Capstone Project - The Battle of Neighborhoods (Week 2)

August 12, 2020

1 Capstone Project - The Battle of Neighborhoods (Week 1)

1.1 1. A description of the problem and a discussion of the background.

1.1.1 Introduction of the City - Los Angeles

Los Angeles, officially the City of Los Angeles and often known by its initials L.A., is the largest city in California. With an estimated population of nearly four million people, it is the second-most populous city in the United States (after New York City) and the third-most populous city in North America (after Mexico City and New York City). Los Angeles is known for its Mediterranean climate, ethnic diversity, Hollywood entertainment industry, and its sprawling metropolis. Los Angeles lies in a basin in Southern California, adjacent to the Pacific Ocean, with mountains as high as 10,000 feet (3,000 m), and deserts. The city, which covers about 469 square miles (1,210 km2),is the seat of Los Angeles County, the most populous county in the United States. The Los Angeles metropolitan area (MSA) is home to 13.1 million people, making it the second-largest metropolitan area in the nation after New York. Greater Los Angeles includes metro Los Angeles as well as the Inland Empire and Ventura County.It is the second-most populous U.S. combined statistical area, also after New York, with a 2015 estimate of 18.7 million people.

1.1.2 Business Problem

Coming down to business problem,I would like to open a restaurant near Santa Monica, which is one of the most beautiful cities in Los Angeles. As it is a famous tourist spot,there is already lots of attention towards it.I know there will be many competitors in terms of restauramt. But keeping them in mind, I need to locate my restaurant in place where more people are attracted and comfortable for a stay and a good meal.I want to bring foreign and local peoples attention towards my new hotel.I would like to flavour my retaurant recipe with Chinese and Japanese to grab their taste. The challenge is to find a suitable location for opening a new restaurant attracted to all local and foreign people in the centre of all famous venues.

1.1.3 Assumption

I assume that 85% local and 15% foreign peoples visit Santa Monica once in a year. Some people stay for couple of days or more. Also they find some place for hangout or a good meal. Their main focus might be belonging to stay somewhere near to reach venues. Apart from these set of people,

students and working professionals are common audience here. So we may need to fascinate them all.

2 Data Selection

We will be completely working on Foursquare data to explore and try to locate our new restaurant where more venues like Hotel, Spa, beach, Theater, memorials that are present nearby.

We will look for midpoint area of venues to locate our new restaurant. Before that our major focus will be on all venues present in and around the core place of Santa Monica.

Just a heads up on how many restaurant are distributed now around Santa Monica. We will perform some EDA on restaurants present in the tourist spot. On furthur notebook we will use Foursquare data to determine other venues as well.

3 Data Preprocessing

3.0.1 Import Libraries

[2]:
```
# Import libraries
import numpy as np # data in a vectorized manner manipulation
import pandas as pd # data analsysis
import requests # HTTP library
from bs4 import BeautifulSoup # scraping library

from pandas.io.json import json_normalize # tranform JSON file into a pandas␣
 ↪dataframe
import json # JSON files manipulation

from sklearn.cluster import KMeans # clustering algorithm

pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

# Matplotlib and associated plotting modules
import matplotlib.cm as cm
import matplotlib.colors as colors
import matplotlib.pyplot as plt

#!conda install -c conda-forge geopy --yes
from geopy.geocoders import Nominatim

#!conda install -c conda-forge folium=0.5.0 --yes
import folium # map rendering library
```

```
print("Libraries Imported")
```

```
Libraries Imported
```

3.0.2 Credentials and Core location

[12]:
```
CLIENT_ID = '3Z3ZIFG1GY2NGYXZ3AVEODZKPAVVCQJHTENE4IR5OXJNTNPW'
CLIENT_SECRET = 'J2WB5IYMG4AJCWMVFOABC5SR1YRH3JOEQ2HOLBOGJEOTF5DB '
VERSION = '20200811'
LIMIT = 150

address = "Santa Monica, Los Angeles"

geolocator = Nominatim(user_agent="foursquare_agent")
location = geolocator.geocode(address)
latitude =location.latitude
longitude =location.longitude

SM = 'Santa Monica location : {},{}'.format(latitude,longitude)
print(SM)
```

```
Santa Monica location : 34.0250724,-118.4965129
```

3.0.3 Search Restaurants within 1 km

[4]:
```
search_query_res = 'restaurant'
radius = 1000
url_restaurant = 'https://api.foursquare.com/v2/venues/search?
↪client_id={}&client_secret={}&ll={},{}&v={}&query={}&radius={}&limit={}'.
↪format(CLIENT_ID, CLIENT_SECRET, latitude, longitude, VERSION,␣
↪search_query_res, radius, LIMIT)
```

3.0.4 Send the Get Request of Restaurants and Examine the Results

[6]:
```
results_restaurant = requests.get(url_restaurant).json()
```

3.0.5 Get Relevant Part of JSON and Transform it into a Pandas Dataframe

[8]:
```
# assign relevant part of JSON to venues
venues_restaurant = results_restaurant['response']['venues']

# tranform venues into a dataframe
dataframe = pd.json_normalize(venues_restaurant)
```

```
print("There are {} restaurants at Santa Monica".format(dataframe.shape[0]))
```

```
There are 16 restaurants at Santa Monica
```

3.0.6 Define Information of Interest and Filter Dataframe

[9]:
```
# keep only columns that include venue name, and anything that is associated␣
 ↪with location
filtered_columns = ['name', 'categories'] + [col for col in dataframe.columns␣
 ↪if col.startswith('location.')] + ['id']
dataframe_filtered = dataframe.loc[:, filtered_columns]

# function that extracts the category of the venue

def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return categories_list[0]['name']


# filter the category for each row
dataframe_filtered['categories'] = dataframe_filtered.apply(get_category_type,␣
 ↪axis=1)


# clean column names by keeping only last term
dataframe_filtered.columns = [column.split('.')[-1] for column in␣
 ↪dataframe_filtered.columns]

#dataframe_filtered
Restaurants_df=dataframe_filtered[['name','categories','distance','lat','lng','id']]
Restaurants_df.head()
```

[9]:

	name	categories	distance	lat	\
0	The Misfit Restaurant + Bar	American Restaurant	1076	34.015399	
1	Michael's Restaurant	American Restaurant	766	34.018740	
2	Restaurant chino Nan hai	Chinese Restaurant	795	34.019454	
3	Simple Things Restaurant	American Restaurant	393	34.022205	
4	Romano's Restaurant	Food	520	34.026932	

```
          lng                        id
0 -118.496591  4da4bb1d0f578cfaafdbd518
1 -118.499770  4acfed0ff964a520e6d620e3
2 -118.491191  503a8c8ee4b0bbf1b03b7e1e
3 -118.494011  5635381d498e8f8d6a6e9bf2
4 -118.501684  4f321f6719836c91c7b83bac
```

3.0.7 Location of Restaurants

[11]:
```
Restaurants_map = folium.Map(location=[latitude, longitude], zoom_start=16) #␣
↪generate map centred around the Santa Monica

# add a red circle marker to represent the core location of Santa Monica
folium.CircleMarker(
    [latitude, longitude],
    radius=10,
    color='red',
    popup='Santa Monica',
    fill = True,
    fill_color = 'red',
    fill_opacity = 0.6
).add_to(Restaurants_map)

# add the restaurants as blue circle markers
for lat, lng, label in zip(Restaurants_df.lat, Restaurants_df.lng,␣
↪Restaurants_df.name):
    folium.CircleMarker(
        [lat, lng],
        radius=5,
        color='blue',
        popup=label,
        fill = True,
        fill_color='blue',
        fill_opacity=0.6
    ).add_to(Restaurants_map)

# display map
Restaurants_map
```

[11]:
```
<folium.folium.Map at 0x7fa113f4b280>
```

Here are all contents for the Capstone Project - The Battle of Neighborhoods (Week 1), I will cover my code and report in the next Notebook. Thanks!

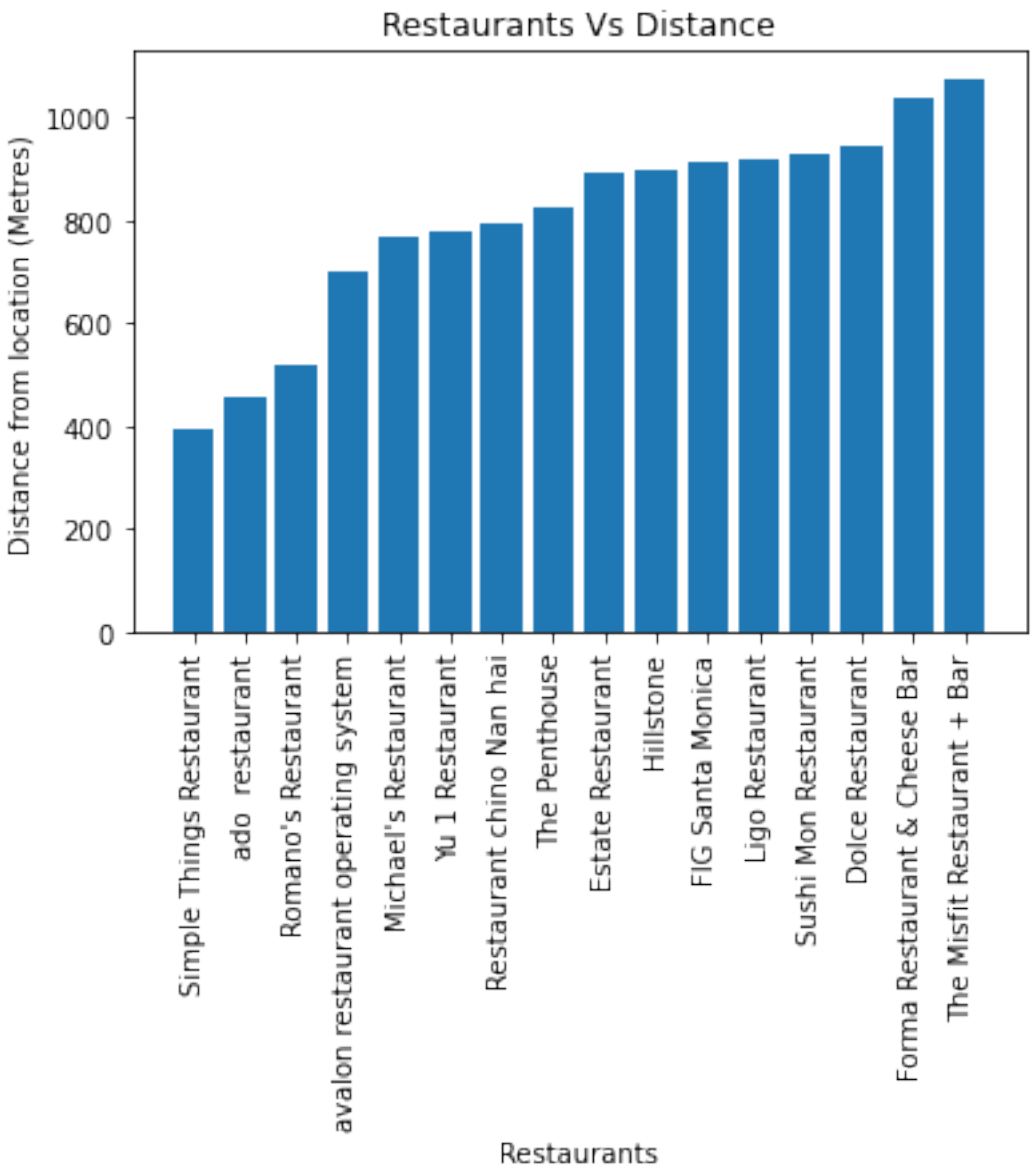
3.1 3. Data Analysis

3.1.1 Distance between Restaurants and the Core Location

[16]:
```
distance_restaurant_df=dataframe_filtered[['name','categories','distance','lat','lng']].
 ↪sort_values('distance')

def plot_bar_x():
    # this is for plotting purpose
    index = np.arange(len(distance_restaurant_df.name))
    plt.bar(distance_restaurant_df.name, distance_restaurant_df.distance)
    plt.xlabel('Restaurants')
    plt.ylabel('Distance from location (Metres)')
    plt.xticks(distance_restaurant_df.name,rotation=90)
    plt.title('Restaurants Vs Distance')
    plt.show()
plot_bar_x()

print("Average distance between restaurants and core location is {} meters".
 ↪format(int(sum(Restaurants_df['distance'])/Restaurants_df.shape[0])))
```



`Average distance between restaurants and core location is 802 meters`

From the plot above, we can find the following facts: 1. Simple Things Restaurant has the cloest distance to the core location of Santa Monica; 2. The Misfit Restaurant + Bar is the farthest among all restaurants; 3. The average distance between restaurants and core location is 802 meters.

3.2 Explore for other venues around Santa Monica

[17]:
```
radius=1000
url_venues = 'https://api.foursquare.com/v2/venues/explore?
 ↪client_id={}&client_secret={}&ll={},{}&v={}&radius={}&limit={}'.
 ↪format(CLIENT_ID, CLIENT_SECRET, latitude, longitude, VERSION, radius, LIMIT)
```

[18]:
```
results_venues = requests.get(url_venues).json()
'There are {} venues around Santa Monica.'.
 ↪format(len(results_venues['response']['groups'][0]['items']))
```

[18]:
```
'There are 100 venues around Santa Monica.'
```

[19]:
```
items_venues = results_venues['response']['groups'][0]['items']
```

[68]:
```
dataframe_venues = pd.json_normalize(items_venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories'] + [col for col in␣
 ↪dataframe_venues.columns if col.startswith('venue.location.')] + ['venue.id']
dataframe_filtered_venues = dataframe_venues.loc[:, filtered_columns]

# filter the category for each row
dataframe_filtered_venues['venue.categories'] = dataframe_filtered_venues.
 ↪apply(get_category_type, axis=1)

# clean columns
dataframe_filtered_venues.columns = [col.split('.')[-1] for col in␣
 ↪dataframe_filtered_venues.columns]

dataframe_filtered_venues
```

[68]:

	name	categories	\
0	Mendocino Farms	Sandwich Place	
1	Benny's Tacos & Chicken Rotisserie	Mexican Restaurant	
2	Santa Monica Seafood	Seafood Restaurant	
3	Sidecar Doughnuts & Coffee	Coffee Shop	
4	Huckleberry Cafe & Bakery	Café	
5	Bluestone Lane	Café	
6	Onda	New American Restaurant	
7	Tocaya Organica	Mexican Restaurant	
8	Rori's Artisanal Creamery	Ice Cream Shop	
9	Primo Passo Coffee Co.	Coffee Shop	
10	Healthy Spot	Pet Store	
11	Art's Table	American Restaurant	
12	Caffe Luxxe	Coffee Shop	
13	Ingo's Tasty Diner	Diner	

14	Rustic Canyon Wine Bar	Wine Bar
15	Father's Office	Gastropub
16	Cassia	Asian Restaurant
17	Kreation Kafe	Juice Bar
18	El Cholo	Mexican Restaurant
19	Basecamp Fitness	Gym / Fitness Center
20	See's Candies	Candy Store
21	Revolution Fitness	Gym
22	Andrew's Cheese Shop	Cheese Shop
23	Frozen Fruit Co	Dessert Shop
24	The Courtyard Kitchen	New American Restaurant
25	John Kelly Chocolates	Chocolate Shop
26	Dermalogica	Spa
27	Aero Theatre	Indie Movie Theater
28	Metropolis Cafe	Coffee Shop
29	Palihouse Santa Monica	Bed & Breakfast
30	Santa Monica Proper Hotel	Hotel
31	Mighty Pilates	Pilates Studio
32	SPUMONI Trattoria & Pizzeria	Italian Restaurant
33	The Massage Place	Massage Studio
34	Benefit Cosmetics	Cosmetics Shop
35	Paper Source	Gift Shop
36	Original Tommy's Shack on Wheels	Food Truck
37	The Duck Blind	Wine Shop
38	Philz Coffee	Coffee Shop
39	Esters Wine Shop & Bar	Wine Bar
40	Truetone Music	Music Store
41	Locanda Portofino Santa Monica	Italian Restaurant
42	Demitasse	Café
43	Santa Monica Liquor	Liquor Store
44	sweetgreen	Salad Place
45	Arthur Murray Dance Center	Dance Studio
46	Wexler's Deli	Deli / Bodega
47	Club Monaco	Clothing Store
48	Santa Monica Farmers Market	Farmers Market
49	The Penthouse	New American Restaurant
50	The Huntley Hotel	Hotel
51	SoulCycle Santa Monica	Cycle Studio
52	Fairmont Miramar Hotel & Bungalows	Hotel
53	Hillstone	New American Restaurant
54	Starbucks	Coffee Shop
55	Krispy Kreme Doughnuts	Donut Shop
56	West End	Nightclub
57	Tar & Roses	American Restaurant
58	M.i.'s Westside Comedy Theater	Comedy Club
59	Solidarity	Polish Restaurant
60	Victoria's Secret	Lingerie Store

```
61                     Marmalade Cafe   New American Restaurant
62                   FIG Santa Monica  Mediterranean Restaurant
63                           Patagonia            Clothing Store
64                       Panini Cafe  Mediterranean Restaurant
65                           Dunkin'                Donut Shop
66                  Burke Williams Spa                      Spa
67                       Tender Greens               Salad Place
68                        R+D Kitchen                 Gastropub
69                      Sweetfin Poké                Poke Place
70              Third Street Promenade            Shopping Plaza
71                           Lemonade                Restaurant
72                                REI       Sporting Goods Shop
73                        Sur La Table      Kitchen Supply Store
74                    Rapha Los Angeles                Coffee Shop
75                 Peet's Coffee & Tea                Coffee Shop
76           The Bungalow Santa Monica                     Lounge
77                        Pono Burger              Burger Joint
78                        Sugaring LA                       Spa
79                    Bhakti Yoga Shala              Yoga Studio
80                             Beaming                Juice Bar
81                             SEPHORA            Cosmetics Shop
82                        Planet Blue                  Boutique
83              Oceana Beach Club Hotel                     Hotel
84                        P.F. Chang's        Chinese Restaurant
85                             Kiehl's            Cosmetics Shop
86                          Cafe Zella                      Café
87                             T's Thai           Thai Restaurant
88                                 MUJI    Furniture / Home Store
89                           GloveWorx                Boxing Gym
90    European Wax Center Santa Monica                       Spa
91                     Pilates Platinum            Pilates Studio
92                           Sweetgreen               Salad Place
93                               SUBWAY            Sandwich Place
94                  Design Within Reach    Furniture / Home Store
95                    The Chestnut Club               Cocktail Bar
96                Rosti Tuscan Kitchen         Italian Restaurant
97                        Pure Barre                        Gym
98                    Estate Restaurant       American Restaurant
99                  DiDio's Italian ice             Ice Cream Shop

                                address        lat         lng  \
0                      631 Wilshire Blvd  34.021229 -118.496065
1                      915 Wilshire Blvd  34.023369 -118.493320
2                     1000 Wilshire Blvd  34.023756 -118.492265
3                      631 Wilshire Blvd  34.021135 -118.495803
4                     1014 Wilshire Blvd  34.024002 -118.492095
5                      631 Wilshire Blvd  34.021440 -118.495910
```

6	700 Wilshire Blvd	34.021344	-118.495056
7	507 Wilshire Blvd	34.020251	-118.496992
8	910 Montana Ave	34.028677	-118.499492
9	702 Montana Ave	34.026899	-118.501634
10	1110 Wilshire Blvd	34.024554	-118.491052
11	1002 Montana Ave	34.029110	-118.498789
12	925 Montana Ave	34.028999	-118.499327
13	1213 Wilshire Blvd	34.025618	-118.490456
14	1119 Wilshire Blvd	34.024877	-118.491245
15	1018 Montana Ave	34.029411	-118.498487
16	1314 7th St	34.019757	-118.493668
17	1023 Montana Ave	34.029816	-118.498434
18	1025 Wilshire Blvd	34.024340	-118.491964
19	1315 Lincoln Blvd	34.020621	-118.492612
20	1227 Wilshire Blvd	34.025962	-118.490123
21	1211 Montana Ave	34.031074	-118.496779
22	728 Montana Ave	34.027393	-118.500925
23	729 Montana Ave Ste 2	34.027296	-118.501246
24	1211 Montana Ave #C	34.031142	-118.496792
25	1111 Montana Ave	34.030252	-118.497639
26	1022 Montana Ave	34.029499	-118.498335
27	1328 Montana Ave	34.031833	-118.495437
28	603 Arizona Ave, Santa Monica, CA 90401	34.019496	-118.494777
29	1001 3rd St	34.021100	-118.501940
30	700 Wilshire Blvd	34.020865	-118.494524
31	625 Montana Ave Ste M	34.026987	-118.502248
32	NaN	34.027212	-118.501398
33	625 Montana Ave	34.026671	-118.502256
34	1210 Montana Ave Ste A	34.030767	-118.496646
35	309 Wilshire Blvd	34.018715	-118.499060
36	NaN	34.026274	-118.493345
37	1102 Montana Ave	34.029822	-118.497641
38	525 Santa Monica Blvd	34.018007	-118.493592
39	1314 7th St	34.019659	-118.493452
40	714 Santa Monica Blvd	34.019006	-118.491888
41	1110 Montana Ave	34.030016	-118.497762
42	1149 3rd St	34.018550	-118.499679
43	1001 Wilshire Blvd	34.023964	-118.492726
44	1343 4th St	34.016976	-118.495518
45	928 Broadway	34.025347	-118.503353
46	616 Santa Monica Blvd	34.018258	-118.492869
47	1225 3rd Street Promenade	34.017993	-118.498237
48	Arizona Ave	34.017024	-118.497677
49	1111 2nd St	34.018779	-118.501245
50	1111 2nd St	34.018795	-118.501052
51	120 Wilshire Blvd	34.017398	-118.500165
52	101 Wilshire Blvd	34.017827	-118.501568

53	202 Wilshire Blvd	34.017535	-118.500055
54	1030 Wilshire Blvd.	34.024290	-118.491766
55	1231 Wilshire Blvd	34.026108	-118.490123
56	1301 5th St	34.018506	-118.495569
57	602 Santa Monica Blvd	34.017974	-118.493190
58	1323A 3rd Street Promenade	34.016790	-118.496720
59	1414 Lincoln Blvd	34.018964	-118.491303
60	1247 3rd Street Promenade	34.016969	-118.497468
61	710 Montana Ave	34.026983	-118.501483
62	101 Wilshire Blvd	34.018017	-118.501522
63	1344 4th St	34.016717	-118.495870
64	312 Wilshire Blvd	34.018730	-118.498756
65	1132 Wilshire Blvd	34.024865	-118.490867
66	1358 4th St	34.016645	-118.495470
67	201 Arizona Ave	34.016426	-118.498583
68	1323 Montana Ave	34.031967	-118.495669
69	829 Broadway	34.018591	-118.489358
70	1202 3rd Street Promenade	34.016113	-118.496059
71	301 Arizona Ave	34.017383	-118.497402
72	402 Santa Monica Blvd	34.016428	-118.494671
73	301 Wilshire Blvd	34.018645	-118.499155
74	1347 4th St	34.016751	-118.495529
75	1401 Montana Avenue,	34.032408	-118.495193
76	101 Wilshire Blvd	34.017501	-118.501270
77	829 Broadway	34.018997	-118.488989
78	1229A Montana Ave	34.031409	-118.496393
79	207 Arizona Ave	34.016625	-118.498481
80	1426 Montana Ave	34.032744	-118.494575
81	1244 3rd Street Promenade	34.017228	-118.498431
82	800 14th St	34.032010	-118.495180
83	849 Ocean Ave	34.021275	-118.505740
84	326 Wilshire Blvd	34.018740	-118.498317
85	1516 Montana Ave	34.033101	-118.493677
86	1531 Wilshire Blvd	34.028494	-118.487377
87	1215 4th St	34.018756	-118.497841
88	1345 3rd Street Promenade	34.016087	-118.496429
89	NaN	34.027144	-118.488543
90	625 Montana Ave Ste F	34.026808	-118.502274
91	1255 2nd st	34.016484	-118.498905
92	NaN	34.033536	-118.493788
93	625 Montana Ave Ste D	34.026736	-118.502344
94	332 Santa Monica Blvd	34.016169	-118.495239
95	1348 14th St	34.024216	-118.485936
96	931 Montana Ave	34.029134	-118.499104
97	201 Wilshire Blvd Ste 120	34.018054	-118.500081
98	1519 Wilshire Blvd	34.028024	-118.487485
99	1305 Montana Ave	34.031682	-118.495945

	labeledLatLngs	distance	postalCode	\
0	[{'label': 'display', 'lat': 34.02122889710969…	429	90401	
1	[{'label': 'display', 'lat': 34.02336896060243…	350	90401	
2	[{'label': 'display', 'lat': 34.02375597395620…	418	90401	
3	[{'label': 'display', 'lat': 34.02113475420749…	443	90401	
4	[{'label': 'display', 'lat': 34.02400201667549…	424	90401	
5	[{'label': 'display', 'lat': 34.02144, 'lng': …	408	90401	
6	[{'label': 'display', 'lat': 34.021344, 'lng':…	436	90017	
7	[{'label': 'display', 'lat': 34.0202511794541,…	538	90401	
8	[{'label': 'display', 'lat': 34.02867679945021…	486	90403	
9	[{'label': 'display', 'lat': 34.02689877862753…	514	90403	
10	[{'label': 'display', 'lat': 34.02455387021680…	507	90401	
11	[{'label': 'display', 'lat': 34.02910991050824…	496	90403	
12	[{'label': 'display', 'lat': 34.02899861773448…	508	90403	
13	[{'label': 'display', 'lat': 34.02561782897627…	562	90403	
14	[{'label': 'display', 'lat': 34.02487694509322…	486	90401	
15	[{'label': 'display', 'lat': 34.02941126344390…	516	90403	
16	[{'label': 'display', 'lat': 34.01975737547978…	647	90401	
17	[{'label': 'display', 'lat': 34.0298161, 'lng'…	557	90403	
18	[{'label': 'display', 'lat': 34.02434041935157…	427	90401	
19	[{'label': 'display', 'lat': 34.02062067340295…	612	90401	
20	[{'label': 'display', 'lat': 34.02596158159572…	597	90403	
21	[{'label': 'display', 'lat': 34.03107416687669…	668	90403	
22	[{'label': 'display', 'lat': 34.02739334423265…	482	90403	
23	[{'label': 'display', 'lat': 34.02729610549303…	501	90403	
24	[{'label': 'display', 'lat': 34.03114163984753…	676	90403	
25	[{'label': 'display', 'lat': 34.03025214319724…	585	90403	
26	[{'label': 'display', 'lat': 34.02949929512181…	520	90403	
27	[{'label': 'display', 'lat': 34.03183325321096…	759	90403	
28	[{'label': 'display', 'lat': 34.019496, 'lng':…	641	90401	
29	[{'label': 'display', 'lat': 34.0211, 'lng': -…	668	90403	
30	[{'label': 'display', 'lat': 34.0208652, 'lng'…	502	90401	
31	[{'label': 'display', 'lat': 34.02698651977544…	570	90403	
32	[{'label': 'display', 'lat': 34.02721158812800…	509	90403	
33	[{'label': 'display', 'lat': 34.02667076078769…	558	90403	
34	[{'label': 'display', 'lat': 34.03076721053076…	634	90403	
35	[{'label': 'display', 'lat': 34.01871511728674…	745	90401	
36	[{'label': 'display', 'lat': 34.02627411975316…	321	NaN	
37	[{'label': 'display', 'lat': 34.029822, 'lng':…	538	90403	
38	[{'label': 'routing', 'lat': 34.017805, 'lng':…	831	90401	
39	[{'label': 'display', 'lat': 34.01965904117117…	665	90401	
40	[{'label': 'display', 'lat': 34.01900587943265…	798	90401	
41	[{'label': 'display', 'lat': 34.03001607672748…	562	90403	
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36	US	Los Angeles	CA	United States	

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11  [1002 Montana Ave (10th St), Santa Monica, CA …
12  [925 Montana Ave (btwn 9th & 10th St), Santa M…
13  [1213 Wilshire Blvd (12th Street), Santa Monic…
14  [1119 Wilshire Blvd (at 11th Ct.), Santa Monic…
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21  [1211 Montana Ave (Euclid Street), Santa Monic…
22  [728 Montana Ave (at Lincoln Blvd.), Santa Mon…
23  [729 Montana Ave Ste 2 (Lincoln Blvd), Santa M…
24  [1211 Montana Ave #C (12th), Santa Monica, CA …
25  [1111 Montana Ave, Santa Monica, CA 90403, Uni…
26  [1022 Montana Ave, Santa Monica, CA 90403, Uni…
27  [1328 Montana Ave (at 14th St), Santa Monica, …
28  [603 Arizona Ave, Santa Monica, CA 90401 (Ariz…
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36                    [Los Angeles, CA, United States]
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4	at 10th Ct	NaN	
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6	NaN	NaN	
7	NaN	NaN	
8	NaN	North of Montana	
9	at 7th St	NaN	
10	at 11th St	NaN	
11	10th St	NaN	
12	btwn 9th & 10th St	NaN	
13	12th Street	NaN	
14	at 11th Ct.	NaN	
15	btwn 10th & 11th St	NaN	
16	NaN	NaN	
17	at 11th St	North of Montana	
18	at 11th St.	NaN	
19	NaN	NaN	
20	NaN	NaN	

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22		at Lincoln Blvd.	NaN
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24		12th	NaN
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27		at 14th St	NaN
28		Arizona	NaN
29		Washington Avenue	NaN
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31		7th Street	NaN
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47		NaN	NaN
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54		11th	NaN
55		at Euclid St	NaN
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57		at 6th St.	NaN
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60		NaN	NaN
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62		at Fairmont Miramar Hotel	NaN
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3.3 Extract Venues using Search Queries

[38]:
```
# Data extracted from foursquare venues
four_sq_venue=pd.
 ↪DataFrame(dataframe_filtered_venues[['name','categories','distance','lat','lng','id']])

# Data extracted from search queries
new_venues=pd.DataFrame(search_df)

# Concatenate both dataframe
df_venue=four_sq_venue
df_venue
```

[38]:

	name	categories	distance	\
0	Mendocino Farms	Sandwich Place	429	
1	Benny's Tacos & Chicken Rotisserie	Mexican Restaurant	350	
2	Santa Monica Seafood	Seafood Restaurant	418	
3	Sidecar Doughnuts & Coffee	Coffee Shop	443	
4	Huckleberry Cafe & Bakery	Café	424	
5	Bluestone Lane	Café	408	
6	Onda	New American Restaurant	436	
7	Tocaya Organica	Mexican Restaurant	538	
8	Rori's Artisanal Creamery	Ice Cream Shop	486	
9	Primo Passo Coffee Co.	Coffee Shop	514	
10	Healthy Spot	Pet Store	507	
11	Art's Table	American Restaurant	496	
12	Caffe Luxxe	Coffee Shop	508	
13	Ingo's Tasty Diner	Diner	562	
14	Rustic Canyon Wine Bar	Wine Bar	486	
15	Father's Office	Gastropub	516	
16	Cassia	Asian Restaurant	647	
17	Kreation Kafe	Juice Bar	557	
18	El Cholo	Mexican Restaurant	427	
19	Basecamp Fitness	Gym / Fitness Center	612	
20	See's Candies	Candy Store	597	
21	Revolution Fitness	Gym	668	
22	Andrew's Cheese Shop	Cheese Shop	482	
23	Frozen Fruit Co	Dessert Shop	501	
24	The Courtyard Kitchen	New American Restaurant	676	
25	John Kelly Chocolates	Chocolate Shop	585	
26	Dermalogica	Spa	520	
27	Aero Theatre	Indie Movie Theater	759	
28	Metropolis Cafe	Coffee Shop	641	
29	Palihouse Santa Monica	Bed & Breakfast	668	
30	Santa Monica Proper Hotel	Hotel	502	
31	Mighty Pilates	Pilates Studio	570	
32	SPUMONI Trattoria & Pizzeria	Italian Restaurant	509	

33	The Massage Place	Massage Studio	558
34	Benefit Cosmetics	Cosmetics Shop	634
35	Paper Source	Gift Shop	745
36	Original Tommy's Shack on Wheels	Food Truck	321
37	The Duck Blind	Wine Shop	538
38	Philz Coffee	Coffee Shop	831
39	Esters Wine Shop & Bar	Wine Bar	665
40	Truetone Music	Music Store	798
41	Locanda Portofino Santa Monica	Italian Restaurant	562
42	Demitasse	Café	782
43	Santa Monica Liquor	Liquor Store	370
44	sweetgreen	Salad Place	905
45	Arthur Murray Dance Center	Dance Studio	631
46	Wexler's Deli	Deli / Bodega	829
47	Club Monaco	Clothing Store	803
48	Santa Monica Farmers Market	Farmers Market	902
49	The Penthouse	New American Restaurant	825
50	The Huntley Hotel	Hotel	814
51	SoulCycle Santa Monica	Cycle Studio	918
52	Fairmont Miramar Hotel & Bungalows	Hotel	931
53	Hillstone	New American Restaurant	900
54	Starbucks	Coffee Shop	446
55	Krispy Kreme Doughnuts	Donut Shop	600
56	West End	Nightclub	736
57	Tar & Roses	American Restaurant	847
58	M.i.'s Westside Comedy Theater	Comedy Club	922
59	Solidarity	Polish Restaurant	832
60	Victoria's Secret	Lingerie Store	906
61	Marmalade Cafe	New American Restaurant	505
62	FIG Santa Monica	Mediterranean Restaurant	911
63	Patagonia	Clothing Store	931
64	Panini Cafe	Mediterranean Restaurant	735
65	Dunkin'	Donut Shop	521
66	Burke Williams Spa	Spa	942
67	Tender Greens	Salad Place	981
68	R+D Kitchen	Gastropub	771
69	Sweetfin Poké	Poke Place	977
70	Third Street Promenade	Shopping Plaza	998
71	Lemonade	Restaurant	859
72	REI	Sporting Goods Shop	977
73	Sur La Table	Kitchen Supply Store	755
74	Rapha Los Angeles	Coffee Shop	930
75	Peet's Coffee & Tea	Coffee Shop	825
76	The Bungalow Santa Monica	Lounge	950
77	Pono Burger	Burger Joint	969
78	Sugaring LA	Spa	705
79	Bhakti Yoga Shala	Yoga Studio	957

80	Beaming	Juice Bar	872
81	SEPHORA	Cosmetics Shop	890
82	Planet Blue	Boutique	782
83	Oceana Beach Club Hotel	Hotel	950
84	P.F. Chang's	Chinese Restaurant	724
85	Kiehl's	Cosmetics Shop	931
86	Cafe Zella	Café	924
87	T's Thai	Thai Restaurant	713
88	MUJI	Furniture / Home Store	1000
89	GloveWorx	Boxing Gym	770
90	European Wax Center Santa Monica	Spa	565
91	Pilates Platinum	Pilates Studio	981
92	Sweetgreen	Salad Place	975
93	SUBWAY	Sandwich Place	568
94	Design Within Reach	Furniture / Home Store	998
95	The Chestnut Club	Cocktail Bar	980
96	Rosti Tuscan Kitchen	Italian Restaurant	511
97	Pure Barre	Gym	847
98	Estate Restaurant	American Restaurant	895
99	DiDio's Italian ice	Ice Cream Shop	737

	lat	lng	id
0	34.021229	-118.496065	56455453498e2e765346728d
1	34.023369	-118.493320	5580affe498e0975d2009d02
2	34.023756	-118.492265	49f8e126f964a520316d1fe3
3	34.021135	-118.495803	563683bd498e2c8761eb2ede
4	34.024002	-118.492095	49d046d0f964a520185b1fe3
5	34.021440	-118.495910	5ab4a38462420b3209f7511a
6	34.021344	-118.495056	5d990da9f665490008a50a35
7	34.020251	-118.496992	58f96576f0ca9540b1151125
8	34.028677	-118.499492	5621e54c498effadee2314bc
9	34.026899	-118.501634	4f5bf0e6e4b024154290ec6b
10	34.024554	-118.491052	49c7bd64f964a520b9571fe3
11	34.029110	-118.498789	531168ef498ed0e38ca4c9f7
12	34.028999	-118.499327	4a7488aaf964a5207bde1fe3
13	34.025618	-118.490456	5500ae93498ee31c16cb6c98
14	34.024877	-118.491245	459d1658f964a520a3401fe3
15	34.029411	-118.498487	3fd66200f964a52002f01ee3
16	34.019757	-118.493668	5580cfe3498eb8ba1ca0874a
17	34.029816	-118.498434	4b0c5f24f964a520003c23e3
18	34.024340	-118.491964	413f9d00f964a520691c1fe3
19	34.020621	-118.492612	54f6a847498edd745efba23a
20	34.025962	-118.490123	4a7ddf31f964a52004f01fe3
21	34.031074	-118.496779	4ac4b9f9f964a520e29e20e3
22	34.027393	-118.500925	4b8743bcf964a52044b931e3
23	34.027296	-118.501246	571e676d498e590d6a3b3ac9
24	34.031142	-118.496792	5116c2dee4b0d096ad84561c

25	34.030252	-118.497639	4f4e9751e4b0db3297266a43
26	34.029499	-118.498335	4b305d8ff964a52036f924e3
27	34.031833	-118.495437	4a4ee93bf964a52031af1fe3
28	34.019496	-118.494777	57ac1165498ee7e60ade54dc
29	34.021100	-118.501940	51800977498e41a800e4e1cf
30	34.020865	-118.494524	5c83169da9e402002c265883
31	34.026987	-118.502248	56745056498ea77d7f72396d
32	34.027212	-118.501398	57fe95d5498e325cdf6bbb7e
33	34.026671	-118.502256	4ad66263f964a520e80621e3
34	34.030767	-118.496646	4b787546f964a520c2cf2ee3
35	34.018715	-118.499060	4c8d69958018a1cd014ef5d2
36	34.026274	-118.493345	4c06ae6a8a81c9b6bc1a2690
37	34.029822	-118.497641	4af3bab0f964a52034ef21e3
38	34.018007	-118.493592	53af17e3498e8de9d6381a9f
39	34.019659	-118.493452	55a8461f498e67daf5fcb43c
40	34.019006	-118.491888	4a984658f964a520472b20e3
41	34.030016	-118.497762	4b6281faf964a520ed492ae3
42	34.018550	-118.499679	5154f8fde889ae67b8016eb7
43	34.023964	-118.492726	4b09c9d7f964a5209d1d23e3
44	34.016976	-118.495518	55ce2ff5498e0153c737c871
45	34.025347	-118.503353	524b5f5b049340c344841fec
46	34.018258	-118.492869	55e4c589498ed66534294cee
47	34.017993	-118.498237	4b22fa95f964a520785124e3
48	34.017024	-118.497677	4b0d6b1af964a520dc4723e3
49	34.018779	-118.501245	47ecf459f964a520694e1fe3
50	34.018795	-118.501052	4a90a8a0f964a520021920e3
51	34.017398	-118.500165	50f4ae1be4b0afcceb376d42
52	34.017827	-118.501568	4a50e8acf964a5203eb01fe3
53	34.017535	-118.500055	4396d5a8f964a520962b1fe3
54	34.024290	-118.491766	5304f128498e6ba90ee7baa7
55	34.026108	-118.490123	4b527e21f964a520b77f27e3
56	34.018506	-118.495569	583d40c9561ded18827aa41a
57	34.017974	-118.493190	4ea4aa88490102dac38dadf2
58	34.016790	-118.496720	4b0862a9f964a520a70a23e3
59	34.018964	-118.491303	4549b820f964a520953c1fe3
60	34.016969	-118.497468	50605ce63d7c47f05ba41640
61	34.026983	-118.501483	4a886210f964a520210620e3
62	34.018017	-118.501522	49bac6c5f964a520a2531fe3
63	34.016717	-118.495870	50ca0a7be4b0646703844e12
64	34.018730	-118.498756	582d2a45375c4a4cac68e7bd
65	34.024865	-118.490867	53ec2649498eb8e57592994e
66	34.016645	-118.495470	457971f7f964a520d73e1fe3
67	34.016426	-118.498583	4ddbb5ef1f6e9b46a129bc6a
68	34.031967	-118.495669	4a4ea9c9f964a520e0ae1fe3
69	34.018591	-118.489358	545a7f18498e92881a614142
70	34.016113	-118.496059	44ded2f5f964a520d2361fe3
71	34.017383	-118.497402	564b9282498e643ca808b538

```
72  34.016428 -118.494671  4b48fac3f964a520826026e3
73  34.018645 -118.499155  4ab6b00ef964a520937820e3
74  34.016751 -118.495529  59a97957acb00b097b3b3ba0
75  34.032408 -118.495193  4a721daaf964a52064da1fe3
76  34.017501 -118.501270  500f2631d63ed6e65eac5fb6
77  34.018997 -118.488989  51818730498ea1f998162a94
78  34.031409 -118.496393  4dfa8e88a8096fbd6be46741
79  34.016625 -118.498481  4c1d8296eac020a1846d48c2
80  34.032744 -118.494575  54ac8878498e5313d7771ab8
81  34.017228 -118.498431  4a6f590cf964a520efd51fe3
82  34.032010 -118.495180  4a4855eaf964a520b3aa1fe3
83  34.021275 -118.505740  4b4bad8ff964a520c1a326e3
84  34.018740 -118.498317  455d90cbf964a520783d1fe3
85  34.033101 -118.493677  4b4a6edcf964a520748726e3
86  34.028494 -118.487377  4b635043f964a52093712ae3
87  34.018756 -118.497841  4adcbce0f964a520412f21e3
88  34.016087 -118.496429  5bad97b1464d65002c874c76
89  34.027144 -118.488543  55423a3a498eea893ae77341
90  34.026808 -118.502274  53d169b6498e6dfab1f00f0e
91  34.016484 -118.498905  4d7044cfcbc58cfaab716f72
92  34.033536 -118.493788  5c6f233da4ba7c002c56b174
93  34.026736 -118.502344  4da768a281541df437a65509
94  34.016169 -118.495239  4b673ef4f964a52097432be3
95  34.024216 -118.485936  53b19e04498e1978c88959bd
96  34.029134 -118.499104  4b95a13cf964a52005ad34e3
97  34.018054 -118.500081  52efeb6c498e555a0434a432
98  34.028024 -118.487485  5510d050498e6fa81a10311d
99  34.031682 -118.495945  4a48558cf964a520b2aa1fe3
```

[39]:
```
to_drop = ['Restaurant','Diner','Kitchen']
df_venues = df_venue[~df_venue['categories'].str.contains('|'.join(to_drop))].
 ↪reset_index()
print("There are {} venues in Santa Monica".format(df_venues.shape[0]))
df_venues[['name','distance','id']]
```

```
There are 76 venues in Santa Monica
```

[39]:

	name	distance	id
0	Mendocino Farms	429	56455453498e2e765346728d
1	Sidecar Doughnuts & Coffee	443	563683bd498e2c8761eb2ede
2	Huckleberry Cafe & Bakery	424	49d046d0f964a520185b1fe3
3	Bluestone Lane	408	5ab4a38462420b3209f7511a
4	Rori's Artisanal Creamery	486	5621e54c498effadee2314bc
5	Primo Passo Coffee Co.	514	4f5bf0e6e4b024154290ec6b
6	Healthy Spot	507	49c7bd64f964a520b9571fe3
7	Caffe Luxxe	508	4a7488aaf964a5207bde1fe3
8	Rustic Canyon Wine Bar	486	459d1658f964a520a3401fe3

9	Father's Office	516	3fd66200f964a52002f01ee3
10	Kreation Kafe	557	4b0c5f24f964a520003c23e3
11	Basecamp Fitness	612	54f6a847498edd745efba23a
12	See's Candies	597	4a7ddf31f964a52004f01fe3
13	Revolution Fitness	668	4ac4b9f9f964a520e29e20e3
14	Andrew's Cheese Shop	482	4b8743bcf964a52044b931e3
15	Frozen Fruit Co	501	571e676d498e590d6a3b3ac9
16	John Kelly Chocolates	585	4f4e9751e4b0db3297266a43
17	Dermalogica	520	4b305d8ff964a52036f924e3
18	Aero Theatre	759	4a4ee93bf964a52031af1fe3
19	Metropolis Cafe	641	57ac1165498ee7e60ade54dc
20	Palihouse Santa Monica	668	51800977498e41a800e4e1cf
21	Santa Monica Proper Hotel	502	5c83169da9e402002c265883
22	Mighty Pilates	570	56745056498ea77d7f72396d
23	The Massage Place	558	4ad66263f964a520e80621e3
24	Benefit Cosmetics	634	4b787546f964a520c2cf2ee3
25	Paper Source	745	4c8d69958018a1cd014ef5d2
26	Original Tommy's Shack on Wheels	321	4c06ae6a8a81c9b6bc1a2690
27	The Duck Blind	538	4af3bab0f964a52034ef21e3
28	Philz Coffee	831	53af17e3498e8de9d6381a9f
29	Esters Wine Shop & Bar	665	55a8461f498e67daf5fcb43c
30	Truetone Music	798	4a984658f964a520472b20e3
31	Demitasse	782	5154f8fde889ae67b8016eb7
32	Santa Monica Liquor	370	4b09c9d7f964a5209d1d23e3
33	sweetgreen	905	55ce2ff5498e0153c737c871
34	Arthur Murray Dance Center	631	524b5f5b049340c344841fec
35	Wexler's Deli	829	55e4c589498ed66534294cee
36	Club Monaco	803	4b22fa95f964a520785124e3
37	Santa Monica Farmers Market	902	4b0d6b1af964a520dc4723e3
38	The Huntley Hotel	814	4a90a8a0f964a520021920e3
39	SoulCycle Santa Monica	918	50f4ae1be4b0afcceb376d42
40	Fairmont Miramar Hotel & Bungalows	931	4a50e8acf964a5203eb01fe3
41	Starbucks	446	5304f128498e6ba90ee7baa7
42	Krispy Kreme Doughnuts	600	4b527e21f964a520b77f27e3
43	West End	736	583d40c9561ded18827aa41a
44	M.i.'s Westside Comedy Theater	922	4b0862a9f964a520a70a23e3
45	Victoria's Secret	906	50605ce63d7c47f05ba41640
46	Patagonia	931	50ca0a7be4b0646703844e12
47	Dunkin'	521	53ec2649498eb8e57592994e
48	Burke Williams Spa	942	457971f7f964a520d73e1fe3
49	Tender Greens	981	4ddbb5ef1f6e9b46a129bc6a
50	R+D Kitchen	771	4a4ea9c9f964a520e0ae1fe3
51	Sweetfin Poké	977	545a7f18498e92881a614142
52	Third Street Promenade	998	44ded2f5f964a520d2361fe3
53	REI	977	4b48fac3f964a520826026e3
54	Rapha Los Angeles	930	59a97957acb00b097b3b3ba0
55	Peet's Coffee & Tea	825	4a721daaf964a52064da1fe3

56	The Bungalow Santa Monica	950	500f2631d63ed6e65eac5fb6
57	Pono Burger	969	51818730498ea1f998162a94
58	Sugaring LA	705	4dfa8e88a8096fbd6be46741
59	Bhakti Yoga Shala	957	4c1d8296eac020a1846d48c2
60	Beaming	872	54ac8878498e5313d7771ab8
61	SEPHORA	890	4a6f590cf964a520efd51fe3
62	Planet Blue	782	4a4855eaf964a520b3aa1fe3
63	Oceana Beach Club Hotel	950	4b4bad8ff964a520c1a326e3
64	Kiehl's	931	4b4a6edcf964a520748726e3
65	Cafe Zella	924	4b635043f964a52093712ae3
66	MUJI	1000	5bad97b1464d65002c874c76
67	GloveWorx	770	55423a3a498eea893ae77341
68	European Wax Center Santa Monica	565	53d169b6498e6dfab1f00f0e
69	Pilates Platinum	981	4d7044cfcbc58cfaab716f72
70	Sweetgreen	975	5c6f233da4ba7c002c56b174
71	SUBWAY	568	4da768a281541df437a65509
72	Design Within Reach	998	4b673ef4f964a52097432be3
73	The Chestnut Club	980	53b19e04498e1978c88959bd
74	Pure Barre	847	52efeb6c498e555a0434a432
75	DiDio's Italian ice	737	4a48558cf964a520b2aa1fe3

3.3.1 Location of all venues

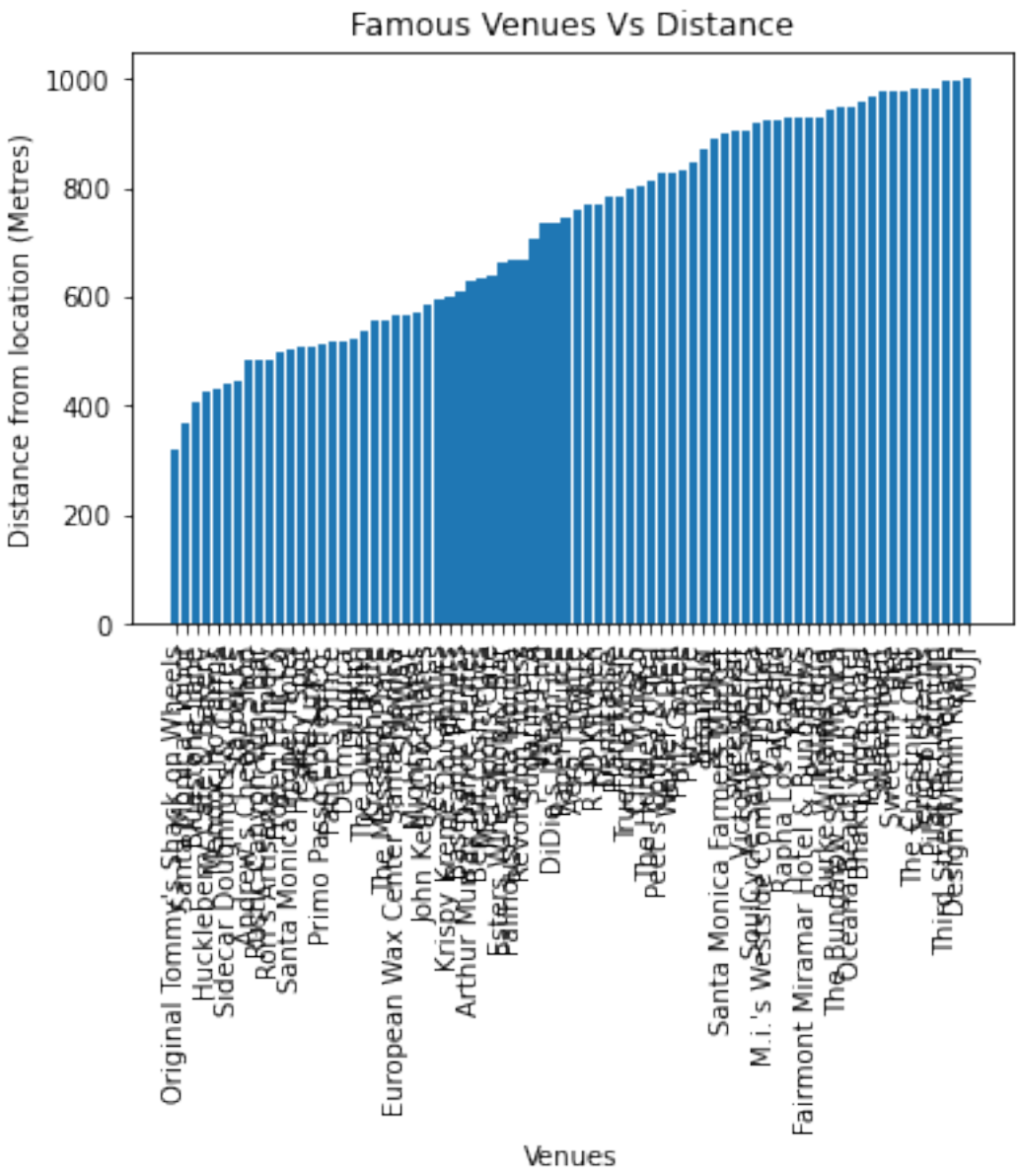
[40]:
```
venues_map = folium.Map(location=[latitude, longitude], zoom_start=16) #␣
↪generate map centred around the Conrad Hotel

# add a red circle marker to represent the Santa Monica
folium.CircleMarker(
    [latitude, longitude],
    radius=10,
    color='red',
    popup='kanyakumari',
    fill = True,
    fill_color = 'red',
    fill_opacity = 0.6
).add_to(venues_map)

# add the Italian restaurants as blue circle markers
for lat, lng, label in zip(df_venues.lat, df_venues.lng, df_venues.name):
    folium.CircleMarker(
        [lat, lng],
        radius=5,
        color='black',
        #popup=label,
        fill = True,
        fill_color='black',
```

```
        fill_opacity=0.6
    ).add_to(venues_map)

# display map
venues_map
```

[40]: <folium.folium.Map at 0x7fa11429c9a0>

3.3.2 Distance between Venues and the Core Location

[49]:
```
distance_venues_df=df_venues.sort_values('distance')

def plot_bar_venue():
    # this is for plotting purpose
    index = np.arange(len(distance_venues_df.name))
    plt.bar(distance_venues_df.name, distance_venues_df.distance)
    plt.xlabel('Venues')
    plt.ylabel('Distance from location (Metres)')
    plt.xticks(distance_venues_df.name,rotation=90)
    plt.title('Famous Venues Vs Distance')
    plt.show()
plot_bar_venue()
```



From the plot above, we can see that most of the venues are located between 500 to 700 meters from the core location.

3.3.3 Clustering based on venues

[71]:
```
final_venues = df_venues
# one hot encoding
neighbor_onehot = pd.get_dummies(final_venues[['categories']], prefix="",␣
 ↪prefix_sep="")
```

```
# add neighborhood column back to dataframe
neighbor_onehot['name'] = final_venues['name']

# move neighborhood column to the first column
fixed_columns = [neighbor_onehot.columns[-1]] + list(neighbor_onehot.columns[:
 ↪-1])
neighbor_onehot = neighbor_onehot[fixed_columns]

neighbor_onehot.head()
```

[71]:

	name	Bed & Breakfast	Boutique	Boxing Gym	\
0	Mendocino Farms	0	0	0	
1	Sidecar Doughnuts & Coffee	0	0	0	
2	Huckleberry Cafe & Bakery	0	0	0	
3	Bluestone Lane	0	0	0	
4	Rori's Artisanal Creamery	0	0	0	

	Burger Joint	Café	Candy Store	Cheese Shop	Chocolate Shop	\
0	0	0	0	0	0	
1	0	0	0	0	0	
2	0	1	0	0	0	
3	0	1	0	0	0	
4	0	0	0	0	0	

	Clothing Store	Cocktail Bar	Coffee Shop	Comedy Club	Cosmetics Shop	\
0	0	0	0	0	0	
1	0	0	1	0	0	
2	0	0	0	0	0	
3	0	0	0	0	0	
4	0	0	0	0	0	

	Cycle Studio	Dance Studio	Deli / Bodega	Dessert Shop	Donut Shop	\
0	0	0	0	0	0	
1	0	0	0	0	0	
2	0	0	0	0	0	
3	0	0	0	0	0	
4	0	0	0	0	0	

	Farmers Market	Food Truck	Furniture / Home Store	Gastropub	Gift Shop	\
0	0	0	0	0	0	
1	0	0	0	0	0	
2	0	0	0	0	0	
3	0	0	0	0	0	
4	0	0	0	0	0	

	Gym	Gym / Fitness Center	Hotel	Ice Cream Shop	Indie Movie Theater	\

```
0    0                    0      0              0                    0
1    0                    0      0              0                    0
2    0                    0      0              0                    0
3    0                    0      0              0                    0
4    0                    0      0              1                    0

   Juice Bar  Lingerie Store  Liquor Store  Lounge  Massage Studio  \
0          0               0             0       0               0
1          0               0             0       0               0
2          0               0             0       0               0
3          0               0             0       0               0
4          0               0             0       0               0

   Music Store  Nightclub  Pet Store  Pilates Studio  Poke Place  Salad Place  \
0            0          0          0               0           0            0
1            0          0          0               0           0            0
2            0          0          0               0           0            0
3            0          0          0               0           0            0
4            0          0          0               0           0            0

   Sandwich Place  Shopping Plaza  Spa  Sporting Goods Shop  Wine Bar  \
0               1               0    0                    0         0
1               0               0    0                    0         0
2               0               0    0                    0         0
3               0               0    0                    0         0
4               0               0    0                    0         0

   Wine Shop  Yoga Studio
0          0            0
1          0            0
2          0            0
3          0            0
4          0            0
```

[72]:
```
neighbor_onehot.shape
neighbor_grouped = neighbor_onehot.groupby('name').mean().reset_index()
```

[73]:
```
# Top 10 venues
num_top_venues = 10

indicators = ['st', 'nd', 'rd']

# create columns according to number of top venues
columns = ['name']
for ind in np.arange(num_top_venues):
    try:
        columns.append('{}{} Most Common Venue'.format(ind+1, indicators[ind]))
```

```
    except:
        columns.append('{}th Most Common Venue'.format(ind+1))

# create a new dataframe
neighborhoods_venues_sorted = pd.DataFrame(columns=columns)
neighborhoods_venues_sorted['name'] = neighbor_grouped['name']
```

[74]:
```
# Clustering

# set number of clusters
kclusters = 3

neighbor_grouped_clustering = neighbor_grouped.drop('name', 1)

# run k-means clustering
kmeans = KMeans(n_clusters=kclusters, random_state=0).
 ↪fit(neighbor_grouped_clustering)

# check cluster labels generated for each row in the dataframe
kmeans.labels_[0:10]


# add clustering labels
neighborhoods_venues_sorted.insert(0, 'Clustersss', kmeans.labels_)

neighbor_merged = final_venues

# merge grouped with data to add latitude/longitude for each neighborhood
neighbor_merged = neighbor_merged.join(neighborhoods_venues_sorted.
 ↪set_index('name'), on='name')

kmeans
```

[74]:
```
KMeans(n_clusters=3, random_state=0)
```

3.3.4 Center of all clusters & Midpoint of all venues

[76]:
```
fin=neighbor_merged.groupby(['Clustersss']).mean()

lati=sum(fin.lat)/len(fin.lat)
longi=sum(fin.lng)/len(fin.lng)

#Taking midpoint of top ten closest restaurant
venues_lan=sum(final_venues.lat)/len(final_venues.lat)
venues_lng=sum(final_venues.lng)/len(final_venues.lng)
```

```
final_latitude=(lati+venues_lan)/2
final_longitude=(longi+venues_lng)/2

print("Final location (Green Dot in our below given map) of our brand new␣
 ↪restaruant:{},{}".format(final_latitude,final_longitude))
```

```
Final location (Green Dot in our below given map) of our brand new
restaruant:34.023760677337236,-118.49650183994382
```

[78]:
```
map_clusters = folium.Map(location=[latitude, longitude], zoom_start=17)

# set color scheme for the clusters
x = np.arange(kclusters)
ys = [i + x + (i*x)**2 for i in range(kclusters)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

folium.CircleMarker(
    [final_latitude, final_longitude],
    radius=10,
    color='green',
    popup='My hotel',
    fill = True,
    fill_color = 'green',
    fill_opacity = 0.6
).add_to(map_clusters)

# add markers to the map
markers_colors = []
for lat, lon, poi, cluster in zip(neighbor_merged['lat'],␣
 ↪neighbor_merged['lng'], neighbor_merged['name'],␣
 ↪neighbor_merged['Clustersss']):
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=True)
    folium.CircleMarker(
        [lat, lon],
        radius=6,
        popup=label,
        color=rainbow[cluster-1],
        fill=True,
        fill_color=rainbow[cluster-1],
        fill_opacity=0.7).add_to(map_clusters)


map_clusters
```

[78]:
```
<folium.folium.Map at 0x7fa114a99fa0>
```

3.4 Discussion

Although there are a lot of competition between each restaurant in Santa Monica, KMeans have figured out the most common place for all the venues. This output was very adjacent to the core location.This proves the accurate spotting of our predicted algorithm.

The aim of the restaurant is to provide the best experience to its customers; therefore, in this final location, customers can reach each famout and popular venues in Santa Monica very convenient. I believe that the location will bring a huge success to the new restaurant.

3.5 Conclusion

My restaurant location Final location is pointed at 34.023760677337236,-118.49650183994382 The final location for the new restaurant can give easy access for our customers to all tourist in Santa Monica. Located at between the school and memorial playhouse which can give more attention to people who passby.

As a business person,one would be able to set up a restaurant on given spot. This will bring revenue automatically as we have located in very near to core one. We proved this with Kmeans.

[ ]:

[ ]: