Link	✔

```
SparkSession available as 'spark'.

Collecting pandas==1.0.3
  Downloading https://files.pythonhosted.org/packages/4a/6a/94b219b8ea0f2d580169e85ed1ed
c0163743f55aaeca8a44c2e8fc1e344e/pandas-1.0.3-cp37-cp37m-manylinux1_x86_64.whl (10.0MB)
Requirement already satisfied: pytz>=2017.2 in /usr/local/lib/python3.7/site-packages (f
rom pandas==1.0.3)
Requirement already satisfied: numpy>=1.13.3 in /usr/local/lib64/python3.7/site-packages
(from pandas==1.0.3)
Collecting python-dateutil>=2.6.1 (from pandas==1.0.3)
  Downloading https://files.pythonhosted.org/packages/d4/70/d60450c3dd48ef87586924207ae8
907090de0b306af2bce5d134d78615cb/python_dateutil-2.8.1-py2.py3-none-any.whl (227kB)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/site-packages (from
python-dateutil>=2.6.1->pandas==1.0.3)
Installing collected packages: python-dateutil, pandas
Successfully installed pandas-1.0.3 python-dateutil-2.8.1
```

```
Collecting matplotlib==3.2.1
  Downloading https://files.pythonhosted.org/packages/b2/c2/71fcf957710f3ba1f09088b35776
a799ba7dd95f7c2b195ec800933b276b/matplotlib-3.2.1-cp37-cp37m-manylinux1_x86_64.whl (12.4
MB)
Requirement already satisfied: python-dateutil>=2.1 in /mnt/tmp/1606578803167-0/lib/pyth
on3.7/site-packages (from matplotlib==3.2.1)
Collecting pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 (from matplotlib==3.2.1)
  Downloading https://files.pythonhosted.org/packages/8a/bb/488841f56197b13700afd5658fc2
79a2025a39e22449b7cf29864669b15d/pyparsing-2.4.7-py2.py3-none-any.whl (67kB)
Collecting cycler>=0.10 (from matplotlib==3.2.1)
  Downloading https://files.pythonhosted.org/packages/f7/d2/e07d3ebb2bd7af696440ce7e754c
59dd546ffe1bbe732c8ab68b9c834e61/cycler-0.10.0-py2.py3-none-any.whl
Requirement already satisfied: numpy>=1.11 in /usr/local/lib64/python3.7/site-packages
(from matplotlib==3.2.1)
Collecting kiwisolver>=1.0.1 (from matplotlib==3.2.1)
  Downloading https://files.pythonhosted.org/packages/d2/46/231de802ade4225b76b96cffe419
cf3ce52bbe92e3b092cf12db7d11c207/kiwisolver-1.3.1-cp37-cp37m-manylinux1_x86_64.whl (1.1M
B)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/site-packages (from
python-dateutil>=2.1->matplotlib==3.2.1)
Installing collected packages: pyparsing, cycler, kiwisolver, matplotlib
Successfully installed cycler-0.10.0 kiwisolver-1.3.1 matplotlib-3.2.1 pyparsing-2.4.7

Collecting seaborn==0.10.0
  Downloading https://files.pythonhosted.org/packages/70/bd/5e6bf595fe6ee0f257ae49336dd1
80768c1ed3d7c7155b2fdf894c1c808a/seaborn-0.10.0-py3-none-any.whl (215kB)
Requirement already satisfied: pandas>=0.22.0 in /mnt/tmp/1606578803167-0/lib/python3.7/
site-packages (from seaborn==0.10.0)
Requirement already satisfied: numpy>=1.13.3 in /usr/local/lib64/python3.7/site-packages
(from seaborn==0.10.0)
Collecting scipy>=1.0.1 (from seaborn==0.10.0)
  Downloading https://files.pythonhosted.org/packages/dc/7e/8f6a79b102ca1ea928bae8998b05
bf5dc24a90571db13cd119f275ba6252/scipy-1.5.4-cp37-cp37m-manylinux1_x86_64.whl (25.9MB)
Requirement already satisfied: matplotlib>=2.1.2 in /mnt/tmp/1606578803167-0/lib/python
3.7/site-packages (from seaborn==0.10.0)
Requirement already satisfied: pytz>=2017.2 in /usr/local/lib/python3.7/site-packages (f
rom pandas>=0.22.0->seaborn==0.10.0)
Requirement already satisfied: python-dateutil>=2.6.1 in /mnt/tmp/1606578803167-0/lib/py
thon3.7/site-packages (from pandas>=0.22.0->seaborn==0.10.0)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /mnt/tmp/1606
578803167-0/lib/python3.7/site-packages (from matplotlib>=2.1.2->seaborn==0.10.0)
Requirement already satisfied: cycler>=0.10 in /mnt/tmp/1606578803167-0/lib/python3.7/si
te-packages (from matplotlib>=2.1.2->seaborn==0.10.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /mnt/tmp/1606578803167-0/lib/python
3.7/site-packages (from matplotlib>=2.1.2->seaborn==0.10.0)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/site-packages (from
python-dateutil>=2.6.1->pandas>=0.22.0->seaborn==0.10.0)
Installing collected packages: scipy, seaborn
Successfully installed scipy-1.5.4 seaborn-0.10.0

Collecting wordcloud==1.8.1
  Downloading https://files.pythonhosted.org/packages/1b/06/0516bdba2ebdc0d5bd476aa66f94
666dd0ad6b9abda723fdf28e451db919/wordcloud-1.8.1-cp37-cp37m-manylinux1_x86_64.whl (366k
B)
Collecting pillow (from wordcloud==1.8.1)
  Downloading https://files.pythonhosted.org/packages/af/fa/c1302a26d5e1a17fa8e10e43417b
6cf038b0648c4b79fcf2302a4a0c5d30/Pillow-8.0.1-cp37-cp37m-manylinux1_x86_64.whl (2.2MB)
Requirement already satisfied: numpy>=1.6.1 in /usr/local/lib64/python3.7/site-packages
(from wordcloud==1.8.1)
Requirement already satisfied: matplotlib in /mnt/tmp/1606578803167-0/lib/python3.7/site
-packages (from wordcloud==1.8.1)
Requirement already satisfied: python-dateutil>=2.1 in /mnt/tmp/1606578803167-0/lib/pyth
on3.7/site-packages (from matplotlib->wordcloud==1.8.1)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /mnt/tmp/1606
578803167-0/lib/python3.7/site-packages (from matplotlib->wordcloud==1.8.1)
```

```
Requirement already satisfied: cycler>=0.10 in /mnt/tmp/1606578803167-0/lib/python3.7/si
te-packages (from matplotlib->wordcloud==1.8.1)
Requirement already satisfied: kiwisolver>=1.0.1 in /mnt/tmp/1606578803167-0/lib/python
3.7/site-packages (from matplotlib->wordcloud==1.8.1)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/site-packages (from
python-dateutil>=2.1->matplotlib->wordcloud==1.8.1)
Installing collected packages: pillow, wordcloud
Successfully installed pillow-8.0.1 wordcloud-1.8.1

Package                    Version
-------------------------- ---------
beautifulsoup4             4.9.1
boto                       2.49.0
click                      7.1.2
cycler                     0.10.0
jmespath                   0.10.0
joblib                     0.16.0
kiwisolver                 1.3.1
lxml                       4.5.2
matplotlib                 3.2.1
mysqlclient                1.4.2
nltk                       3.5
nose                       1.3.4
numpy                      1.16.5
pandas                     1.0.3
Pillow                     8.0.1
pip                        9.0.1
py-dateutil                2.2
pyparsing                  2.4.7
python-dateutil            2.8.1
python37-sagemaker-pyspark 1.4.0
pytz                       2020.1
PyYAML                     5.3.1
regex                      2020.7.14
scipy                      1.5.4
seaborn                    0.10.0
setuptools                 28.8.0
six                        1.13.0
soupsieve                  1.9.5
tqdm                       4.48.2
wheel                      0.29.0
windmill                   1.6
wordcloud                  1.8.1
```

2. Importing

In [2]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from os import path
from PIL import Image
from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator
import pyspark.sql.functions as F
from pyspark.sql.functions import explode, split, desc, col, avg, udf, when
from pyspark.sql.types import IntegerType, StringType, DoubleType
```

3. Loading Data

In [3]:
```
business_df = spark.read.json('s3://yelpreviewdataset/yelp_academic_dataset_business.js
```

4. Overview of Data

In [4]:
```
print(f'Columns: {len(business_df.columns)} | Rows: {business_df.count():,}')
```

```
Columns: 14 | Rows: 209,393
```

In [5]:
```
business_df.printSchema()
```

```
root
 |-- address: string (nullable = true)
 |-- attributes: struct (nullable = true)
 |    |-- AcceptsInsurance: string (nullable = true)
 |    |-- AgesAllowed: string (nullable = true)
 |    |-- Alcohol: string (nullable = true)
 |    |-- Ambience: string (nullable = true)
 |    |-- BYOB: string (nullable = true)
 |    |-- BYOBCorkage: string (nullable = true)
 |    |-- BestNights: string (nullable = true)
 |    |-- BikeParking: string (nullable = true)
 |    |-- BusinessAcceptsBitcoin: string (nullable = true)
 |    |-- BusinessAcceptsCreditCards: string (nullable = true)
 |    |-- BusinessParking: string (nullable = true)
 |    |-- ByAppointmentOnly: string (nullable = true)
 |    |-- Caters: string (nullable = true)
 |    |-- CoatCheck: string (nullable = true)
 |    |-- Corkage: string (nullable = true)
 |    |-- DietaryRestrictions: string (nullable = true)
 |    |-- DogsAllowed: string (nullable = true)
 |    |-- DriveThru: string (nullable = true)
 |    |-- GoodForDancing: string (nullable = true)
 |    |-- GoodForKids: string (nullable = true)
 |    |-- GoodForMeal: string (nullable = true)
 |    |-- HairSpecializesIn: string (nullable = true)
 |    |-- HappyHour: string (nullable = true)
 |    |-- HasTV: string (nullable = true)
 |    |-- Music: string (nullable = true)
 |    |-- NoiseLevel: string (nullable = true)
 |    |-- Open24Hours: string (nullable = true)
 |    |-- OutdoorSeating: string (nullable = true)
 |    |-- RestaurantsAttire: string (nullable = true)
 |    |-- RestaurantsCounterService: string (nullable = true)
 |    |-- RestaurantsDelivery: string (nullable = true)
 |    |-- RestaurantsGoodForGroups: string (nullable = true)
 |    |-- RestaurantsPriceRange2: string (nullable = true)
 |    |-- RestaurantsReservations: string (nullable = true)
 |    |-- RestaurantsTableService: string (nullable = true)
 |    |-- RestaurantsTakeOut: string (nullable = true)
 |    |-- Smoking: string (nullable = true)
 |    |-- WheelchairAccessible: string (nullable = true)
 |    |-- WiFi: string (nullable = true)
 |-- business_id: string (nullable = true)
 |-- categories: string (nullable = true)
 |-- city: string (nullable = true)
 |-- hours: struct (nullable = true)
 |    |-- Friday: string (nullable = true)
 |    |-- Monday: string (nullable = true)
 |    |-- Saturday: string (nullable = true)
 |    |-- Sunday: string (nullable = true)
```

```
|    |-- Thursday: string (nullable = true)
|    |-- Tuesday: string (nullable = true)
|    |-- Wednesday: string (nullable = true)
|-- is_open: long (nullable = true)
|-- latitude: double (nullable = true)
|-- longitude: double (nullable = true)
|-- name: string (nullable = true)
|-- postal_code: string (nullable = true)
|-- review_count: long (nullable = true)
|-- stars: double (nullable = true)
|-- state: string (nullable = true)
```

Display the first 5 rows with the following columns:

- business_id
- name
- city
- state
- categories

In [6]:
```
busi_df = business_df.select('business_id', 'name', 'city', 'state', 'stars', 'categori
busi_df.show(5)
```

```
+--------------------+--------------------+--------------+-----+-----+----------------
---+
|         business_id|                name|          city|state|stars|          categor
ies|
+--------------------+--------------------+--------------+-----+-----+----------------
---+
|f9NumwFMBDn751xgF...|The Range At Lake...|      Cornelius|   NC|  3.5|Active Life, Gu
n/...|
|Yzvjg0SayhoZgCljU...|   Carlos Santo, NMD|     Scottsdale|   AZ|  5.0|Health & Medica
l,...|
|XNoUzKckATkOD1hP6...|             Felinus|       Montreal|   QC|  5.0|Pets, Pet Servic
e...|
|6OAZjbxqM5ol29BuH...|Nevada House of Hose|North Las Vegas|   NV|  2.5|Hardware Stores,
...|
|51M2Kk903DFYI6gnB...|USE MY GUY SERVIC...|          Mesa|   AZ|  4.5|Home Services, P
l...|
+--------------------+--------------------+--------------+-----+-----+----------------
---+
only showing top 5 rows
```

Part II: Analyzing Categories

Let's now answer: **How many unique categories are represented in this dataset?**

Essentially, we have the categories per business as a list - this is useful to quickly see what each business might be represented as but it is difficult to easily answer the following questions such as:

- How many businesses are categorized as Active Life?
- What are the top 20 most popular categories available?

1. Association Table

We need to "break out" these categories from the business ids? One common approach to take is to build an association table mapping a single business id multiple times to each distinct category.

For instance, given the following:

business_id	categories
abcd123	a,b,c

We would like to derive something like:

business_id	category
abcd123	a
abcd123	b
abcd123	c

What this does is allow us to then perform a myriad of rollups and other analysis on this association table which can aid us in answering the questions asked above.

Display the first 5 rows of the association table below

In [7]:
```
associ_table_one = business_df.select('business_id', explode(split(business_df.categori
associ_table_one.show(5)
```

```
+--------------------+----------------+
|         business_id|        category|
+--------------------+----------------+
|f9NumwFMBDn751xgF...|     Active Life|
|f9NumwFMBDn751xgF...|Gun/Rifle Ranges|
|f9NumwFMBDn751xgF...|     Guns & Ammo|
|f9NumwFMBDn751xgF...|        Shopping|
|Yzvjg0SayhoZgCljU...|Health & Medical|
+--------------------+----------------+
only showing top 5 rows
```

2. Total Unique Categories

Finally, we are ready to answer the question: **what is the total number of unique categories available?**

In [8]:
```
associ_table_one.select('category').distinct().count()
```

```
1336
```

3. Top Categories By Business

Now let's find the top categories in this dataset by rolling up categories.

Counts of Businesses / Category

In [9]:
```
category_count = associ_table_one.select('category').groupby(associ_table_one.category)
category_count.show()
```

```
+--------------------+-----+
```

```
|            category|count|
+--------------------+-----+
|      Dermatologists|  341|
|      Paddleboarding|   36|
|        Aerial Tours|   28|
|         Hobby Shops|  828|
|          Bubble Tea|  720|
|             Embassy|   13|
|            Handyman|  682|
|             Tanning|  938|
|      Aerial Fitness|   29|
|             Tempura|    1|
|             Falafel|  159|
|       Outlet Stores|  399|
|        Summer Camps|  318|
|     Clothing Rental|   55|
|      Sporting Goods| 2311|
|     Cooking Schools|  118|
|  College Counseling|   15|
|  Lactation Services|   50|
|Ski & Snowboard S...|   50|
|             Museums|  359|
+--------------------+-----+
only showing top 20 rows
```

Bar Chart of Top Categories

With this data available, let us now build a barchart of the top 20 categories

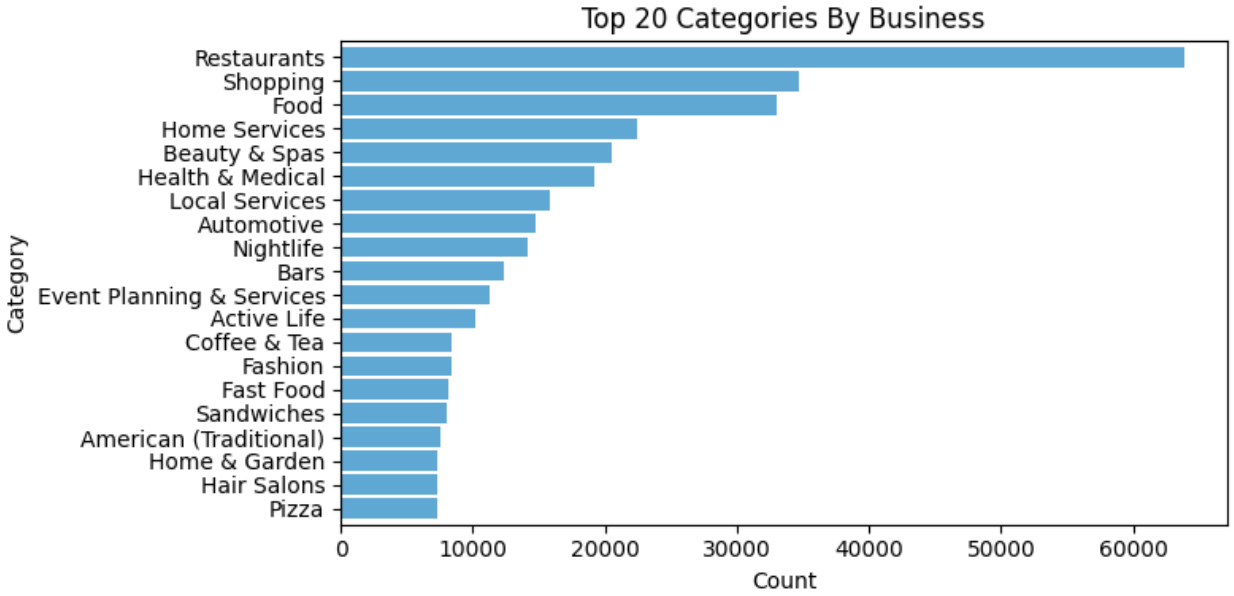
In [10]:

```
top_20 = category_count.sort(desc('count')).limit(20).toPandas()

ax = top_20.plot(kind='barh', x='category', y='count',
            figsize=(8, 4), color='#5fa8d3', zorder=2, width=0.85)

ax.invert_yaxis()
ax.set_xlabel("Count")
ax.set_ylabel("Category")
ax.set_title("Top 20 Categories By Business")
ax.get_legend().remove()

plt.tight_layout()
%matplot plt
```



Clears the entire current figure with all its axes

In [11]:
```
plt.clf()
plt.cla()
plt.close()
```

Part III. Do Yelp Reviews Skew Negative?

Oftentimes, it is said that the only people who write a written review are those who are extremely dissatisfied or extremely satisfied with the service received.

How true is this really? Let's try and answer this question.

1. Loading Review Data

Begin by loading the review data set from S3 and printing schema to determine what data is available

In [12]:
```
review_df = spark.read.json('s3://yelpreviewdataset/yelp_academic_dataset_review.json')
review_df.printSchema()
```

```
root
 |-- business_id: string (nullable = true)
 |-- cool: long (nullable = true)
 |-- date: string (nullable = true)
 |-- funny: long (nullable = true)
 |-- review_id: string (nullable = true)
 |-- stars: double (nullable = true)
 |-- text: string (nullable = true)
 |-- useful: long (nullable = true)
 |-- user_id: string (nullable = true)
```

Let's begin by listing the business_id and stars columns together for the user reviews data

```
business_stars = review_df.select('business_id', 'stars')
```

In [13]:
```
business_stars.show(5)
```

```
+--------------------+-----+
|         business_id|stars|
+--------------------+-----+
|-MhfebM0QIsKt87iD...|  2.0|
|1brU8StCq3yDfr-QM...|  1.0|
|HQl28KMwrEKHqhFrr...|  5.0|
|5JxlZaqCnk1MnbgRi...|  1.0|
|IS4cv902ykd8wj1TR...|  4.0|
+--------------------+-----+
only showing top 5 rows
```

Now, let's aggregate along the stars column to get a resultant dataframe that displays average stars per business as accumulated by users who **took the time to submit a written review**

In [14]:
```
written_review = review_df.where(col("text").isNotNull()).groupby(review_df.business_id
written_review.show(5)
```

```
+--------------------+------------------+
|         business_id|        avg(stars)|
+--------------------+------------------+
|VHsNB3pdGVcRgs6C3...| 3.411764705882353|
|RMjCnixEY5i12Ciqn...|3.5316455696202533|
|ipFreSFhjClfNETuM...|               2.6|
|dLDMU8bOLnkDTmPUr...| 4.942857142857143|
|Qm2datcYBPXrPATVG...| 4.352941176470588|
+--------------------+------------------+
only showing top 5 rows
```

Now the fun part - let's join our two dataframes (reviews and business data) by business_id

In [15]:
```
user_review = review_df.groupby(review_df.business_id).agg(avg(col("stars")))
# inner join
joined_written_review = business_df.join(written_review, on=['business_id'])
joined_user_review = business_df.join(user_review,on=['business_id'])
```

Let's see a few of these:

In [16]:
```
joined_written_review.select("""avg(stars)""","stars","name","city","state").sort(desc(
```

```
+----------+-----+--------------------+----------+-----+
|avg(stars)|stars|                name|      city|state|
+----------+-----+--------------------+----------+-----+
|       5.0|  5.0| KNG Marketing Group|     Tempe|   AZ|
|       5.0|  5.0|Eagle Ridge Painting|  Chandler|   AZ|
|       5.0|  5.0|       MAC Cosmetics|Pittsburgh|   PA|
|       5.0|  5.0| Hernandez Ironworks|   Phoenix|   AZ|
|       5.0|  5.0|Edward J Malik, O...| Las Vegas|   NV|
+----------+-----+--------------------+----------+-----+
only showing top 5 rows
```

Compute a new dataframe that calculates what we will call the skew (for lack of a better word) between the avg stars accumulated from written reviews and the actual star rating of a business (ie: the average of stars given by reviewers who wrote an actual review and reviewers who just provided a star rating).

The formula you can use is something like:

(row['avg(stars)'] - row['stars']) / row['stars']

If the **skew** is negative, we can interpret that to be: reviewers who left a written response were more dissatisfied than normal. If **skew** is positive, we can interpret that to be: reviewers who left a written response were more satisfied than normal.

In [17]:
```
fv_joined_written_review = joined_written_review.select("avg(stars)","stars","name","ci
                                                        .sort("""avg(stars)""",ascending=False)

fv_joined_user_review = joined_user_review.select("avg(stars)","stars","name","city","s
                                                 .sort("""avg(stars)""",ascending=False)

fv_df = fv_joined_written_review.withColumn("skew",
                                            ((fv_joined_written_review["""avg(stars)"""
                                             /fv_joined_written_review["stars"]))

fv_df.sort("""skew""",ascending=False).show()
```

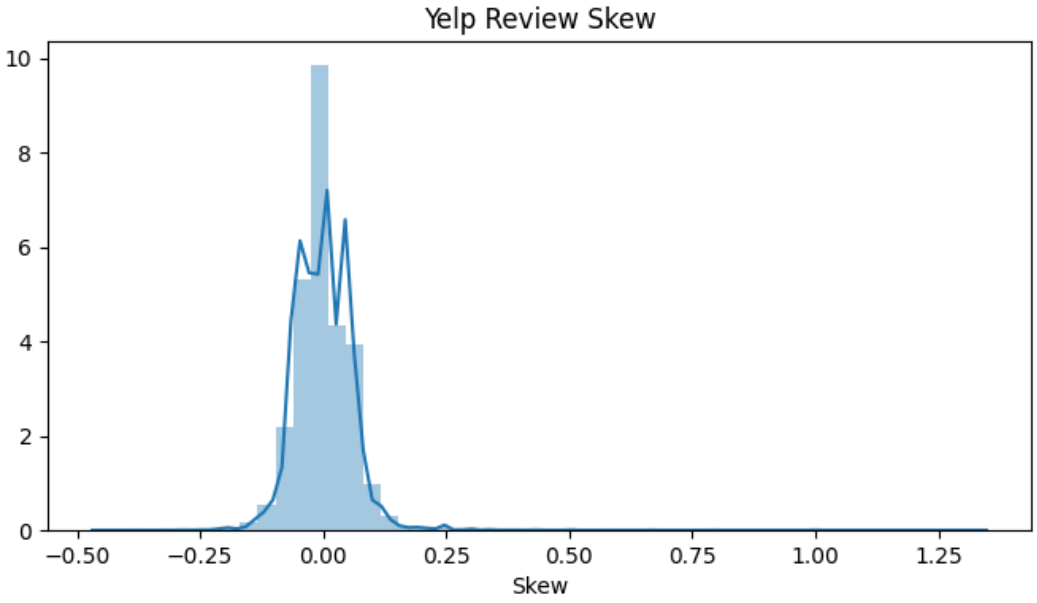
```
+------------------+-----+--------------------+----------+-----+------------------+
|        avg(stars)|stars|                name|      city|state|              skew|
+------------------+-----+--------------------+----------+-----+------------------+
|2.3333333333333335|  1.0| Mikado Sushi Robata|   Toronto|   ON|1.3333333333333335|
|3.3333333333333335|  1.5|Black Brook Golf ...|    Mentor|   OH|1.2222222222222223|
|               2.0|  1.0|DollarPlus Discou...| Las Vegas|   NV|               1.0|
|               2.0|  1.0|Torrey Pines Reha...| Las Vegas|   NV|               1.0|
|               2.0|  1.0|Golden West Pool ...| Las Vegas|   NV|               1.0|
|               2.0|  1.0|           H&R Block|   Calgary|   AB|               1.0|
|               2.0|  1.0|Convenient Food M...|    Elyria|   OH|               1.0|
|               2.0|  1.0|Foothills Primary...|  Chandler|   AZ|               1.0|
|               2.0|  1.0|Affordable Decks ...|Bethel Park|   PA|               1.0|
|               2.0|  1.0|          StorageOne| Las Vegas|   NV|               1.0|
|               2.0|  1.0|Children's Campus...|   Phoenix|   AZ|               1.0|
|               2.0|  1.0|            Water Dr|   Calgary|   AB|               1.0|
|               2.8|  1.5|RideNow Powerspor...|   Phoenix|   AZ|0.8666666666666666|
|1.8333333333333333|  1.0|Tri-County Snow P...|    Medina|   OH|0.8333333333333333|
|               1.8|  1.0|Mr. Transmission/...|  Matthews|   NC|               0.8|
|               1.8|  1.0|    1-2-3 Automotive| Henderson|   NV|               0.8|
|               1.8|  1.0|Mathis Towing and...| Charlotte|   NC|               0.8|
|               1.8|  1.0|         Pulte Homes| Las Vegas|   NV|               0.8|
|               1.8|  1.0|Colangelo's no Fr...|  Oakville|   ON|               0.8|
|               1.8|  1.0|The Continental A...|   Phoenix|   AZ|               0.8|
+------------------+-----+--------------------+----------+-----+------------------+
only showing top 20 rows
```

In [18]:
```
fv_df = fv_df.toPandas()
```

And finally, graph it!

In [19]:
```
plt.figure(figsize=(8,4))
ax = sns.distplot(fv_df["skew"])
ax.set_xlabel('Skew')
plt.title("Yelp Review Skew")

%matplot plt
```



Clears the entire current figure with all its axes

In [20]:
```
plt.clf()
plt.cla()
plt.close()
```

So, do Yelp (written) Reviews skew negative? Does this analysis actually prove anything? Expound on implications / interpretations of this graph.

The distribution of skew appears to be normal, but skewed a little bit to the right. The implications of the above graph are that the satisfaction level of reviewers who left positively skewed reviews is greater than the dissatisfaction level of reviewers who left negatively skewed reviews. In other words, reviewers who left a written response were slightly more satisfied than normal.

Part IV. Should the Elite be Trusted?

How accurate or close are the ratings of an "elite" user (check Users table schema) vs the actual business rating

It takes a special Yelper to become an Elite. Frequent, quality reviews and photos are important in the application of the elite status on Yelp. Elite candidates need to meet the criteria below for the consideration.

To become Elite, Yelpers agree that they

- Are using their real name on Yelp.
- Have a clear photo of themself on their profile page.
- Are of legal drinking age where they live.

They also agree that they are NOT

- A business owner.
- Closely affiliated with a business owner.
- Managing a Yelp Business Account.
- Working for one of Yelp's competitors.

It's important to know that accepting compensation or freebies in exchange for reviews or leveraging the Elite Squad for personal or commercial gain will result in Elite status being revoked or account closure.

1. Loading User Data

In [21]:
```
user_df = spark.read.json('s3://yelpreviewdataset/yelp_academic_dataset_user.json')
```

2. Overview of Data

In [22]:
```
user_df.printSchema()
print(f'User Dataset Columns: {len(user_df.columns)} | Rows: {user_df.count():,}')
review_df.printSchema()
print(f'Review Dataset Columns: {len(review_df.columns)} | Rows: {review_df.count():,}'
```

```
root
 |-- average_stars: double (nullable = true)
 |-- compliment_cool: long (nullable = true)
 |-- compliment_cute: long (nullable = true)
 |-- compliment_funny: long (nullable = true)
 |-- compliment_hot: long (nullable = true)
 |-- compliment_list: long (nullable = true)
 |-- compliment_more: long (nullable = true)
 |-- compliment_note: long (nullable = true)
 |-- compliment_photos: long (nullable = true)
 |-- compliment_plain: long (nullable = true)
 |-- compliment_profile: long (nullable = true)
 |-- compliment_writer: long (nullable = true)
 |-- cool: long (nullable = true)
 |-- elite: string (nullable = true)
 |-- fans: long (nullable = true)
 |-- friends: string (nullable = true)
 |-- funny: long (nullable = true)
 |-- name: string (nullable = true)
 |-- review_count: long (nullable = true)
 |-- useful: long (nullable = true)
 |-- user_id: string (nullable = true)
 |-- yelping_since: string (nullable = true)

User Dataset Columns: 22 | Rows: 1,968,703
root
 |-- business_id: string (nullable = true)
 |-- cool: long (nullable = true)
 |-- date: string (nullable = true)
 |-- funny: long (nullable = true)
 |-- review_id: string (nullable = true)
 |-- stars: double (nullable = true)
 |-- text: string (nullable = true)
 |-- useful: long (nullable = true)
 |-- user_id: string (nullable = true)
```

```
Review Dataset Columns: 9 | Rows: 8,021,122
```

In [23]:
```
user_df.select('user_id','elite').show(5)
```

```
+--------------------+--------------------+
|             user_id|               elite|
+--------------------+--------------------+
|ntlvfPzc8eglqvk92...|                    |
|FOBRPlBHa3WPHFB5q...|2008,2009,2010,20...|
|zZUnPeh2hEp0WydbA...|                2010|
|QaELAmRcDc5TfJEyl...|                2009|
|xvu8G900tezTzbbfq...|2009,2010,2011,20...|
+--------------------+--------------------+
only showing top 5 rows
```

3. Split Elite column

In [24]:
```
user_elite_split = user_df.select('user_id', explode(split(user_df.elite, ',')).alias('
user_elite_split = user_elite_split.withColumn('elite', user_elite_split.elite.cast(Int
user_elite_split.show(5)
print(f'User Elite Split Dataset Columns: {len(user_elite_split.columns)} | Rows: {user
```

```
+--------------------+-----+
|             user_id|elite|
+--------------------+-----+
|ntlvfPzc8eglqvk92...| null|
|FOBRPlBHa3WPHFB5q...| 2008|
|FOBRPlBHa3WPHFB5q...| 2009|
|FOBRPlBHa3WPHFB5q...| 2010|
|FOBRPlBHa3WPHFB5q...| 2011|
+--------------------+-----+
only showing top 5 rows

User Elite Split Dataset Columns: 2 | Rows: 2,125,315
```

In [25]:
```
user_elite_split.select("elite").distinct().sort('elite', ascending=False).show()
```

```
+-----+
|elite|
+-----+
| 2018|
| 2017|
| 2016|
| 2015|
| 2014|
| 2013|
| 2012|
| 2011|
| 2010|
| 2009|
| 2008|
| 2007|
| 2006|
| null|
+-----+
```

In [26]:
```
Elite_or_Not = user_elite_split.select('user_id',
           when(user_elite_split.elite.isNull(), "Not Elite").otherwise("Elite").alias(
```

```
Elite_or_Not.show()
```

```
+--------------------+------------+
|             user_id|Elite or Not|
+--------------------+------------+
|ntlvfPzc8eglqvk92...|   Not Elite|
|FOBRPlBHa3WPHFB5q...|       Elite|
|FOBRPlBHa3WPHFB5q...|       Elite|
|FOBRPlBHa3WPHFB5q...|       Elite|
|FOBRPlBHa3WPHFB5q...|       Elite|
|FOBRPlBHa3WPHFB5q...|       Elite|
|FOBRPlBHa3WPHFB5q...|       Elite|
|zZUnPeh2hEp0WydbA...|       Elite|
|QaELAmRcDc5TfJEyl...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|xvu8G900tezTzbbfq...|       Elite|
|z5_82komKV3mI4ASG...|       Elite|
|ttumcu6hWshk_EJVW...|   Not Elite|
+--------------------+------------+
only showing top 20 rows
```

In [27]:
```
unique_user_df = Elite_or_Not.dropDuplicates(['user_id'])
unique_user_df.show()
```

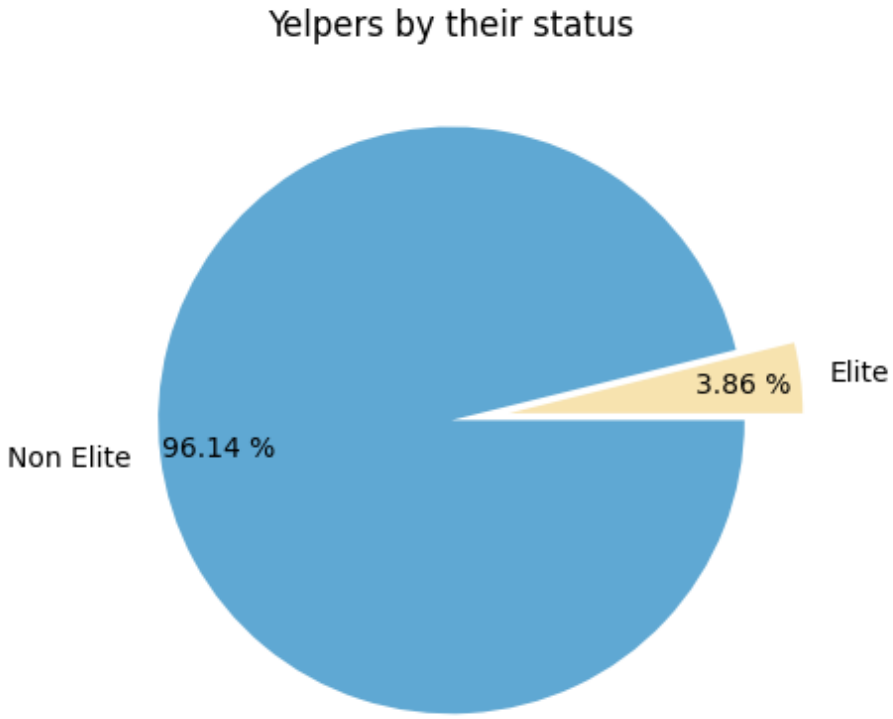
```
+--------------------+------------+
|             user_id|Elite or Not|
+--------------------+------------+
|---RfKzBwQ8t3wu-L...|   Not Elite|
|--1UpCuUDJQbqiuFX...|   Not Elite|
|--AGAPpP1pgp1afbq...|   Not Elite|
|--C-42rr7hPSsUROJ...|   Not Elite|
|--ChzqcPs4YFWlw1j...|   Not Elite|
|--ET3paBtrThD95dk...|   Not Elite|
|--GLTFzU93A40YB56...|   Not Elite|
|--I4wRDhmM2J2VLzK...|   Not Elite|
|--RquisWmBzcezXZr...|   Not Elite|
|--UizzbnQlZg7bEv2...|   Not Elite|
|--cd_gA-9Q8gM9P2c...|   Not Elite|
|--dhSVoOFDBiMCCwD...|   Not Elite|
|--fpTdHQOGWGbAjk9...|   Not Elite|
|--ju6XpRd0dY1Swmf...|   Not Elite|
|--oVdTxVd7QVr8Y0U...|   Not Elite|
|--pWqE-KOwDWo5ADG...|   Not Elite|
|--t6W1JHbStaCp5RO...|   Not Elite|
|--tmwndDOZJwfRvvt...|   Not Elite|
|--yrdC1dIR6VYsW6k...|   Not Elite|
|-06viLTmtlRTHxxDg...|   Not Elite|
+--------------------+------------+
only showing top 20 rows
```

Plot Yelpers by their status

In [60]:
```
eliteCount = unique_user_df.select("Elite or Not").filter(col("Elite or Not") == "Elite
noneliteCount = unique_user_df.select("Elite or Not").filter(col("Elite or Not") == "No
labels = ["Elite", "Non Elite"]
```

```
colors = ["#f7e3af", "#5fa8d3"]
explode = (0.2, 0)
plt.pie([eliteCount,noneliteCount], labels = labels, colors = colors, autopct="%.2f %%"
plt.title("Yelpers by their status")
plt.show()

%matplot plt
```



As we can see from the pie chart above, around 96.14% of Yelpers are non elite, whereas only 3.86% of Yelpers are elite.

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In [73]:
```
plt.clf()
plt.cla()
plt.close()
```

4. Join "Unique User" Dataset with Review Dataset

In [28]:
```
user_join_review = review_df.join(unique_user_df, on = "user_id", how='left')
print(f'User Join Review Dataset Columns: {len(user_join_review.columns)} | Rows: {user
```

```
User Join Review Dataset Columns: 10 | Rows: 8,021,122
```

5. Clean Data

Combined Dateset which includes elite and non-elite

In [29]:
```
combine_df = user_join_review.select('review_id','business_id','stars','user_id','Elite
```

Combined (Elite and Non-Elite) Average Ratings Grouped by Business ID

In [30]:
```
combine_stars_df = combine_df.groupBy("business_id").agg(F.mean('stars').alias('Stars')
```

Elite Only Dataset

In [31]:
```
elite_df = combine_df.filter(col("Elite or Not") == "Elite")
```

Elite Average Rating Grouped by Business ID

In [32]:
```
elite_stars_df = elite_df.groupBy("business_id").agg(F.mean('stars').alias('Stars rated
```

Non-Elite Dataset

In [33]:
```
non_elite_df = combine_df.filter(col("Elite or Not") == "Not Elite")
```

Non-Elite Average Rating Grouped by Business ID

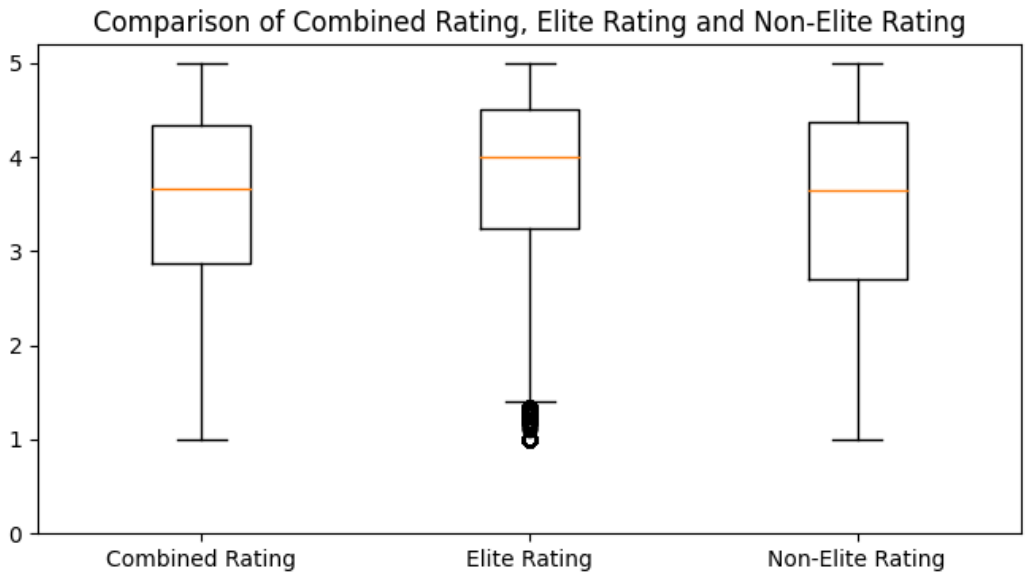
In [34]:
```
non_elite_stars_df = non_elite_df.groupBy("business_id").agg(F.mean('stars').alias('Sta
```

Prepare data for plotting

In [62]:
```
combined_data = combine_stars_df.toPandas()["Stars"].values.tolist()
elite_data = elite_stars_df.toPandas()["Stars rated by elite"].values.tolist()
non_elite_data = non_elite_stars_df.toPandas()["Stars rated by non elite"].values.tolis
data = [combined_data, elite_data, non_elite_data]
```

And finally, graph it!

In [36]:
```
fig = plt.figure(figsize =(8, 4))
plt.boxplot(data)
plt.xticks([1, 2, 3], ['Combined Rating', 'Elite Rating', 'Non-Elite Rating'])
plt.title("Comparison of Combined Rating, Elite Rating and Non-Elite Rating")
y_ticks = np.arange(0, 6, 1)
plt.yticks(y_ticks)
%matplot plt
```



Clears the entire current figure with all its axes

In [61]:
```
plt.clf()
plt.cla()
plt.close()
```

As we can see from the boxplot, the first, third quantiles, and the median of the elite ratings are higher than the non-elites' ratings. In addition, most low ratings in elite dataset are being categoried as outliers. Overall, I would say elite should not be trusted because they tend to give higher ratings compared with non-elite group.

Part V. What is the Most Recommended Restaurant?

1. Filter business data to collect 5 star rated restaurants

In [38]:
```
five_strs_resta_df = business_df.select('business_id', 'name', 'city', 'stars', 'review
                                        .where(col('categories').like("%Restaurants%"))
                                        .filter(col("stars") == 5)
```

2. Check which city has the largest number of 5 star rated restaurants

In [39]:
```
city_count = five_strs_resta_df.select('city').groupby(five_strs_resta_df.city).count()
city_count.show()
```

```
+-----------+-----+
|       city|count|
+-----------+-----+
|  Las Vegas|  225|
|   Montréal|  171|
|    Toronto|  165|
```

```
|    Phoenix|  132|
| Pittsburgh|   82|
|    Calgary|   79|
|  Cleveland|   61|
|  Charlotte|   55|
| Scottsdale|   43|
|       Mesa|   36|
|    Madison|   34|
|Mississauga|   27|
|  Henderson|   22|
|      Tempe|   19|
|   Chandler|   18|
|    Gilbert|   18|
|   Glendale|   16|
|      Laval|   15|
|   Brampton|   13|
|   Matthews|    9|
+-----------+-----+
only showing top 20 rows
```

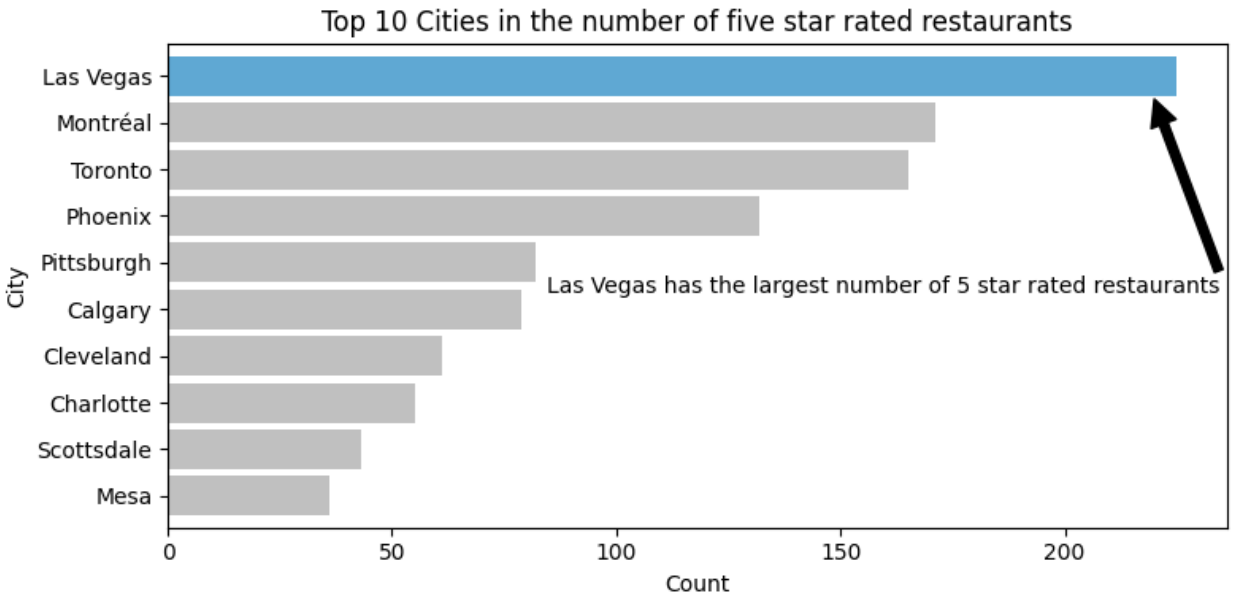
3. Plot the top 10 cities that have the largest number of 5 star rated restaurants

In [40]:
```
top_10 = city_count.sort(desc('count')).limit(10).toPandas()

ax = top_10.plot(kind='barh', x='city', y='count',
            figsize=(8, 4), zorder=2, width=0.85, \
                 color=['#5fa8d3','silver','silver','silver','silver','silver','silver'

ax.invert_yaxis()
ax.set_xlabel("Count")
ax.set_ylabel("City")
ax.set_title("Top 10 Cities in the number of five star rated restaurants")
ax.annotate('Las Vegas has the largest number of 5 star rated restaurants',
            xy=(220, 0.5), xycoords='data',
            xytext=(30, -90), textcoords='offset points',
            arrowprops=dict(facecolor='black'),
            horizontalalignment='right', verticalalignment='bottom')
ax.get_legend().remove()

plt.tight_layout()
%matplot plt
```



Clears the entire current figure with all its axes

In [41]:
```
plt.clf()
plt.cla()
plt.close()
```

4. Deep dive into Las Vegas and check which restaurants has the most reviews

In [42]:
```
Las_Vegas_five_strs_resta = five_strs_resta_df.filter(col("city") == "Las Vegas")
Las_Vegas_top_10_most_reviews_resta = Las_Vegas_five_strs_resta.select('business_id','n
                                                                       .sort("""review_count""
Las_Vegas_top_10_most_reviews_resta.show()
```

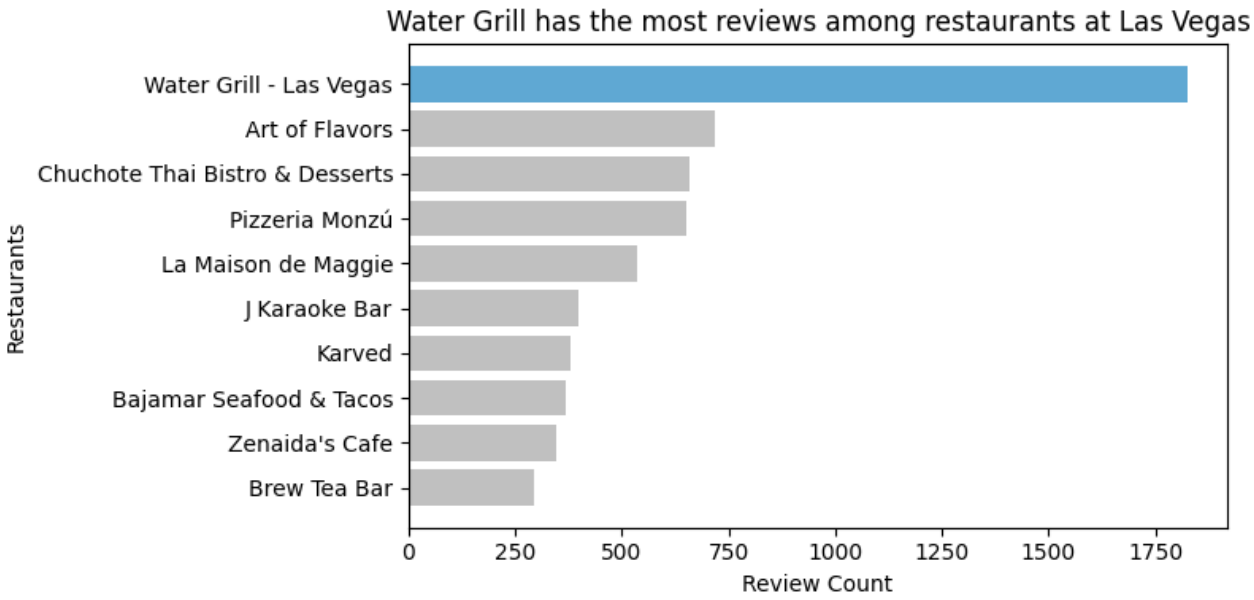
```
+--------------------+--------------------+--------------------+------------+
|         business_id|                name|          categories|review_count|
+--------------------+--------------------+--------------------+------------+
|IhNASEZ3XnBHmuuVn...|        Brew Tea Bar|Restaurants, Food...|        1827|
|8fFTJBh0RB2EKG53i...|      Zenaida's Cafe|Cafes, Breakfast ...|         717|
|G4hjhtA_wQ-tSOGpg...|Bajamar Seafood &...|Fast Food, Dive B...|         658|
|cePE3rCuUOVSCCAHS...|              Karved|Restaurants, Sand...|         651|
|3pSUr_cdrphurO6m1...|       J Karaoke Bar|Nightlife, Bars, ...|         534|
|2B46bRpDh49eDyjXG...| La Maison de Maggie|Cafes, Creperies,...|         397|
|kafUXRNfQm3e_U14S...|      Pizzeria Monzú|Italian, Pizza, B...|         381|
|4Pl-ziYL2oerGyIPl...|Chuchote Thai Bis...|Comfort Food, Res...|         370|
|O7UMzd3i-Zk8dMeyY...|      Art of Flavors|American (New), I...|         345|
|sVjL9DQ8hYW_pS-jp...|Water Grill - Las...|Restaurants, Seafood|         294|
+--------------------+--------------------+--------------------+------------+
```

5. Plot the top 10 five-star rated restaurants at Las Vegas in the number of reviews

In [72]:
```
fig = plt.figure(figsize =(8, 4))
restaurants_name = Las_Vegas_top_10_most_reviews_resta.toPandas()["name"].values.tolist
review_count = Las_Vegas_top_10_most_reviews_resta.sort('review_count').toPandas()["rev
plt.barh(restaurants_name, review_count, color=['silver','silver','silver','silver','si
```

```
plt.xlabel("Review Count")
plt.ylabel("Restaurants")
plt.title("Water Grill has the most reviews among restaurants at Las Vegas")
plt.tight_layout()
plt.show()

%matplot plt
```



Clears the entire current figure with all its axes

In [44]:
```
plt.clf()
plt.cla()
plt.close()
```

6. A glance of what type of restaurants are those top 10 restaurants in the number of reviews at Las Vegas

In [45]:
```
Las_Vegas_top_10_most_reviews_resta.select('name','categories').sort("""review_count"""
```

```
+-----------------------------+--------------------------------------------------
-----------------------------------+
|name                         |categories
|
+-----------------------------+--------------------------------------------------
-----------------------------------+
|Water Grill - Las Vegas      |Restaurants, Seafood
|
|Art of Flavors               |American (New), Ice Cream & Frozen Yogurt, Restaurants,
Gelato, Desserts, Food          |
|Chuchote Thai Bistro & Desserts|Comfort Food, Restaurants, Thai, Beer, Wine & Spirits,
Desserts, Food                  |
|Pizzeria Monzú               |Italian, Pizza, Breakfast & Brunch, Restaurants
|
|La Maison de Maggie          |Cafes, Creperies, Restaurants, French, Gluten-Free
|
|J Karaoke Bar                |Nightlife, Bars, Restaurants, Asian Fusion, Cocktail Ba
```

```
rs, Karaoke, American (New), Korean |
|Karved                          |Restaurants, Sandwiches, Fast Food, Salad, American (Ne
w), American (Traditional), Barbeque|
|Bajamar Seafood & Tacos         |Fast Food, Dive Bars, Bars, Tacos, Seafood, Nightlife,
Mexican, Restaurants               |
|Zenaida's Cafe                  |Cafes, Breakfast & Brunch, Restaurants
|
|Brew Tea Bar                    |Restaurants, Food, Cafes, Tea Rooms, Bubble Tea, Desser
ts                                 |
+--------------------------------+-------------------------------------------------
-----------------------------------+
```

7. Join reviews dataset with top ten restaurants in Las Vegas that has most reviews

In [46]:
```
top_ten_join_reviews = review_df.join(Las_Vegas_top_10_most_reviews_resta, on="business
```

8. Take a look at some written reviews of the restaurant that has most reviews in Las Vegas

In [47]:
```
WaterGrill_review = top_ten_join_reviews.filter(col("name") == "Water Grill - Las Vegas
WaterGrill_review.show(truncate = False)
```

```
+-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------+
|text
|
+-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------+
|I loved pretty much everything about this place. To start, our server David was amazin
g. So attentive, so sweet. And the asiago rolls they brought out were ridiculous. I coul
d've made a meal of those. We started with the tuna poke and sake. The tuna was luscious
and served with fried wonton chips - a perfect vessel. For an entree, I got the cioppino
```

and was brought out a bib (necessary) and a bowl for shells (cleaned ever 5 minutes). It was second to my favorite place for cioppino in San Francisco, but delicious nonetheles s. My husband got the swordfish and really enjoyed as well. It felt very intimate, despi te the size of the restaurant and all service, from the hostess (who gave me a black nap kin since I was wearing black), to David, to the young man who brought over an 8 pound l ive crab just so we could look at it. We appreciate you!
|
|Was here for work this week in Las Vegas and came up on the Water Grill by accident. My self and the rest of the staff ended up eating at this restaurant almost every night of our visit. The service is impeccable, the bartenders knew our names, knew our orders an d made everything right. Food is so fresh and raw bar is incredible ! The few little gl itches that we did have with food were made more than right by the management and by the staff without expectation and without hesitation. I Would highly recommend going here i f you haven't been. For this place to be in the middle of the desert, the seafood taste d incredibly fresh. Standout dishes for me were the raw Peruvian scallops, Trojan roll and the garbanzo mussels. The bread is delicious and always comes out fresh.
|
|The Water Grill in the Forum Shops at Caesars Palace was an amazing experience! We wer e welcomed guests and treated to the very best of service Las Vegas has to offer. We ha d the whole Dover sole escabeche style, the sea bass which the chef was so great to acco mmodate and swap the cauliflower curry and purée for the gnocchi it was originally paire d with (low carb choice!), and we had an amazing selection of oysters . The view is fun, people watching in Vegas out of the hot sun! The wait staff is fabulous with so much ex perience it's a wonder they were able to get this dream team together! Kit from Jersey City is also one of the top waiters at none other than Joel Robuchon (the mansion) in MG M Grand. He wanted to expand his horizons and is an adivinado of what the executive che f and general a manger are "bringing to the table!" We had east coast and west coast oy sters along with some amazing homemade gelato and sorbet. These cheese bread smelled li ke a small pillow of luxury (but no carbs for me... boooo) so I did enjoy and over the t op selection of cheeses for my dessert. It is fair to say we will be back soon. There is so much to explore on this fresh, adventurous and aspirational seafood menu! Thanks for a wonderful time! Oh and do yourself a favor and try the Gruener!|
|Omg! Locals run to this fish place! Fresh fish, amazing and impeccable service from Lew is; and the sommelier Karla, knows her wine! Antwynet, the manager, was phenomenal and t his place caters to tourists and locals. Great pricing for Las Vegas and just a good ex perience! Trading on old Las Vegas style concierge! 5 stars and we are addicted!
|
|Hands down the best mussels/chorizo dish I've ever had.Must try,its spicy,delicious,the broth is amazing.I couldn't finish, it's a huge appetizer,and a great new restaurant
|
|My fiance and I made reservations on the 28th for dinner.
We were seated immediately and our water, Lewis W., came over and asked if we wanted dri nks. Gave him our order and he made a suggestion for a slight variation on the drink I ordered; well worth the suggestion. From there, throughout dinner and dessert, we could n't have been happier to have been taken care of by Lewis. He was awesome and we were so glad to have met him. He has to be one of the most gracious and caring waiters I have ev er met. We will for sure be back and will definitely remember to ask for him. Quite a ge m to have at this location.
Once again, many thanks to Lewis for making our date night wonderful.
|
|Our group from work ate here for dinner on a Friday evening. The food, the service, pre sentation. AMAZING! Nikki, Leslie, and Shannon were kind, friendly, and helpful. Started off with some clam chowder and went with the filet mignon as my entree. Others went with a mixed organic green salad and king salmon.
|
|We are with dear friends who picked this place after much research.. I am completely in awe. The atmosphere was great. Wonderful bar. We had Shannon as a waitress and she was e xtremely lovely and patient.. .. my friend didn't like the first glass of wine.. they di dn't have any issues and Shannon went beyond to make sure there was a wine my friend lik ed as she listened to her :).. this is just the beginning of the experience! We ordered the 1lb king crab legs (two of them for each couple) and it was spectacular. I grew up e ating crab and king crab and their king crab leg entree was by far the best I have ever tasted! We also had their oysters, etc.. still not finished!! They oysters were wonderfu l, the polenta was so good (and I don't like polenta at all), wedge salad (wonderful) an d then we topped it off with their bread pudding which puts all the other restaurants to

shame and I have had bread pudding at many restaurants including New Orleans. Do yoursel
f a favor and stop here and eat our menu.. you Will not be disappointed :) thank you Sha
nnon and staff!
|
|Place had amazingly fresh seafood, really chill music, and an awesome vibe! As far as I
know, this is the only place in LV that has fresh raw seafood, and they do it well. Phas
on and Cade were awesome servers that gave us great advice on things to do in LV and wha
t wines to get.
|
|We had the best seafood meal in a long time. We live ub the Pac NW so i wasn't expect
ing to have such a great seafood meal in Vegas. Cade or bartender was exceptional. Wou
ld absolutely go back.
|
|Huge restaurant with lots of casual seating. No wait. We were seated immediately. Our w
aiter was very attentive and recommended several appetizers to share. If you love seafoo
d then you need to check-out this place. There's an extensive menu with something for ev
eryone. Take a break from gambling or shopping at Caesars and check-out Water Grill for
a relaxing evening. We went to a show after dinner and our server made sure we were out
at the right time without having to rush. Great service!
|
|Lewis, what great waiter who spend his times to make sure everyone understand how the m
enu works. Very outspoken, smile all the times, love what he does and he make that we al
l leave here what great foods and great feeling for his customers. I recommend him a GEM
gentleman and waiter again. The Water Grill in Las Vegas, the foods is real GEM!!! Also
you can bet on it.

Pat and Marlene Orlando from AZ.
|
|Excellent restaurant. There was so much on the menu wasn't even sure what to order. Wan
ted almost everything on the menu! Went with oysters and the wild Alaskan red king crab
nuggets for an appetizer and then shared the wild Nootka king salmon because we had eate
n earlier. The salmon was amazing. The crab and oysters were delicious too. Wanted to tr
y the bread pudding for dessert but just was too full! The sour dough bread was also rea
lly good. Wasn't really a fan of the cheese bread but I'm sure some people would like i
t. Will definitely be back. Service was great. Want to try more items off this menu!
|
|Very nice Sea Food and excellent service. This is the place to be when you are up for s
ome seafood in the desert.
|
|Natalie was our server - awesome service! She made sure to check on us often - ask how
our food was, if we needed anything else, etc. she did a wonderful job of "walking" us t
hrough every part of the menu, and answering any questions we had about specific items.
We would definitely recommend eating here when you visit Las Vegas! Food was excellent!
|
|Five star for both the food and service. The seafood is fresh and in high quality. We o
rdered an oyster sampler, and the oysters are fatty and tasty. The seafood platter was a
lso very good. What is even better is that the food is not overpriced!
Highly recommended!
|
|This years choice for our anniversary dinner. LOVE LOVE LOVE the decor and atmosphere.
The clam chowder was the BEST I've had, aside from San Francisco. My husband enjoyed his
tuna poké. The ribetlye was delightful and he really liked his Chilean sea bass...he doe
sn't care for butternut squash, but ate all of the gnocchi and puree.
|
|Beyond amazing! From customer service to the presentation of the food Water Grill deliv
ers the best tasting food. Perfectly cooked and great seasoning on everything.
The cucumber margarita is a must!!
|
|Amazing food, great service, fresh seafood! Had the spiny lobster and scallops everythi
ng was perfect!
|
|LOVED sitting at the raw bar!!! Great atmosphere, amazing raw bar! This staff takes it
s food and artistry seriously. The platters and towers are beautiful! We ate here befor
e the Madonna debacle and, since we walked out of her show, this became the highlight of
our evening! Ask questions about the oyster choices! I had a sampling and they were all

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amazing! Sushi delicious, too!  AND THE HAMACHI NACHOS! Yum!
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only showing top 20 rows
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9. WordCloud for the written reviews of the Water Grill

In [48]:
```python
text = WaterGrill_review.toPandas().values
wordcloud = WordCloud(
    width = 3000,
    height = 2000,
    background_color = 'white',
    stopwords = STOPWORDS).generate(str(text))
fig = plt.figure(
    figsize = (8, 4),
    facecolor = 'k',
    edgecolor = 'k')
plt.imshow(wordcloud, interpolation = 'bilinear')
plt.title("WordCloud for the written reviews of the Water Grill")
plt.axis('off')
plt.tight_layout(pad=0)
plt.show()

%matplot plt
```

In [50]:
```
plt.clf()
plt.cla()
plt.close()
```