

```
# Location-Based Recommendations
# Recommendation systems are widely utilized in different applications for predicting the
# in a product or service. Most likely you have come across or interacted with some type o
# few minutes or hours in your online presence.
# These Recommender systems can be of different types and the most prominent ones include
# filtering. In this article, we will study location-based recommendations, where we speci
# more relevant recommendations utilizing the location of the users.

# To illustrate the crucial aspects of location-based recommenders we will perform a simpl
# K-Means algorithm with Yelp Dataset from Kaggle.

# Installing packages on systems like ubuntu.
!apt install gdal-bin python-gdal python3-gdal
# Understanding gdal: https://developers.planet.com/planetschool/getting-started-with-gdal
!apt install python3-rtree
!pip install git+git://github.com/geopandas/geopandas.git
# Understanding GeoPandas: https://github.com/geopandas/geopandas
!pip install descartes
!pip install folium
!pip install plotly_express

Reading package lists... Done
Building dependency tree
Reading state information... Done
gdal-bin is already the newest version (2.2.3+dfsg-2).
python-gdal is already the newest version (2.2.3+dfsg-2).
The following package was automatically installed and is no longer required:
    libnvidia-common-460
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
    python3-numpy
Suggested packages:
    python-numpy-doc python3-nose python3-numpy-dbg
The following NEW packages will be installed:
    python3-gdal python3-numpy
0 upgraded, 2 newly installed, 0 to remove and 19 not upgraded.
Need to get 2,288 kB of archives.
After this operation, 13.2 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 python3-numpy amd64 1:1.1
Get:2 http://archive.ubuntu.com/ubuntu bionic/universe amd64 python3-gdal amd64 2.
Fetched 2,288 kB in 0s (6,703 kB/s)
Selecting previously unselected package python3-numpy.
(Reading database ... 155680 files and directories currently installed.)
Preparing to unpack .../python3-numpy_1%3a1.13.3-2ubuntu1_amd64.deb ...
Unpacking python3-numpy (1:1.13.3-2ubuntu1) ...
Selecting previously unselected package python3-gdal.
Preparing to unpack .../python3-gdal_2.2.3+dfsg-2_amd64.deb ...
Unpacking python3-gdal (2.2.3+dfsg-2) ...
Setting up python3-numpy (1:1.13.3-2ubuntu1) ...
Setting up python3-gdal (2.2.3+dfsg-2) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
    libnvidia-common-460
```

```
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
  libspatialindex-c4v5 libspatialindex-dev libspatialindex4v5
  python3-pkg-resources
Suggested packages:
  python3-setuptools
The following NEW packages will be installed:
  libspatialindex-c4v5 libspatialindex-dev libspatialindex4v5
  python3-pkg-resources python3-rtree
0 upgraded, 5 newly installed, 0 to remove and 19 not upgraded.
Need to get 671 kB of archives.
After this operation, 3,948 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libspatialindex4v5 amd64 1.8.5-5
Get:2 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libspatialindex-c4v5 amd64 1.8.5-5
Get:3 http://archive.ubuntu.com/ubuntu bionic/main amd64 python3-pkg-resources all 3.8.0-1
Get:4 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libspatialindex-dev amd64 1.8.5-5
Get:5 http://archive.ubuntu.com/ubuntu bionic/universe amd64 python3-rtree all 0.8.0-1
Fetched 671 kB in 0s (2,518 kB/s)
Selecting previously unselected package libspatialindex4v5:amd64.
(Reading database ... 156090 files and directories currently installed.)
Preparing to unpack .../libspatialindex4v5_1.8.5-5_amd64.deb ...
Unpacking libspatialindex4v5:amd64 (1.8.5-5) ...
```

```
!apt-get -qq install -y libarchive-dev && pip install -U libarchive
import libarchive
# https://pypi.python.org/pypi/pydot
!apt-get -qq install -y graphviz && pip install pydot
import pydot
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/
Requirement already satisfied: libarchive in /usr/local/lib/python3.7/dist-packages (1.1.9-1)
Requirement already satisfied: nose in /usr/local/lib/python3.7/dist-packages (from libarchive)
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/
Requirement already satisfied: pydot in /usr/local/lib/python3.7/dist-packages (1.3.0-1)
Requirement already satisfied: pyparsing>=2.1.4 in /usr/local/lib/python3.7/dist-packages (2.2.0-1)
```

```
!apt-get -qq install -y libfluidsynth1
```

```
Selecting previously unselected package libfluidsynth1:amd64.
(Reading database ... 156179 files and directories currently installed.)
Preparing to unpack .../libfluidsynth1_1.1.9-1_amd64.deb ...
Unpacking libfluidsynth1:amd64 (1.1.9-1) ...
Setting up libfluidsynth1:amd64 (1.1.9-1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.5) ...
```

```
!pip install cartopy
import cartopy
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/
Collecting cartopy
  Downloading Cartopy-0.20.3.tar.gz (10.8 MB)
    |████████| 10.8 MB 4.3 MB/s
  Installing build dependencies ... done
  Getting requirements to build wheel ... error
  WARNING: Discarding https://files.pythonhosted.org/packages/98/a9/0e4000eabafcfcff637:
```

```
Downloading Cartopy-0.20.2.tar.gz (10.8 MB)
|██████████| 10.8 MB 31.6 MB/s
Installing build dependencies ... done
Getting requirements to build wheel ... error
WARNING: Discarding https://files.pythonhosted.org/packages/f6/55/1e1c737dc9436b320de...
Downloading Cartopy-0.20.1.tar.gz (10.8 MB)
|██████████| 10.8 MB 5.6 MB/s
Installing build dependencies ... done
Getting requirements to build wheel ... error
WARNING: Discarding https://files.pythonhosted.org/packages/fc/59/aa52698e3838f4cd0e...
Downloading Cartopy-0.20.0.tar.gz (10.8 MB)
|██████████| 10.8 MB 29.8 MB/s
Installing build dependencies ... done
Getting requirements to build wheel ... error
WARNING: Discarding https://files.pythonhosted.org/packages/0f/c0/58453b036e79046d21...
Downloading Cartopy-0.19.0.post1.tar.gz (12.1 MB)
|██████████| 12.1 MB 165 kB/s
Installing build dependencies ... done
Getting requirements to build wheel ... done
Preparing wheel metadata ... done
Requirement already satisfied: numpy>=1.13.3 in /usr/local/lib/python3.7/dist-packages
Collecting pyshp>=2
Downloading pyshp-2.3.1-py2.py3-none-any.whl (46 kB)
|██████████| 46 kB 4.4 MB/s
Requirement already satisfied: shapely>=1.5.6 in /usr/local/lib/python3.7/dist-packages
Building wheels for collected packages: cartopy
Building wheel for cartopy (PEP 517) ... done
Created wheel for cartopy: filename=Cartopy-0.19.0.post1-cp37-cp37m-linux_x86_64.whl
Stored in directory: /root/.cache/pip/wheels/98/01/f7/bd10aeb96fe4b518cde5f7c4f5e1
Successfully built cartopy
Installing collected packages: pyshp, cartopy
Successfully installed cartopy-0.19.0.post1 pyshp-2.3.1
```

```
!pip install geopandas
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/
Collecting geopandas
    Downloading geopandas-0.10.2-py2.py3-none-any.whl (1.0 MB)
|██████████| 1.0 MB 5.1 MB/s
Requirement already satisfied: pandas>=0.25.0 in /usr/local/lib/python3.7/dist-packages
Collecting pyproj>=2.2.0
    Downloading pyproj-3.2.1-cp37-cp37m-manylinux2010_x86_64.whl (6.3 MB)
|██████████| 6.3 MB 17.9 MB/s
Requirement already satisfied: shapely>=1.6 in /usr/local/lib/python3.7/dist-packages
Collecting fiona>=1.8
    Downloading Fiona-1.8.21-cp37-cp37m-manylinux2014_x86_64.whl (16.7 MB)
|██████████| 16.7 MB 106 kB/s
Requirement already satisfied: setuptools in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from fiona>=1.8)
Requirement already satisfied: click>=4.0 in /usr/local/lib/python3.7/dist-packages
Collecting click-plugins>=1.0
    Downloading click_plugins-1.1.1-py2.py3-none-any.whl (7.5 kB)
Collecting cligj>=0.5
    Downloading cligj-0.7.2-py3-none-any.whl (7.1 kB)
Collecting munch
    Downloading munch-2.5.0-py2.py3-none-any.whl (10 kB)
Requirement already satisfied: six>=1.7 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: attrs>=17 in /usr/local/lib/python3.7/dist-packages
```

```
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: python-dateutil>=2.7.3 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages
Installing collected packages: munch, cligj, click-plugins, pyproj, fiona, geopandas
Successfully installed click-plugins-1.1.1 cligj-0.7.2 fiona-1.8.21 geopandas-0.10.2
```

```
import pandas as pd
import numpy as np
import geopandas as gpd

import matplotlib.pyplot as plt
import seaborn as sns

import folium

import plotly
import plotly.offline as py
import plotly.graph_objs as go
import plotly_express as px

from sklearn.cluster import KMeans
from sklearn.metrics import silhouette_score

!wget https://www.dropbox.com/s/3x1w789mmuae3ao/yelp_academic_dataset_business.zip
!unzip yelp_academic_dataset_business.zip

--2022-08-16 02:44:30-- https://www.dropbox.com/s/3x1w789mmuae3ao/yelp\_academic\_dataset\_business.zip?dl=1
Resolving www.dropbox.com (www.dropbox.com)... 162.125.5.18, 2620:100:601d:18::a27d:1
Connecting to www.dropbox.com (www.dropbox.com)|162.125.5.18|:443... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: /s/raw/3x1w789mmuae3ao/yelp_academic_dataset_business.zip [following]
--2022-08-16 02:44:30-- https://www.dropbox.com/s/raw/3x1w789mmuae3ao/yelp\_academic\_dataset\_business.zip?dl=1
Reusing existing connection to www.dropbox.com:443.
HTTP request sent, awaiting response... 302 Found
Location: https://uc5b231e6a6c0845d6bc36edee6b.dl.dropboxusercontent.com/cd/0/inline/3x1w789mmuae3ao/yelp\_academic\_dataset\_business.zip
--2022-08-16 02:44:31-- https://uc5b231e6a6c0845d6bc36edee6b.dl.dropboxusercontent.com/cd/0/inline/3x1w789mmuae3ao/yelp\_academic\_dataset\_business.zip?dl=1
Resolving uc5b231e6a6c0845d6bc36edee6b.dl.dropboxusercontent.com (uc5b231e6a6c0845d6bc36edee6b)
Connecting to uc5b231e6a6c0845d6bc36edee6b.dl.dropboxusercontent.com (uc5b231e6a6c0845d6bc36edee6b)|162.125.5.18|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: /cd/0/inline2/BrGKckfApHWp5i5WoKVWU-N1sdPpG5tWhejS1470Rvep4hvBE3tcRHnHlwRBQ
--2022-08-16 02:44:31-- https://uc5b231e6a6c0845d6bc36edee6b.dl.dropboxusercontent.com/cd/0/inline/3x1w789mmuae3ao/yelp\_academic\_dataset\_business.zip?dl=1
Reusing existing connection to uc5b231e6a6c0845d6bc36edee6b.dl.dropboxusercontent.com (uc5b231e6a6c0845d6bc36edee6b)
HTTP request sent, awaiting response... 200 OK
Length: 24278298 (23M) [application/zip]
Saving to: 'yelp_academic_dataset_business.zip'

yelp_academic_data 100%[=====] 23.15M 53.9MB/s in 0.4s

2022-08-16 02:44:32 (53.9 MB/s) - 'yelp_academic_dataset_business.zip' saved [24278298]

Archive: yelp_academic_dataset_business.zip
inflating: yelp_academic_dataset_business.json
```

```
df = pd.read_json('yelp_academic_dataset_business.json', lines=True)
df.head()
```

	business_id	name	address	city	state	postal_code]
0	1SWheh84yJXfytovlLXOAQ	Arizona Biltmore Golf Club	2818 E Camino Acequia Drive	Phoenix	AZ	85016	3
1	QXAEGFB4oINsVuTFxEYKFQ	Emerald Chinese Restaurant	30 Eglinton Avenue W	Mississauga	ON	L5R 3E7	4
2	gnKjwL_1w79qoiV3IC_xQQ	Musashi Japanese Restaurant	10110 Johnston Rd, Ste 15	Charlotte	NC	28210	3
3	xvX2CttrVhyG2z1dFg_0xw	Farmers Insurance - Paul Lorenz	15655 W Roosevelt St, Ste 237	Goodyear	AZ	85338	3
4	HhyxOkGAM07SRYtlQ4wMFQ	Queen City Plumbing	4209 Stuart Andrew Blvd, Ste F	Charlotte	NC	28217	3



df.shape

(192609, 14)

▼ Exploratory Data Analysis (EDA)

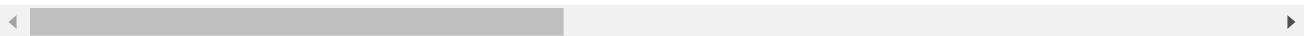
```
df['Restaurants'] = df['categories'].str.contains('Restaurants')
df.head(2)
```

	business_id	name	address	city	state	postal_code	latitude	longitude
0	1SWheh84yJXftyovILXOAQ	Arizona Biltmore Golf Club	2818 E Camino Acequia Drive	Phoenix	AZ	85016	33.4523	-112.0740

1	QXAEGFB4oINsVuTFxEYKFQ	Emerald Chinese	30 Eglinton Avenue W	Mississauga	ON	L5R 3E7	43.6572	-79.3832
---	------------------------	-----------------	----------------------	-------------	----	---------	---------	----------

```
df_restaurants = df.loc[df.Restaurants == True]
df_restaurants.head()
```

	business_id	name	address	city	state	postal_code	latitude	longitude
1	QXAEGFB4oINsVuTFxEYKFQ	Emerald Chinese Restaurant	30 Eglinton Avenue W	Mississauga	ON	L5R 3E7	43.6572	-79.3832
2	gnKjwL_1w79qoiV3IC_xQQ	Musashi Japanese Restaurant	10110 Johnston Rd, Ste 15	Charlotte	NC	28210	35.2271	-80.4790
11	1Dfx3zM-rW4n-31KeC8sJg	Taco Bell	2450 E Indian School Rd	Phoenix	AZ	85016	33.4523	-112.0740
13	fweCYi8FmbJXHCqLnwuk8w	Marco's Pizza	5981 Andrews Rd	Mentor-on-the-Lake	OH	44060	41.5200	-81.3800
17	PZ-LZzSlhSe9utkQYU8pFg	Carluccio's Tivoli Gardens	1775 E Tropicana Ave, Ste 29	Las Vegas	NV	89119	36.2000	-115.1800

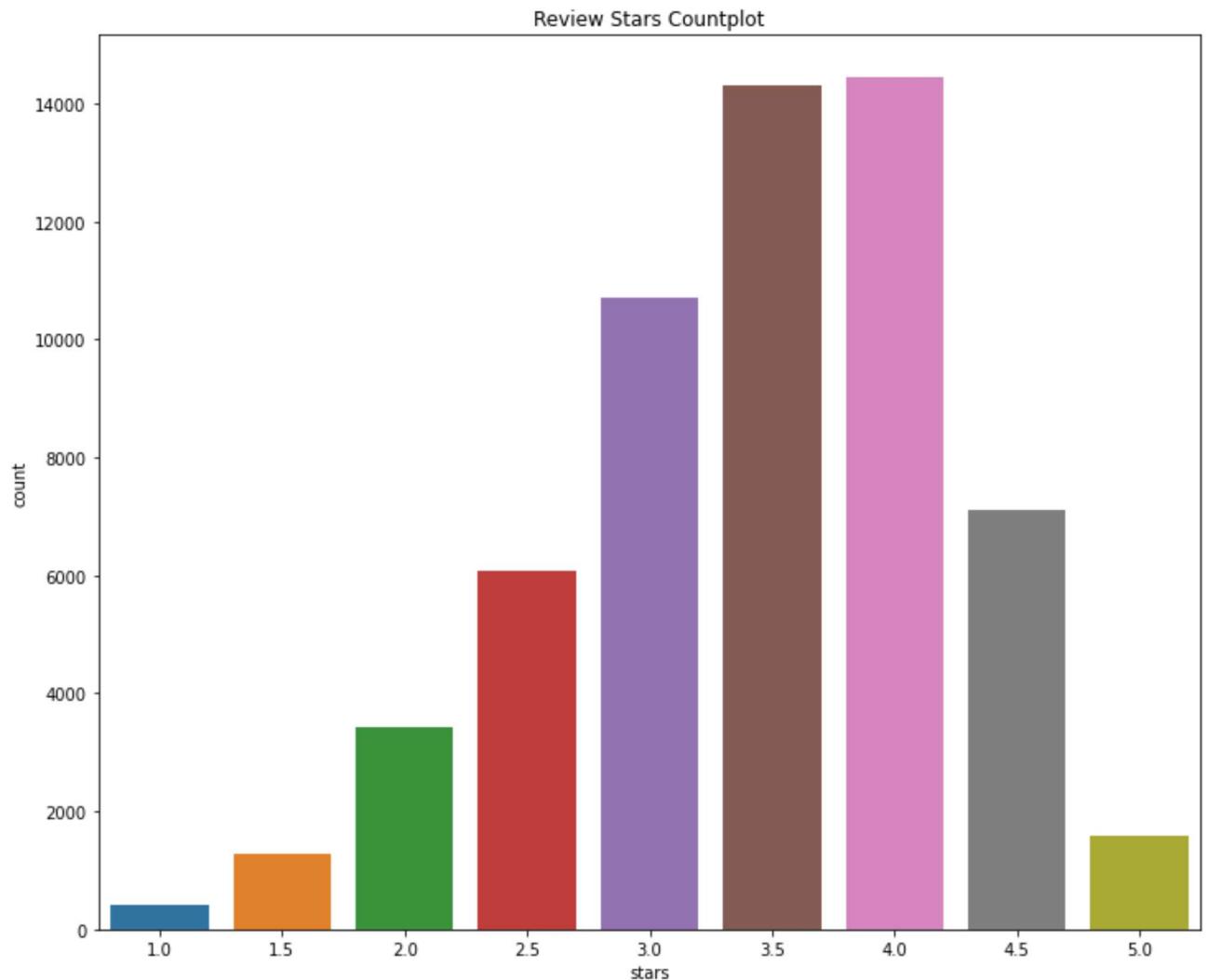


```
df_restaurants.shape
```

```
(59371, 15)
```

```
fig, ax = plt.subplots(figsize=(12,10))
sns.countplot(df_restaurants['stars'], ax=ax)
plt.title('Review Stars Countplot')
# plt.savefig('stars.png')
plt.show()
```

/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning:
Pass the following variable as a keyword arg: x. From version 0.12, the only valid pc

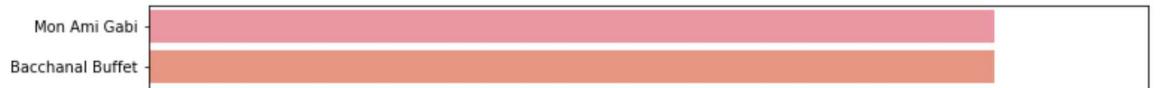


```
top_restaurants = df_restaurants.sort_values(by=['review_count', 'stars'], ascending=False)
top_restaurants.head()
```

		business_id	name	address	city	state	postal_code	la
82250	4JNXUYY8wbaaDmk3BPzlWw	Mon Ami Gabi	3655 Las Vegas Blvd S		NV	89109	36.	
89206	RESDUcs7fliihp38-d6_6g	Bacchanal Buffet	3570 S Las Vegas Blvd		NV	89109	36.	
35199	K7IWdNUhCbcnEvI0NhGewg	Wicked Spoon	3708 Las Vegas Blvd S		NV	89109	36.	

..... 3535

```
fig, ax = plt.subplots(figsize=(12,10))
sns.barplot(x = 'stars', y = 'name', data=top_restaurants, ax= ax);
plt.savefig('top20_restaurants.png')
plt.show()
```

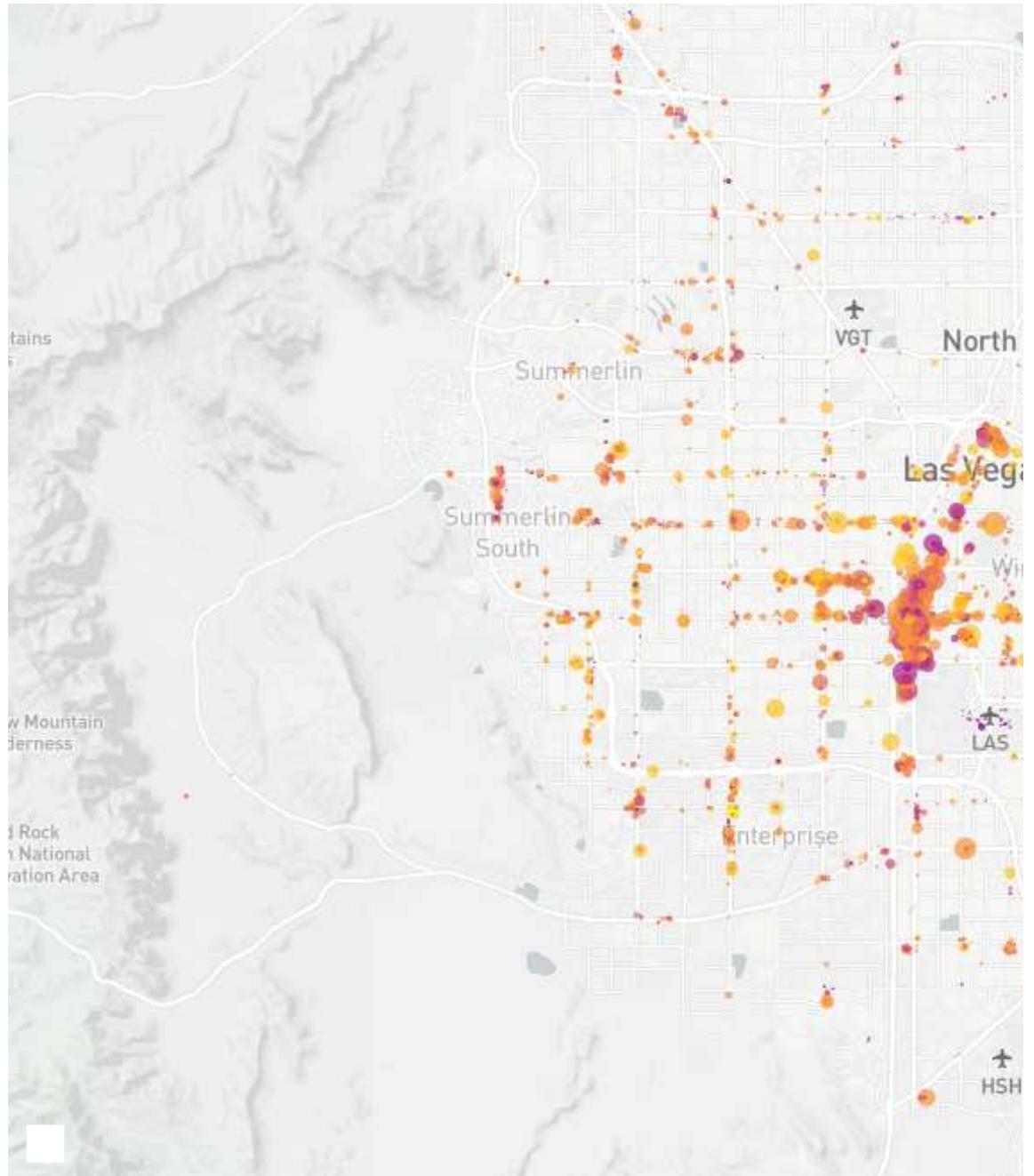


```
px.set_mapbox_access_token("pk.eyJ1Ijoic2lkZHAYnZQilCJhIjoiY2txZHM2bjdyMDd6bjJvbWxkcG5odW5  
#configure_plotly_browser_state()  
px.scatter_mapbox(df_restaurants, lat="latitude", lon="longitude", color="stars", size='re  
size_max=30, zoom=3, width=1200, height=800)
```



```
lasVegas = df_restaurants[df_restaurants.state == 'NV']  
px.scatter_mapbox(lasVegas, lat="latitude", lon="longitude", color="stars", size='review_c
```

```
size_max=15, zoom=10, width=1200, height=800)
```



K-Means Clustering

Determining the number of clusters (K)

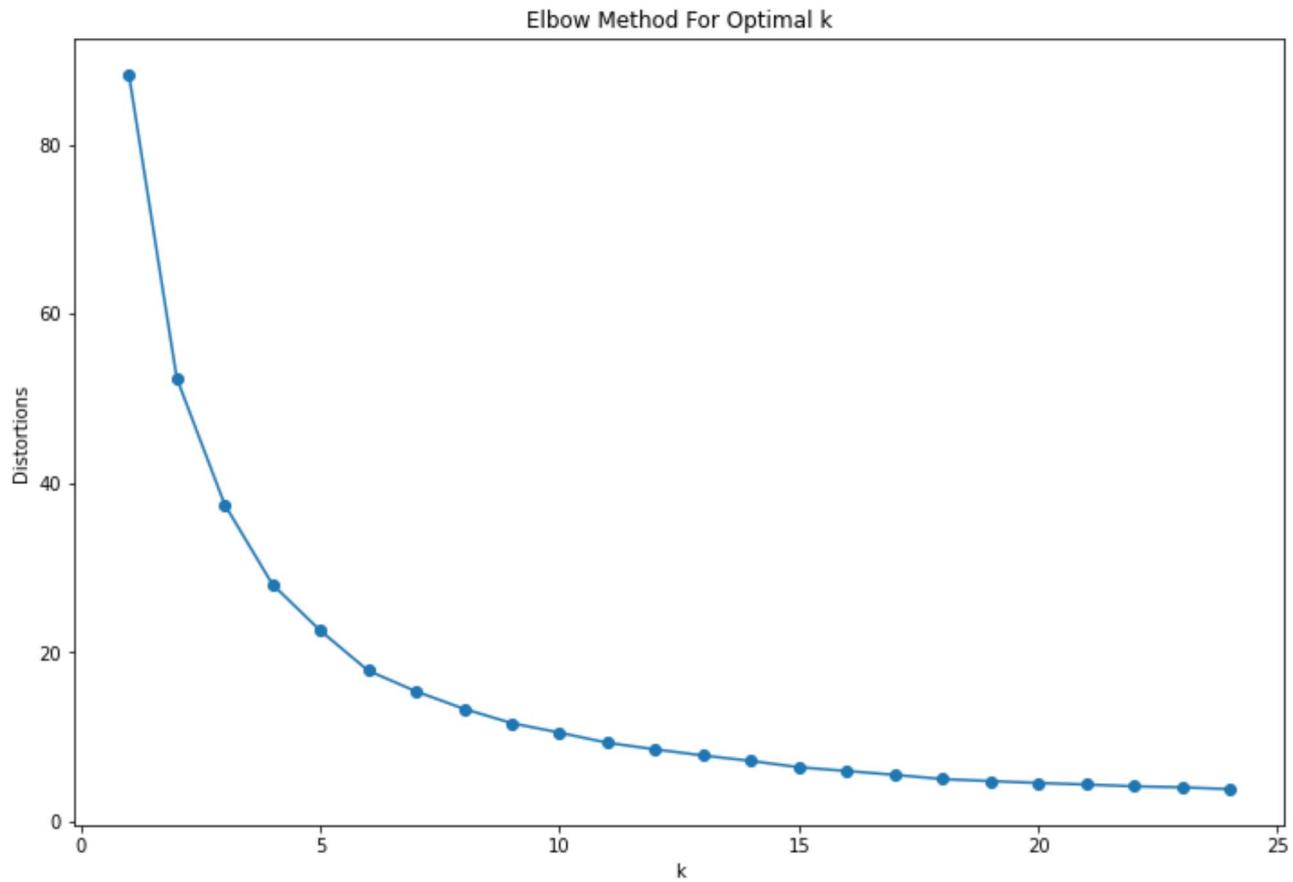
```
# Elbow method to determine the number of K in Kmeans Clustering  
coords = lasVegas[['longitude','latitude']]
```

```

distortions = []
K = range(1,25)
for k in K:
    kmeansModel = KMeans(n_clusters=k)
    kmeansModel = kmeansModel.fit(coords)
    distortions.append(kmeansModel.inertia_)

fig, ax = plt.subplots(figsize=(12, 8))
plt.plot(K, distortions, marker='o')
plt.xlabel('k')
plt.ylabel('Distortions')
plt.title('Elbow Method For Optimal k')
# plt.savefig('elbow.png')
plt.show()

```



```

from sklearn.metrics import silhouette_score

sil = []
kmax = 50

# dissimilarity would not be defined for a single cluster, thus, minimum number of cluster
for k in range(2, kmax+1):
    kmeans = KMeans(n_clusters = k).fit(coords)
    labels = kmeans.labels_
    sil.append(silhouette_score(coords, labels, metric = 'euclidean'))

```

sil

```
↳ [0.38400973051084614,  
 0.3666485409730202,  
 0.3957803680934535,  
 0.3867315516425134,  
 0.4110242062298683,  
 0.4167440556520479,  
 0.4096017442120267,  
 0.40477704319804797,  
 0.408393501675126,  
 0.42543300988808075,  
 0.42734390061922883,  
 0.42676848220094754,  
 0.43410167790287635,  
 0.4330370678052522,  
 0.43823312297212347,  
 0.44567809606586944,  
 0.4487762193751817,  
 0.44204824697783063,  
 0.4398300358017396,  
 0.4337549614863143,  
 0.4321442685545738,  
 0.4317761562476496,  
 0.43932627222444515,  
 0.42490389249535615,  
 0.41119868446372804,  
 0.4286983409553633,  
 0.41795904203120304,  
 0.42607230808966623,  
 0.4241083889146795,  
 0.4282926857265048,  
 0.4382222465753215,  
 0.4370619159185213,  
 0.44028761094653274,  
 0.4320918929960097,  
 0.43692365744033207,  
 0.4501503321057221,  
 0.42909204560055153,  
 0.44299984523698976,  
 0.4518289565575724,  
 0.4413369159149414,  
 0.4470164359827324,  
 0.4388697261442726,  
 0.4478522087310355,  
 0.4474447103264944,  
 0.44758874763734946,  
 0.4473144930611234,  
 0.4555584994977747,  
 0.4538159060446536,  
 0.45877877134845735]
```

▼ K-Means Clustering

```
kmeans = KMeans(n_clusters=5, init='k-means++')
kmeans.fit(coords)
y = kmeans.labels_
print("k = 5", " silhouette_score ", silhouette_score(coords, y, metric='euclidean'))

k = 5 silhouette_score 0.38892857727731345

lasVegas['cluster'] = kmeans.predict(lasVegas[['longitude','latitude']])
lasVegas.head()

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: SettingWithCopyWarning:
```

A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

		business_id	name	address	city	state	postal_code	latitude	longitude
17	PZ-LZzSIhSe9utkQYU8pFg	Carluccio's Tivoli Gardens	1775 E Tropicana Ave, Ste 29	Las Vegas	NV	89119	36.100000	115.170000	-115.170000
25	tstimHoMcYbkSC4eBA1wEg	Maria's Mexican Restaurant & Bakery	6055 E Lake Mead Blvd	Las Vegas	NV	89156	36.195000	115.195000	-115.195000
75	kANF0dbeoW34s2vwh6Umfw	Dairy Queen	6125 Spring Mountain Rd	Las Vegas	NV	89146	36.125000	115.125000	-115.125000
111	X8mtoSxY8whtmbDlj0D3Aw	Imperial Asian Buffet	4343 N Rancho Dr	Las Vegas	NV	89030	36.238000	115.238000	-115.238000
135	bJP4I_BGq2CudEu0m-wNjg	Artisan Fine Dining Room	Artisan Hotel, 1501 W Sahara Ave	Las Vegas	NV	89102	36.143000	115.143000	-115.143000



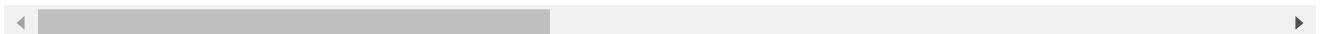
◀ ▶

```
px.scatter_mapbox(lasVegas, lat="latitude", lon="longitude", color="cluster", size='review_count',
                  hover_data= ['name', 'latitude', 'longitude'], zoom=10, width=1200, height=600)
```

▼ Location-Based Recommendation

```
top_restaurants_lasVegas = lasVegas.sort_values(by=['review_count', 'stars'], ascending=False)
top_restaurants_lasVegas.head()
```

		business_id	name	address	city	state	postal_code	la
82250	4JNXUYY8wbaaDmk3BPzIWw	Mon Ami Gabi		3655 Las Vegas Blvd S	Las Vegas	NV	89109	36.
89206	RESDUcs7fliihp38-d6_6g	Bacchanal Buffet		3570 S Las Vegas Blvd	Las Vegas	NV	89109	36.
35199	K7IWdNUhCbcnEvl0NhGewg	Wicked Spoon		3708 Las Vegas Blvd S	Las Vegas	NV	89109	36.
58852	f4x1YBxkLrZg652xt2KR5g	Hash House A Go Go		3535 Las Vegas Blvd	Las Vegas	NV	89109	36.
141820	cYwJA2A6l12KNkm2rtXd5g	Gordon Ramsay BurGR		3667 Las Vegas Blvd S	Las Vegas	NV	89109	36.



```
def recommend_restaurants(df, longitude, latitude):
    # Predict the cluster for longitude and latitude provided
    cluster = kmeans.predict(np.array([longitude,latitude]).reshape(1,-1))[0]
    print(cluster)

    # Get the best restaurant in this cluster
    return df[df['cluster']==cluster].iloc[0:5][['name', 'latitude','longitude']]


recommend_restaurants(top_restaurants_lasVegas, -115.1891691, 36.1017316)
```

3

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:451: UserWarning:
```

X does not have valid feature names, but KMeans was fitted with feature names

		name	latitude	longitude	
82250		Mon Ami Gabi	36.112859	-115.172434	
89206		Bacchanal Buffet	36.116113	-115.176222	
35199		Wicked Spoon	36.109550	-115.176155	
58852		Hash House A Go Go	36.118181	-115.171580	
141820	Gordon Ramsay BurGR		36.110724	-115.172169	

```
recommend_restaurants(top_restaurants_lasVegas, -115.2798544, 36.0842838)
```

0

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:451: UserWarning:
```

X does not have valid feature names, but KMeans was fitted with feature names

		name	latitude	longitude	
131069		Hash House A Go Go	36.144713	-115.240092	
116890		Echo & Rig	36.166576	-115.286232	
42288		Red Rock Casino Resort & Spa	36.156413	-115.332847	
11169	Juan's Flaming Fajitas & Cantina		36.100509	-115.302689	
9191		Honey Salt	36.160577	-115.292996	

```
recommend_restaurants(top_restaurants_lasVegas, -115.082821, 36.155011 )
```

2

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:451: UserWarning:
```

X does not have valid feature names, but KMeans was fitted with feature names

		name	latitude	longitude	
111864	Lotus of Siam		36.143664	-115.141891	
79764	Eat.		36.166900	-115.138977	
127088	Pizza Rock		36.171618	-115.142267	
55675	Carson Kitchen		36.167878	-115.140640	
160676	Golden Nugget		36.169781	-115.145534	

```
test_coordinates = {
    'user': [1, 2, 3],
    'latitude' : [36.1017316, 36.0842838, 36.155011],
```

```
'longitude' : [-115.1891691, -115.2798544, -115.082821],  
}
```

```
test_df = pd.DataFrame(test_coordinates)  
test_df
```

	user	latitude	longitude	edit
0	1	36.101732	-115.189169	
1	2	36.084284	-115.279854	
2	3	36.155011	-115.082821	

```
user1 = test_df[test_df['user'] == 1]  
user1
```

	user	latitude	longitude	edit
0	1	36.101732	-115.189169	

```
fig = px.scatter_mapbox(recommend_restaurants(top_restaurants_lasVegas, user1.longitude, u  
zoom=10, width=1200, height=800, hover_data= ['name', 'latitude', 'long  
fig.add_scattermapbox(lat=user1["latitude"], lon= user1["longitude"]).update_traces(dict(m
```

3

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:451: UserWarning:
```

```
X does not have valid feature names, but KMeans was fitted with feature names
```

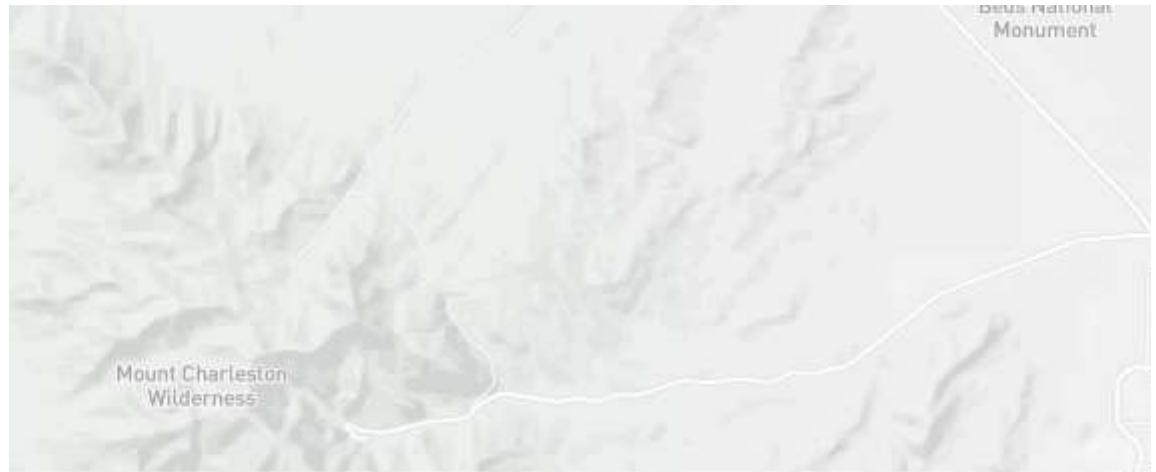


```
user3 = test_df[test_df['user'] == 2].reset_index()
fig = px.scatter_mapbox(recommend_restaurants(top_restaurants_lasVegas, user3.longitude, u
    zoom=10, width=1200, height=800, hover_data= ['name', 'latitude', 'long
fig.add_scattermapbox(lat=user3["latitude"], lon= user3["longitude"]).update_traces(dict(m
```

0

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:451: UserWarning:
```

```
X does not have valid feature names, but KMeans was fitted with feature names
```



✓ 0s completed at 08:21

● ✕