Capstone – Final Report
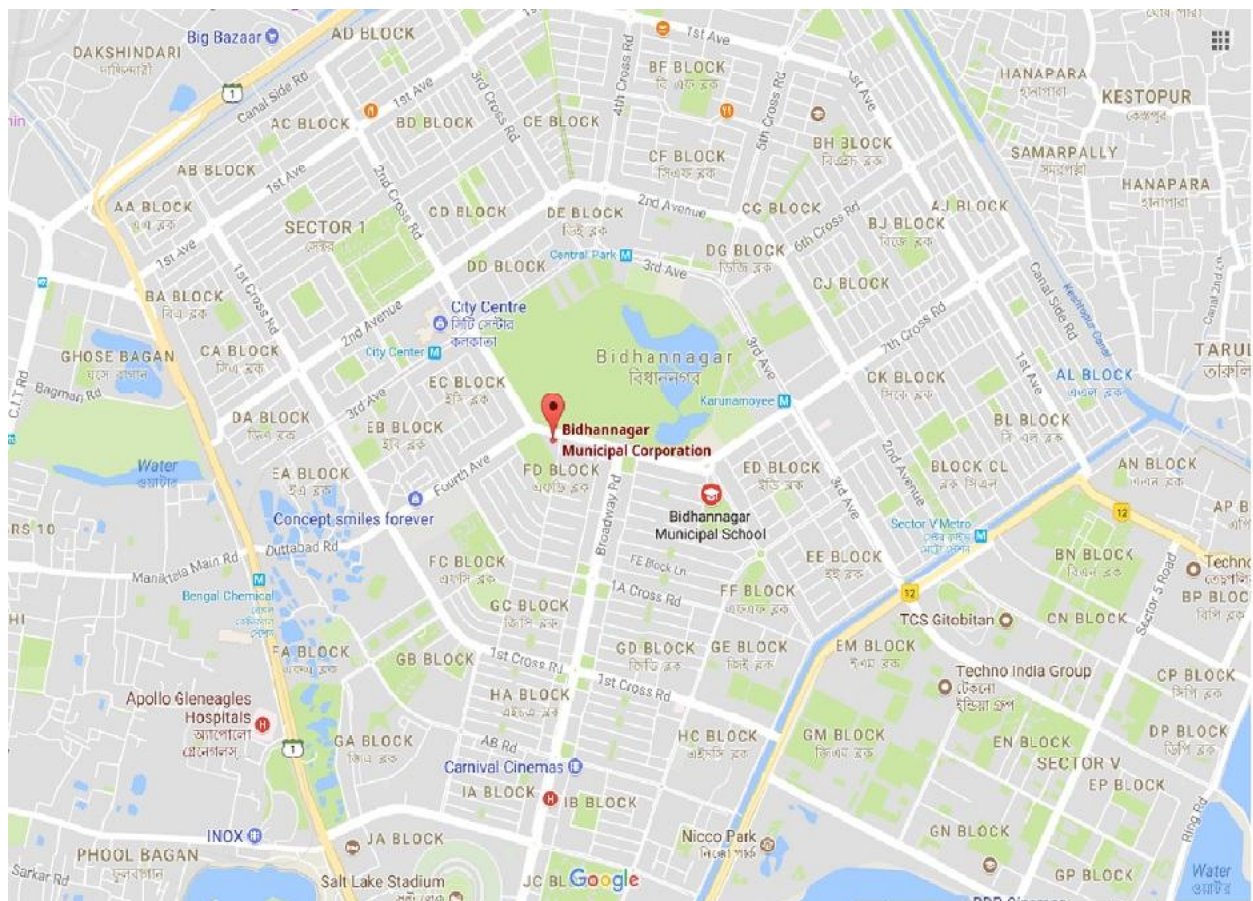Final Report

7/22/2020

Table of Contents

1. Introduction

1.1 Background

The purpose of the project is to help XYZ Inc in scouting for a suitable location to open a **hotel/restaurant** in Salt Lake City so that they can make a conscious call on the investments made on the location of the hotel/ restaurant and aim to make it a profit making venture .

1.2 Location

Salt Lake City is a well-planned satellite township in Kolkata located on the eastern part of India. The area is divided into multiple sectors, which are further sub-divided into various blocks. Dynamic and with a constantly evolving landscape with large green spaces and water bodies, Salt Lake is a vibrant part of the city comprising of both residential and commercial areas and is also the main IT hub of the city.

Map of Salt Lake City

1.3 Key Ask

Considering the substantial opportunity that the township offers in terms of the hospitality industry, the customer would like to have a study performed based on the current competitive landscape so that meaningful insights can be derived to help them decide on a viable location for opening a hotel/restaurant.

2 Data

- GeoPy Python package would be used to obtain the latitude and the longitude coordinates of all the locations
- Foursquare API would be used to obtain information about
  - The existing hotels and restaurants in Salt Lake City
  - Explore additional venues and locations with in a specified radius
- All data is transformed into pandas dataframe
- Folium Python library would be used to visualize the results on a map

3. Methodology

3.1 Import Libraries

Load the following libraries :

- Numpy- for vector manipulation
- Pandas- for data analysis
- Requests- for http library request
- json_normalize - transform JSON file into a pandas dataframe
- Json -JSON files manipulation
- Matplotlib and associated plotting modules
- KMeans from sklearn cluster (clustering algorithm)
- Nominatim from geopy.geocoders
- Folium - map rendering library

3.2 Four Square Credentials and Location

Pass Four Square Credentials and obtain the co-ordinates of the core location .
Salt Lake core location : 22.5735344,88.4132664

3.3 Four Square API Search

A search is performed using Four Square API for hotels, restaurants and cafes within 1.5 KM of Salt lake City core location
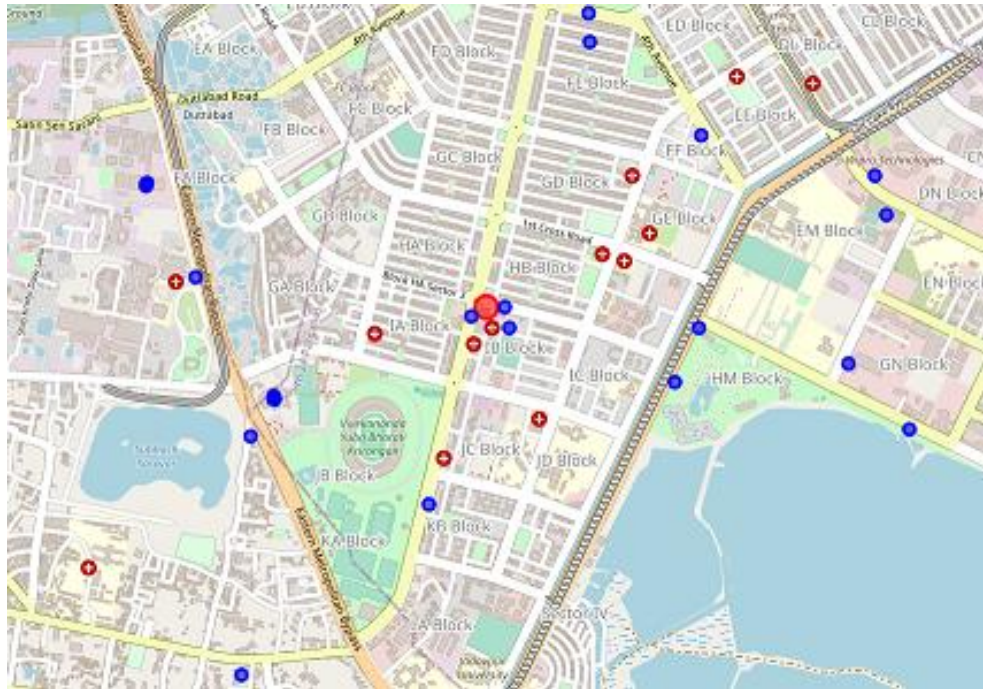
- Get requests to obtain results of queries for hotels, restaurants and cafes
- Relevant part of JSON is obtained and transformed into a pandas dataframe
- 30 restaurants, cafes and hotels were found within the specified radius
- Dataframe is cleaned up to show only relevant columns , snapshot provided below:

```
df_new=dataframe_filtered[['name','categories','distance','lat','lng','id']]
df_new
```

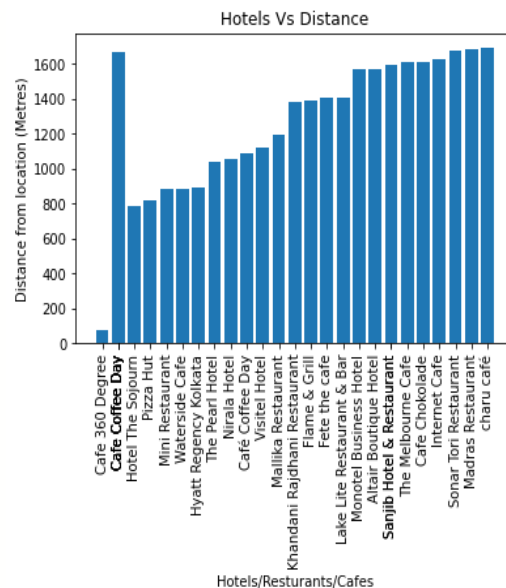|	name	categories	distance	lat	lng	id
0	Hotel The Sojourn	Hotel	789	22.566729	88.411087	4bd5c2649649ce7293a0511d
1	The Pearl Hotel	Bed & Breakfast	1035	22.569062	88.404429	4bd885802ecdce720dcbd0f2
2	Sanjib Hotel & Restaurant	Indian Restaurant	1598	22.559192	88.414024	50195e27e4b02547cec93e58
3	Visitel Hotel	Hotel	1121	22.574566	88.402409	5c13aa78b9ac38002c63100e
4	Nirala Hotel	Indian Restaurant	1051	22.579412	88.421278	50e95b1ce4b0ae33cb6b7f7d
5	Altair Boutique Hotel	Hotel	1571	22.576707	88.428161	5c1a71b416fa04002c23cfcd
6	Monotel Business Hotel	Hotel	1569	22.578023	88.427737	52163cc993cd196b5be7277d
7	Hyatt Regency Kolkata	Hotel	890	22.570358	88.405319	4bc788f893bdeee1927d37ae
0	Mini Restaurant	Indian Restaurant	886	22.570452	88.405310	4fba4857e4b06ef132cc25cd
1	Mallika Restaurant	Diner	1190	22.583630	88.417073	508bf809e4b06f6d191b16b3
2	Lake Lite Restaurant & Bar	Restaurant	1404	22.571563	88.426760	4f6c6f9be4b0e3b3bbeeef54
3	Khandani Rajdhani Restaurant	Vegetarian / Vegan Restaurant	1386	22.577797	88.400588	4cda754299026dcb2a200681
4	Sanjib Hotel & Restaurant	Indian Restaurant	1598	22.559192	88.414024	50195e27e4b02547cec93e58
5	Madras Restaurant	South Indian Restaurant	1685	22.569337	88.429019	58cc00c3ce593d315f801ed3
6	Sonar Tori Restaurant	Bengali Restaurant	1678	22.587797	88.407974	5d4aa41b57df850008c2516b
7	Pizza Hut	Pizza Place	819	22.572822	88.421198	54917e47498e98b1542ad453
8	Flame & Grill	Indian Restaurant	1389	22.577749	88.400545	4bec1e92b3352d7fe43e57d2
0	Cafe 360 Degree	Café	70	22.573511	88.413953	4e5df62daeb78833bb8576c9
1	Cafe Coffee Day	Café	70	22.573182	88.412693	4e903a4d9adf26eeb9ea2a8e
2	Cafe Coffee Day	Café	1671	22.587764	88.408075	4bee9dee3686c9b61db0246e
3	Cafe Coffee Day	Café	117	22.572824	88.414106	4d980d77a2c654814055e953
4	Cafe Chokolade	Café	1611	22.587030	88.407605	4dfc34cccc3f82583a4b07a8
5	Internet Cafe	Internet Cafe	1624	22.585836	88.421775	5031d562e4b0648638d12afc
6	Cafe Coffee Day	Café	777	22.570942	88.420286	57809d2e498eb537b3f5e7ad
7	Café Coffee Day	Café	1087	22.582632	88.417110	4c6ebbdf5d089c74ac0608c3
8	Cafe Coffee Day	Café	1388	22.577678	88.400524	4c6ebc885d089c74190908c3
9	Waterside Cafe	Café	886	22.570363	88.405353	4ca2a6b3f832a1cd9b2e97e5
10	The Melbourne Cafe	Café	1607	22.585940	88.405266	5c85ec35c58ed7002cb71cce
11	Fete the cafe	Café	1403	22.586146	88.413252	516f871ae4b0884c823d9713
12	charu café	Fast Food Restaurant	1693	22.560888	88.404106	4fcf6f7ae4b0ab736eeedc23

Snapshot of Dataframe

- Location of hotels/ restaurants/cafes are to be displayed on a map using Folium map rendering library

Salt Lake core location ● hotels/restaurants/cafes ●

Legend :

- Average distance between hotels and core location is 1188 meters
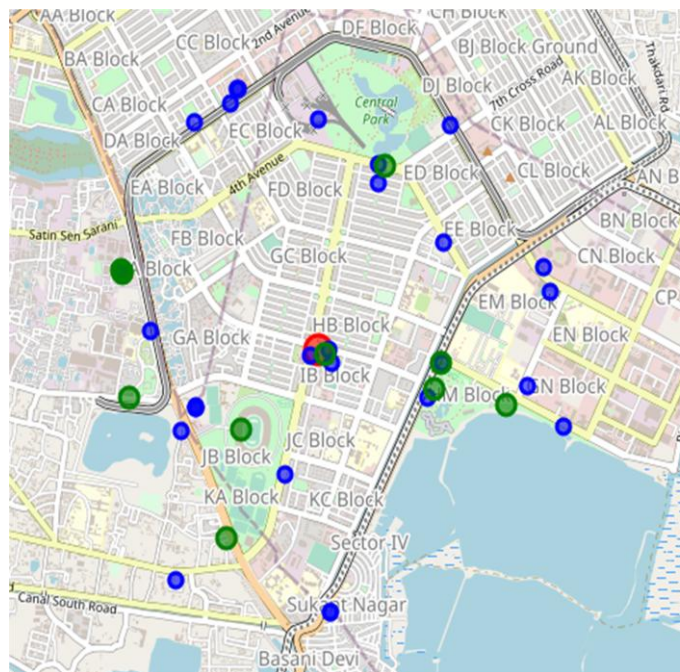
3.4 Four Square API Explore

Four Square API explore is used to explore venues with in 1.5 km of Salt lake core location

- Around 40 venues are extracted which also contains hotels, cafes and restaurants.
- Removing restaurants , hotels and cafes from the explored list 11 specific venues were obtained as shown below :

There are 11 venues in Salt lake

	name	categories	distance	lat	lng	id
2	Carnival Cinemas	Movie Theater	51	22.573300	88.413693	54f84dce498e211ce5c20c9e
4	INOX	Multiplex	1292	22.570893	88.401026	4d4404083616b60c94b5dfc2
5	Yuvabharati Krirangan (Salt Lake Stadium)	Soccer Stadium	707	22.569197	88.408232	4d5f52e3ef378cfa06736ea6
9	Mani Square Mall	Shopping Mall	1387	22.577823	88.400591	4c333482a0ced13af334166e
15	PVR (XL)	Multiplex	1390	22.577859	88.400579	4d0111e6f7988eecee2b5de7
20	Nicco Park	Theme Park	801	22.571358	88.420695	4c234b3113c00f47a0be88de
22	Nicco Super Bowl	Bowling Alley	816	22.572807	88.421175	4d6100dbb6b9a1cdc8578251
25	Big Bazaar	Department Store	1198	22.583548	88.417543	4be982bb947820a1e916b6db
28	Nico Park Plaza	Plaza	1284	22.570518	88.425325	50c207bde4b064777206c0d6
30	Brand Factory	Convenience Store	1299	22.563254	88.407283	4fce783fe4b0fb844e12e6a3
34	Westside	Clothing Store	1384	22.577738	88.400588	4ff2d670e4b0042e63187036

- The venues along with the hotels, restaurants and cafes found using search function in section 3.3 were displayed on a map using Folium map rendering library
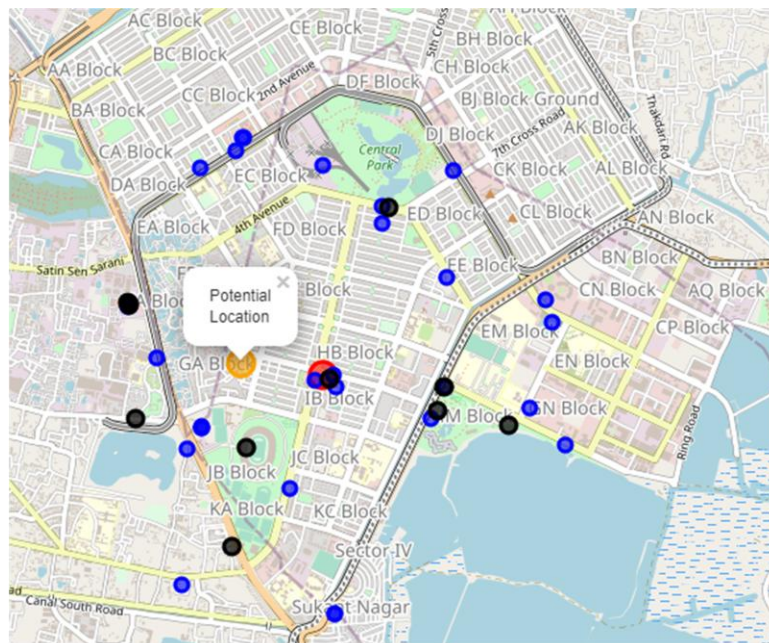

Salt Lake core location 🔴 hotels/restaurants/cafes 🔵 venues 🟢

3.5 Clustering

Clustering is done based on the venue locations obtained in section 3.4 and the potential location is collated based on the location of the centroid of all the clusters and proximity to the core location.

- Potential location of the new restaurant is obtained as : 22.574226346438508 N , 88.40792437661369 E
- Location of Core Location , Potential Location for restaurant, existing hotels/ restaurants/cafes and venue clusters are to be displayed on a map using Folium map rendering library as depicted below :

Salt Lake core location ● hotels/restaurants/cafes ●
Potential location ● Venue clusters ●

4. Results

- Considering a 1.5 km radius from the core location of Salt Lake City located at (22.5735344 N, 88.4132664 E) , around 30 restaurants, cafes and hotels were found using Foursquare API search. A broad classification is provided below:
    - Restaurants -12
    - Cafe-12
    - Hotel-4
    - Bed & Breakfast -1

- Average distance between hotels/ restaurants / cafes from the core location is 1188 meters, the closest ones are Cafe 360Degrees, Cafe Coffee Day , Hotel The Sojourn.
- Around **40 venues** are found using **Foursquare API explore** with in 1.5 km radius of the core location of which **11** venues are considered after dropping all the hotels, restaurants, cafes and other food and drinks joints from the data frame.
- The **potential location** of the new restaurant **(22.574226346438508 N, 88.40792437661369 E) at GA block** is collated based on the location of the centroid of all the clusters and proximity to the core location.

5. Discussion

On further review it is noticed that the cuisine served in the restaurants around Salt Lake are predominantly:

- o Indian
- o Vegetarian / Vegan
- o Italian
- o Mediterranean etc.

The search using Four Square API does not show any **Chinese** or **Continental** foods joint which are also popular cuisines in the city. This can be deliberated further on the choice of cuisine to be served by the restaurant.

 The potential location has a few cafes nearby so there should not be much competition for the new restaurant with a different variety of cuisine.

6. Conclusion

Based on detailed analysis the identified venue for the new restaurant is **(22.574226346438508 N, 88.40792437661369 E)** at **GA block**. The location has limited competition while being close to the core location and accessible from the main venues in the area which could potentially ensure footfall. The type of cuisine to be served like Chinese or Continental can be analyzed further.

Analysis has been performed using the data available using Four Square API, this can be further enhanced using data available from additional sources**.**