

Identifying the best area to open a coffee shop near Deshapriya Park, Kolkata



Introduction

The city of Kolkata is famous for its teas as it's in the same state which has the city of Darjeeling which is usually considered as Champagne for teas. However, the city has always loved its cafes and have always been a growing market for coffee and tea alike. This analysis will help potential business investors to aid their decision of where to open a new coffee shop business near Deshapriya Park, Kolkata.

Data

We will factor in the following criterions to evaluate the various neighborhoods and determine the optimal one to open the coffee shop

- Total number of existing coffee shop in the neighborhood (the lesser the better)
- Distance of neighborhood from Deshapriya Park (the closer the better)
- Distance to existing coffee shop from the target center

We will use regularly spaced circular grids of locations, centered around Deshapriya Park center, to define our neighborhoods.

The following data sources will be used to generate the required information:

- **Google Maps API:** To reverse geo code the centers of candidate areas around the target. We will get the centers of the areas via google maps api and will take this data to define circular areas with a radius of 300 meters from the target location. The google maps api will be used to

get the latitude and longitudes of the address (i.e. Deshapriya Park, Kolkata) and that dataset will be the central point for the rest of the data analysis.

- **Foursquare API:** To determine the number of cafes and their location in every neighborhood circling the target area. Once we get the geo location data from the google maps API we can use Foursquare to get detailed locational info about the various existing coffee shops in and around the target area.

We will analyze the above data to zone in on the best spot in and around Deshapriya Park which will have either zero or very few existing cafes and ideally be not too far from our target area, Deshapriya Park.

Methodology

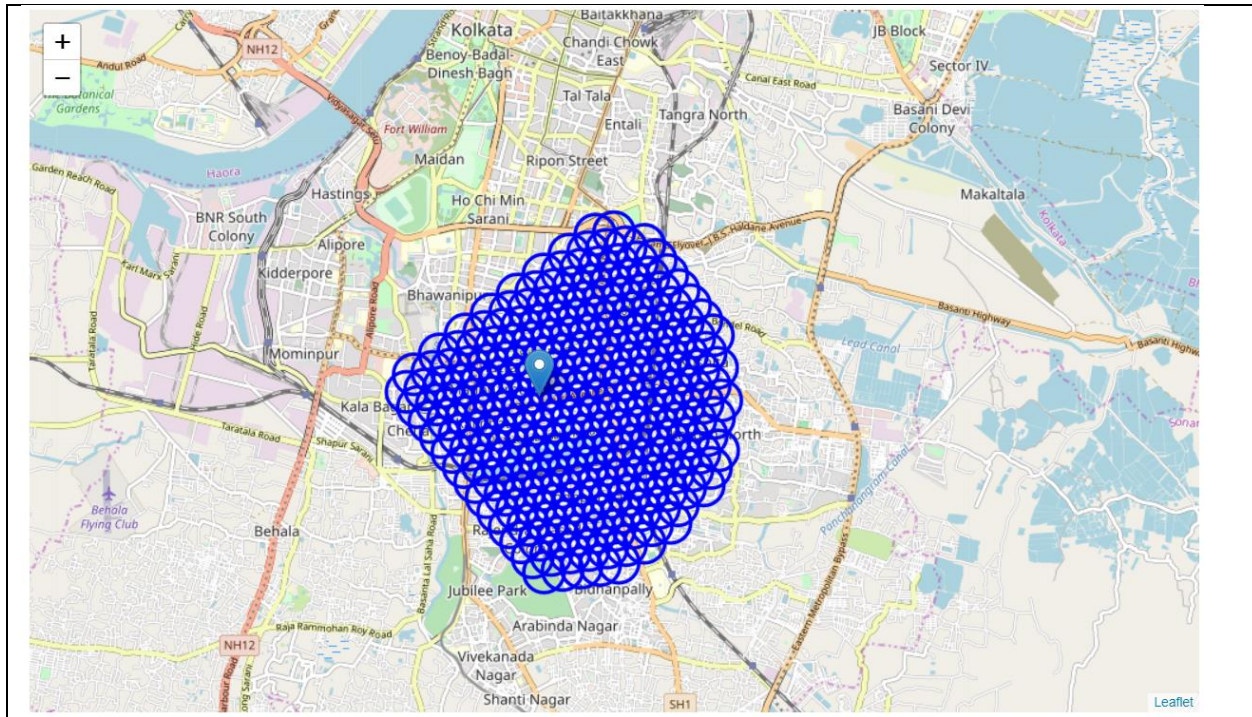
First, we will create latitude & longitude coordinates for the centers of our candidate neighborhoods. We will create a grid of cells covering our area of interest which is approx. 12x12 kilometers centered around Deshapriya Park, Kolkata.

Let's first find the latitude & longitude of Deshapriya Park, Kolkata, using specific, well known address and Google Maps geocoding API.

```
{'lat': 22.5186792, 'lng': 88.3557941}  
Coordinate of Deshapriya Park, Kolkata: [22.5186792, 88.3557941]
```

Next, we will create a grid of area candidates which are equidistant from the target area and within ~3km from Deshapriya Park. The neighborhoods will be defined as circular areas with a radius of 300m. Also, we will be converting back and forth between WGS84 spherical system and UTM Cartesian coordinate system for Folium map.

We now create a hexagonal grid of cells by offsetting every other row, and adjusting vertical row spacing so that every cell center is equi-distant from all its neighbors.



Next, we will use Google Maps API to get approximate addresses of those locations and then use Foursquare API to get Coffee Shop venues in the neighborhoods.

We'll lookup venues in 'Cafe' category, 'Cafeteria' category and 'Coffee Shop' category to have a more confident analysis.

```
Total number of Cafe spots: 34  
Average number of Cafe spots in neighborhood: 0.5778688524590164  
Total number of Cafeteria venues: 1  
Average number of Cafeteria venues in neighborhood: 0.012295081967213115  
Total number of Coffee Shop spots: 147  
Average number of Coffee Shop spots in neighborhood: 1.6926229508196722
```

Next, we will finally analyze the data for the following criteria:

1. Areas of low Coffee Shop density. (We will consider areas that are ~3km around deshapriya park.
2. Areas which have less Coffee Shops in the vicinity.
3. Finally, clustering (using K-means clustering) of locations with no more than 2 coffee shops in radius of 250 metres and locations without coffee shops in radius of 400 meters.

```
Average number of Cafe spots in every area with radius=300m: 0.577868852
4590164
Average number of Cafeteria spots in every area with radius=300m: 0.0122
95081967213115
Average number of Coffee Shop spots in every area with radius=300m: 1.69
26229508196722
```

Now we'll calculate the distance to nearest coffee shop from every area candidate center (not only those within 300m - we want distance to the closest one, regardless of how far).

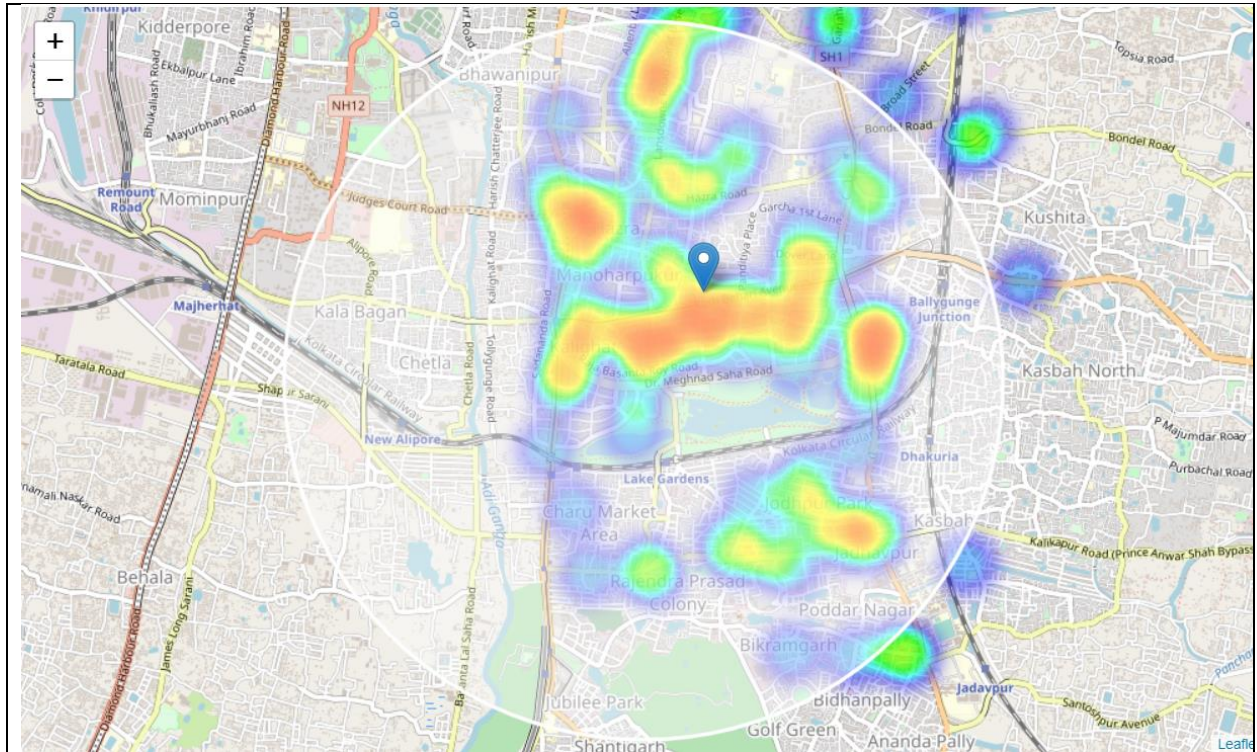
```
Average distance to closest Coffee shop spot from each area center: 601.40466
47183824
```

So, on average Coffee Shops can be found within ~600m from every area center candidate.

Let's create a map showing heatmap / density of coffee shops and try to extract some meaningful info from that.



Based on this we will now focus our analysis on areas south-west, south, south-east and east from Deshapriya Park center - we will move the center of our area of interest and reduce it's size to have a radius of 2.5km. This places our location candidates mostly in boroughs with large low restaurant density south and south west from Deshapriya Park.



This covers all coffee shops in nearby neighborhoods.

Next we create more dense grid of location candidates restricted to our new region of interest (100m apart).

2261 candidate neighborhood centers generated.

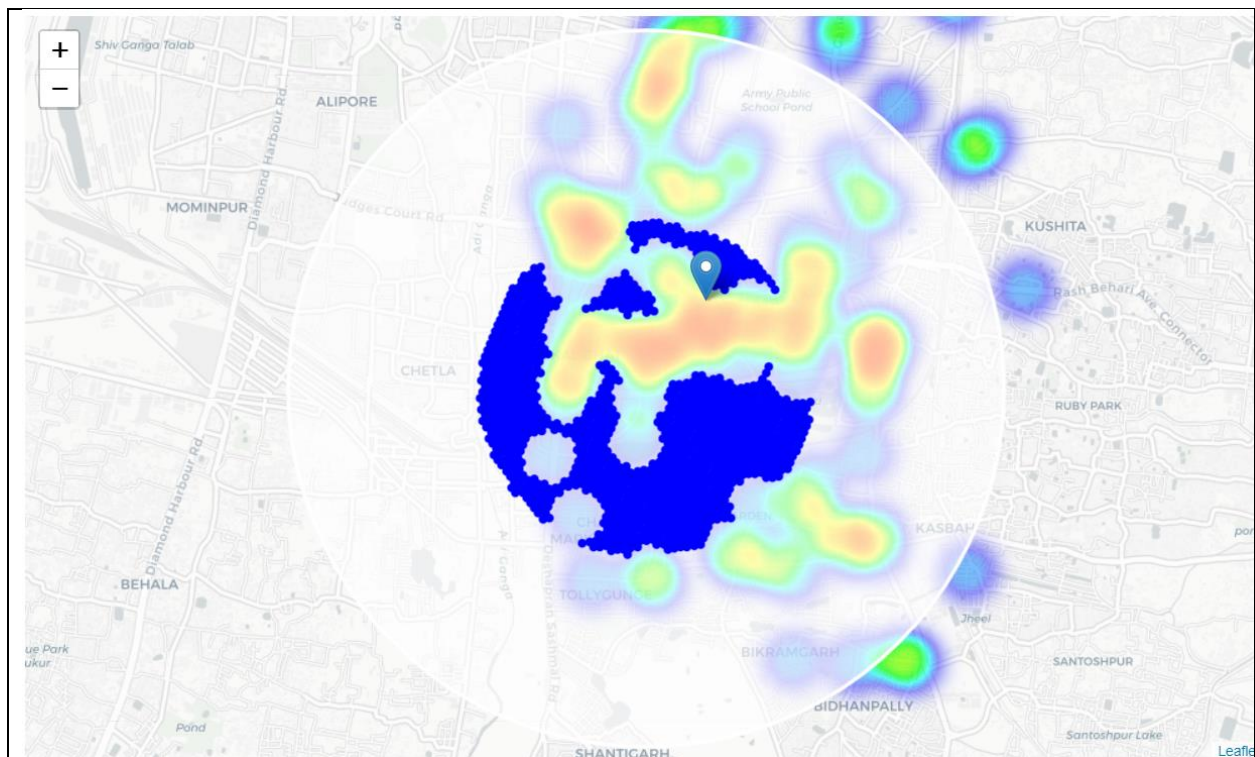
Now we'll calculate for each location candidate - the number of coffee shops in vicinity (we'll use radius of 250 meters) and distance to closest coffee shop.

	Latitude	Longitude	X	Y	Coffee Shops nearby	Distance to Coffee Shops
0	22.506923	88.342619	9.412275e+06	6.166981e+06	0	736.974614
1	22.506588	88.342895	9.412375e+06	6.166981e+06	0	746.487983
2	22.508986	88.341413	9.411725e+06	6.167068e+06	0	838.399390
3	22.508651	88.341689	9.411825e+06	6.167068e+06	0	779.118902
4	22.508316	88.341965	9.411925e+06	6.167068e+06	0	728.792831
5	22.507982	88.342241	9.412025e+06	6.167068e+06	0	689.385029
6	22.507647	88.342517	9.412125e+06	6.167068e+06	0	662.845717
7	22.507312	88.342793	9.412225e+06	6.167068e+06	0	650.751236
8	22.506977	88.343069	9.412325e+06	6.167068e+06	0	653.903585
9	22.506643	88.343345	9.412425e+06	6.167068e+06	0	672.088257

Now we'll filter those locations with no more than two Coffee Shop in radius of 250 meters, and no Coffee Shop in radius of 400 meters.

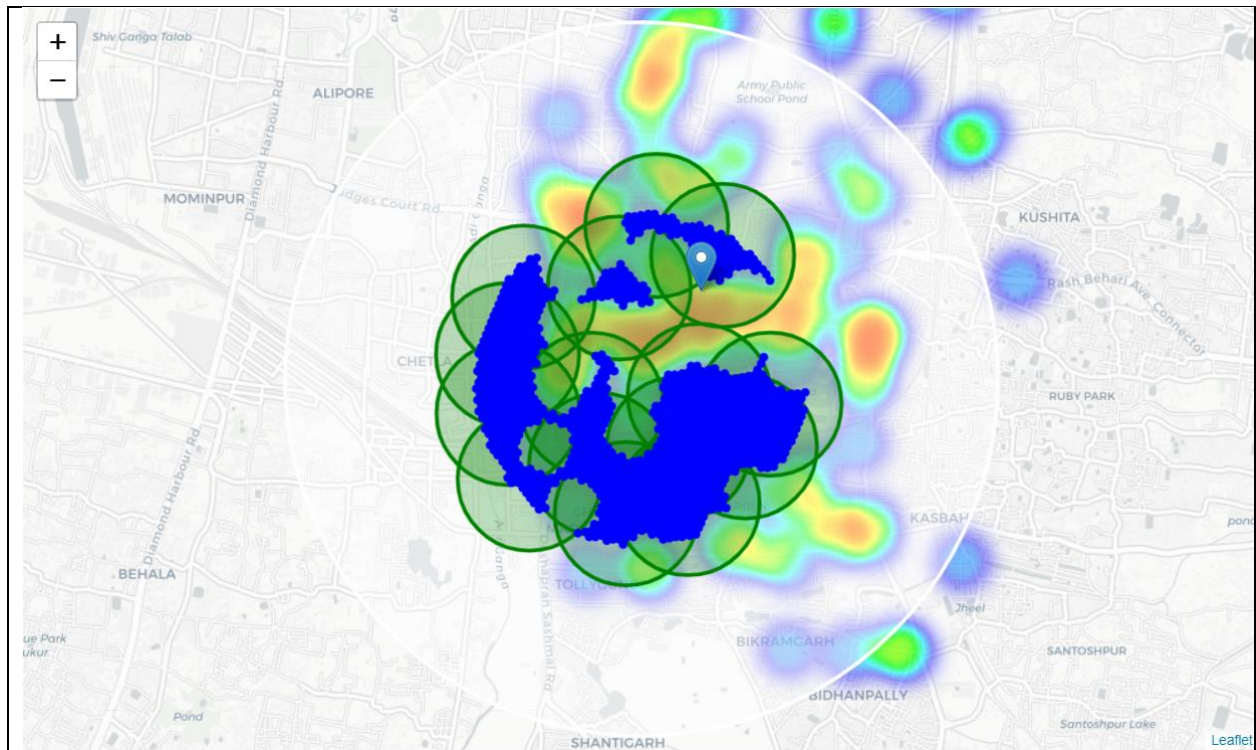
Locations with no more than two Coffee Shops nearby: 2141
Locations with no Coffee Shops within 400m: 1147
Locations with both conditions met: 1147

Lets put the above on a map:

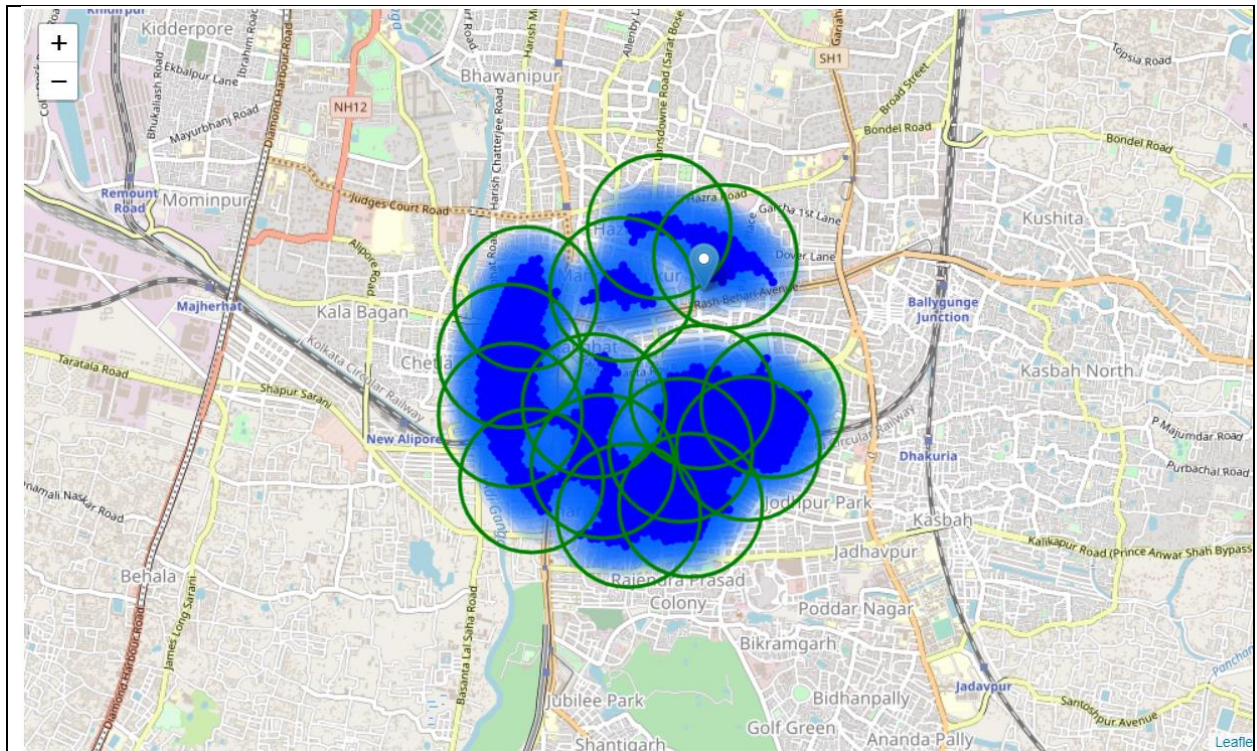


We now have a good number of locations close to Deshapriya Park (mostly in south and south east of Deshapriya Park), and we know that each of those locations has no more than two Coffee Shops in 250m, and no Coffee Shop closer than 400m. Any of those locations is a potential candidate for a new coffee shop.

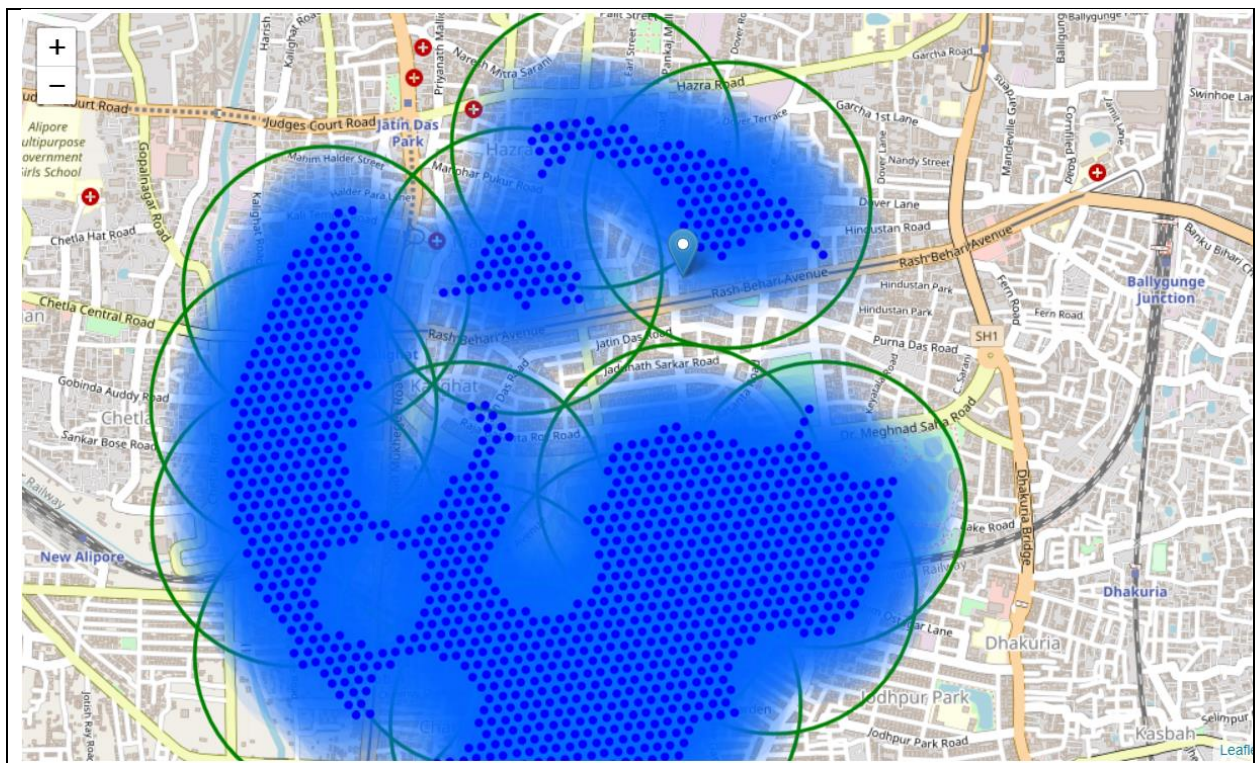
We will now cluster those locations to create centers of zones containing good locations. The zones, their centers and their addresses will be our final result of this analysis.



Clustering without Heat Map:



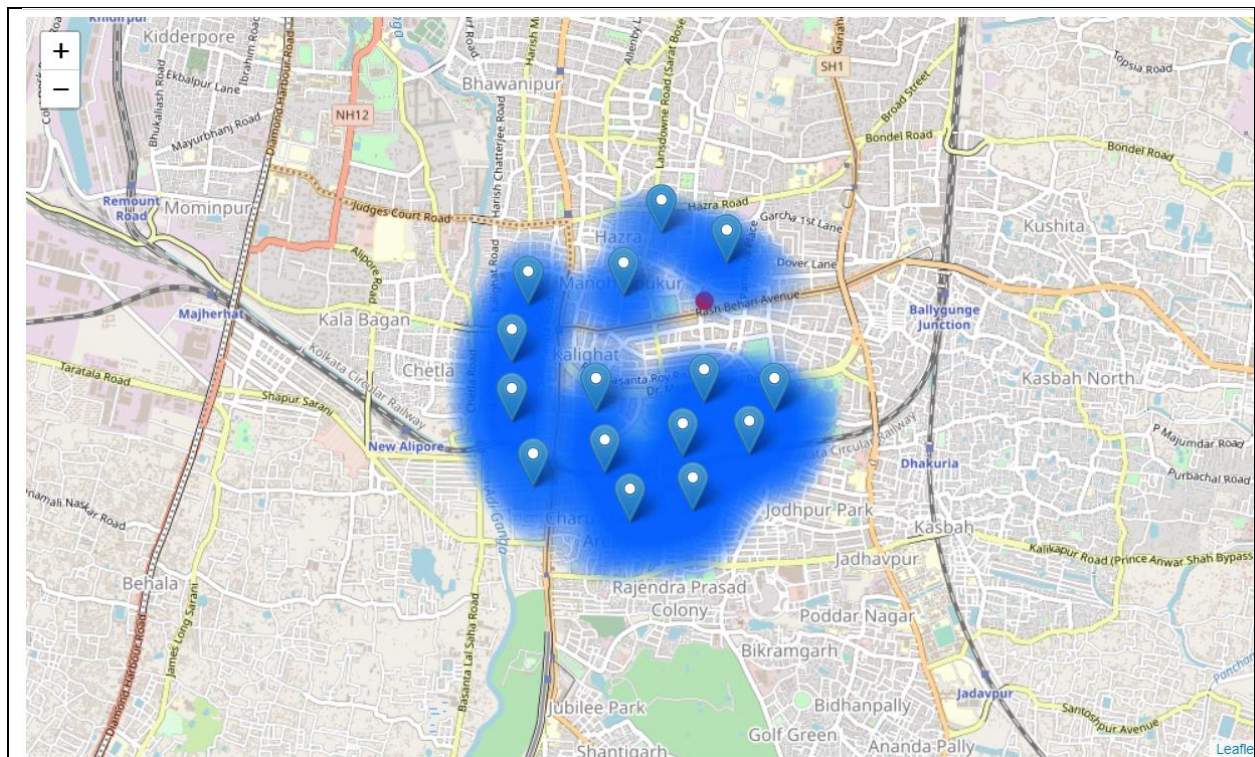
Zoom in on deshapiya park area:



Finally, let's reverse geocode those candidate area centers to get the addresses for the final result.

Addresses of centers of areas recommended:

15/A, Dover Terrace, Ballygunge, Kolkata, West Bengal 700019 => 0.6km from Deshapriya Park
142, Charu Chandra Pl E, Kolkata, West Bengal 700033 => 3.0km from Deshapriya Park
59, Kavi Bharati Sarani Rd, Dhakuria, South End Park, Ballygunge, Kolkata, West Bengal 700029 => 1.6km from Deshapriya Park
62, Anami Sangha, Kalighat, Kolkata, West Bengal 700026 => 2.7km from Deshapriya Park
8F, Sahanagar, Kalighat, Kolkata, West Bengal 700026 => 3.4km from Deshapriya Park
37/6, Swiss Park, Badam Talla, Tollygunge, Kolkata, West Bengal 700033 => 3.5km from Deshapriya Park
30A,B, Manoharpukur, Kalighat, Kolkata, West Bengal 700029 => 1.2km from Deshapriya Park
49A, Jodhpur Gardens, Lake Gardens, Kolkata, West Bengal 700045 => 2.4km from Deshapriya Park
Lake Gardens, Dr Deodhar Rahaman Rd, Charu Chandra Place East, Jodhpur Gardens, Lake Gardens, Kolkata, West Bengal 700033 => 2.4km from Deshapriya Park
21, Bhowanipore, Lake Range, Kalighat, Kolkata, West Bengal 700026 => 2.4km from Deshapriya Park
126, Lake Gardens, Kolkata, West Bengal 700045 => 3.2km from Deshapriya Park
Vivekananda Park, Dhakuria, Rabindra Sarobar, Kolkata, West Bengal 700029 => 2.0km from Deshapriya Park
12/E, Shsmal Rd, Tollygunge, Kolkata, West Bengal 700033 => 3.8km from Deshapriya Park
30, Dover Terrace, Ballygunge, Kolkata, West Bengal 700019 => 1.2km from Deshapriya Park
27/1B, Sahanagar, Kalighat, Kolkata, West Bengal 700026 => 3.1km from Deshapriya Park



Results

The analysis enabled us to recommend 15 street addresses for a new coffee shop near deshapriya park area in Kolkata. The areas and the addresses will serve as good starting point for anyone who is looking to open a new Coffee Shop business in Kolkata near Deshapriya Park area.

Discussion

Although the suggested areas are recommendations based on the data science analysis, they are not final solutions as a lot of other factors need to be considered before finalizing the venue like local area conditions, crime rate, real estate cost, etc. Those can be separate topics for data analysis.

Conclusion

This project aimed at recommending good venues for opening a new Coffee Shop business in the Deshapriya Park area in Kolkata by performing data analysis of nearby neighborhoods for existing coffee shops and also considering nearby existing coffee shop distances from the target area. By calculating coffee shop density distribution from Foursquare data, we first identified general areas that required further analysis, and then generated extensive collection of locations which satisfy requirements like no other coffee shop in the area or very less coffee shop in the vicinity. Clustering of those locations was then performed in order to create major zones of interest and addresses of those clusters formed the basic set of recommendation for this analysis. Finally, a set 15 locations were suggested as a starting point for further analysis (real estate cost, crime, safety, etc.) and finalization.