

Find a Optimal location for a Indian Restaurant in Colombo, Sri Lanka

By Dilan Weerakkody ([Github Project Page](#))

1.Introduction:

1.1 Background

The success of establishing a new restaurant depends on several factors: demand, brand loyalty, quality of food, competition, ambiance,etc... In most cases, a restaurant's location plays an essential determinant for its success. Hence, it is advantageous and of utmost importance to determine the most strategic location for establishment in order to maximize business profits.

1.2 Business Problem

A client seeks to establish a franchised Indian restaurant,in a Colombo District,Sri Lanka. Which neighbourhood would appear to be the optimal and most strategic location for the business operations? The objective of this capstone project is to locate the optimal neighborhood for operation.since there are lots of restaurants in Colombo , we will try to detect location that are not already crowded with restaurants.we are also particularly interested areas with no Indian restaurants in vicinity, but this could be a place very near to other venues such as parks, Movie Theaters etc..

1.3 Interests

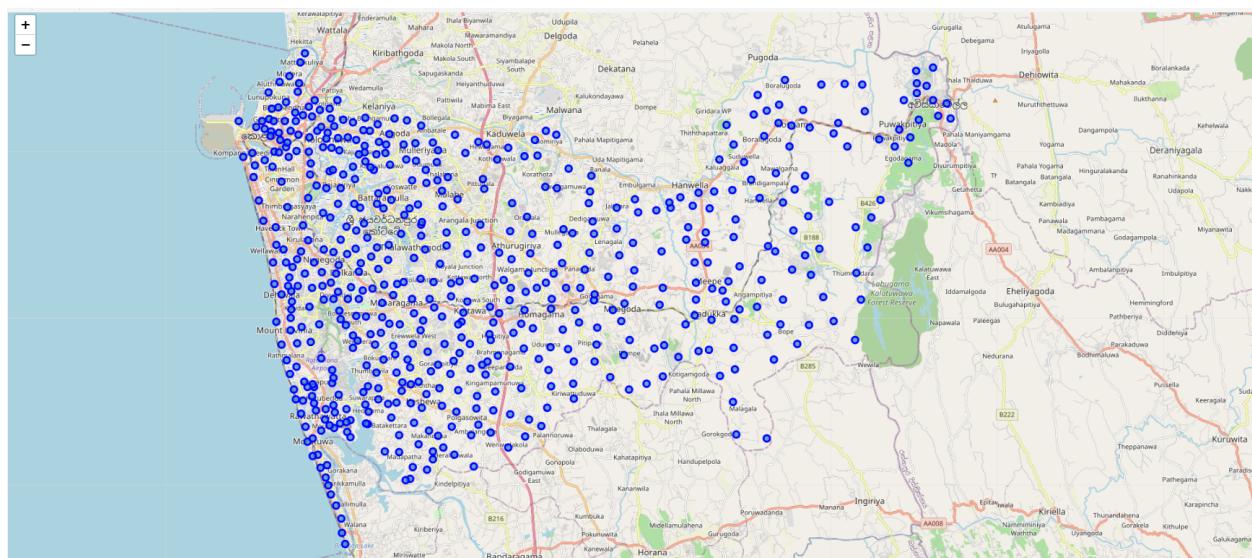
Fellow entrepreneurs seeking to either establish a new restaurant of a certain niche or have plans to expand their franchised restaurants would be very interested in the competitive advantages and business values this finding can potentially reap.

2.Data

2.1 Creating list of Neighbourhoods in Colombo

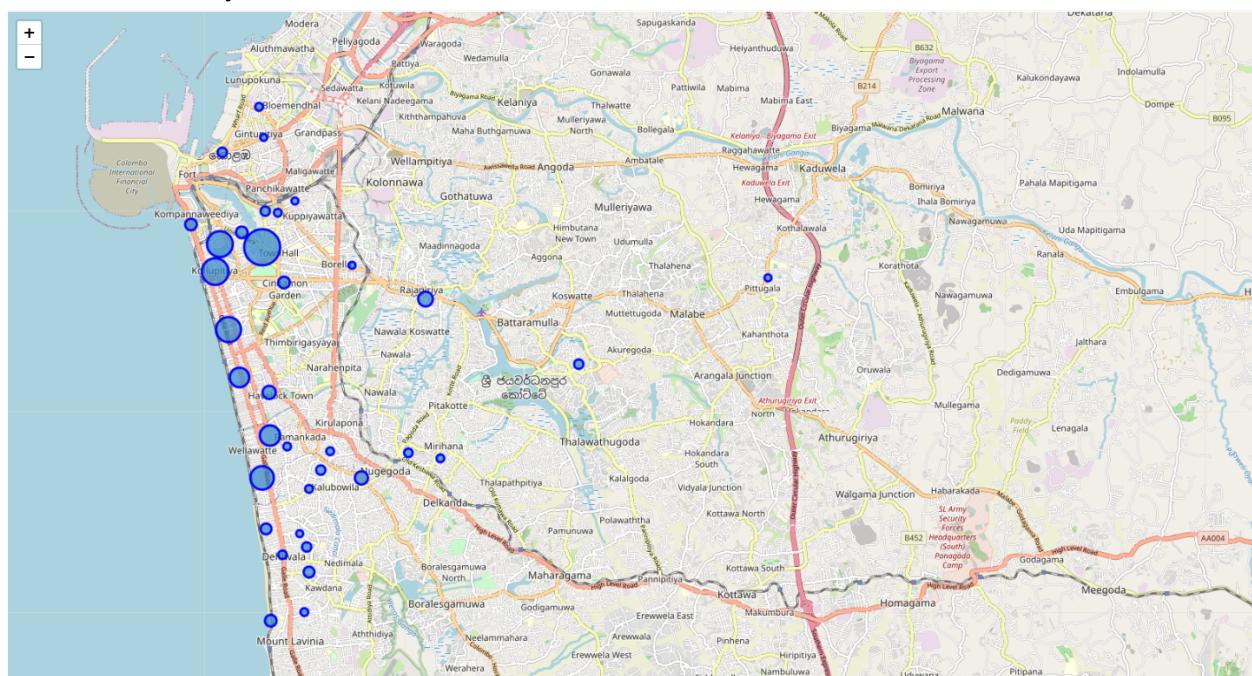
Colombo is capital of sri lanka with 676km² land area with a population over 2.5 million.Colombo district divided into 557 Grama Niladhari (**GN**) Divisions , which would be the smallest division for the neighbourhood). [The survey department of srilanka](#) contains map of GN divisions of sri lanka and from this site we can download KMZ file of Colombo district. with a help of online converter ,data can be converted to a geojson [file](#).

Following figure shows all Neighbourhoods (Grama Niladhari Divisions) in Colombo district.



2.2 Restaurant / Food venues in Colombo respect to each neighborhood

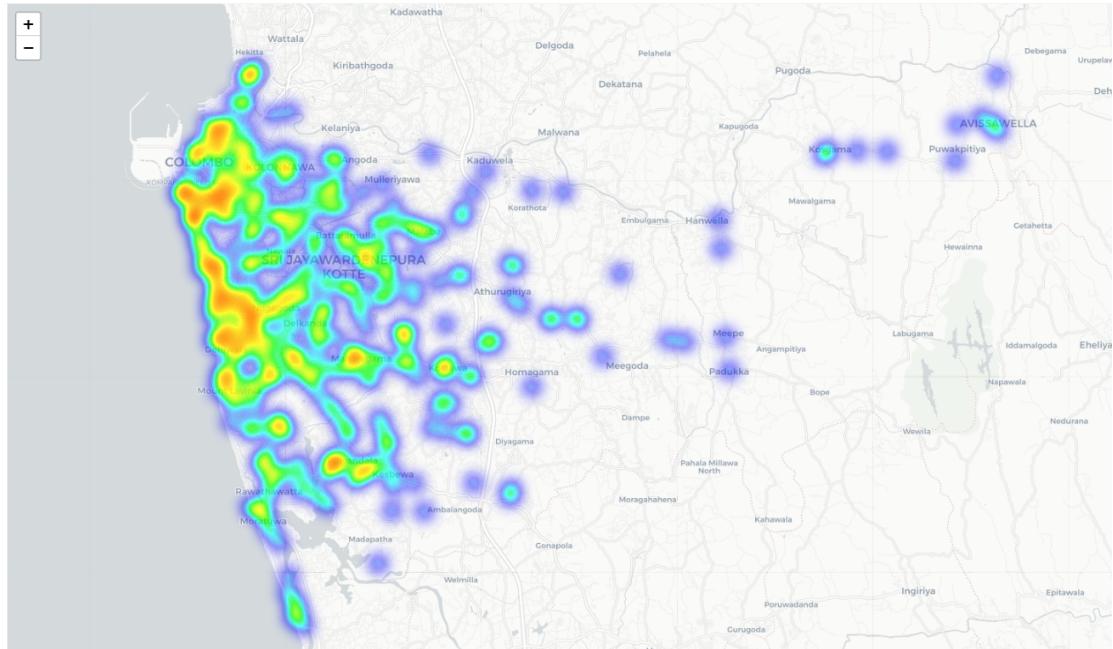
Data is pulled for each neighborhood using foursquare venue API. later screened these data as described in analysis section.



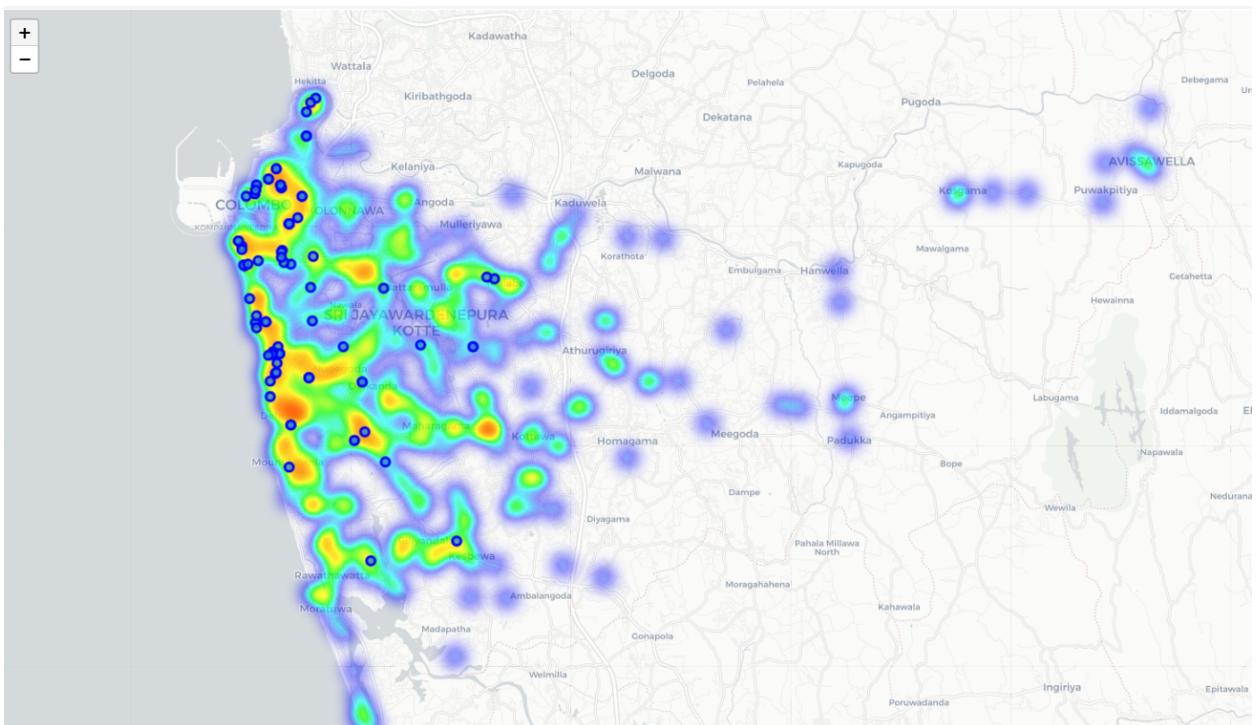
4. Analysis

4.1 Exploratory Data Analysis

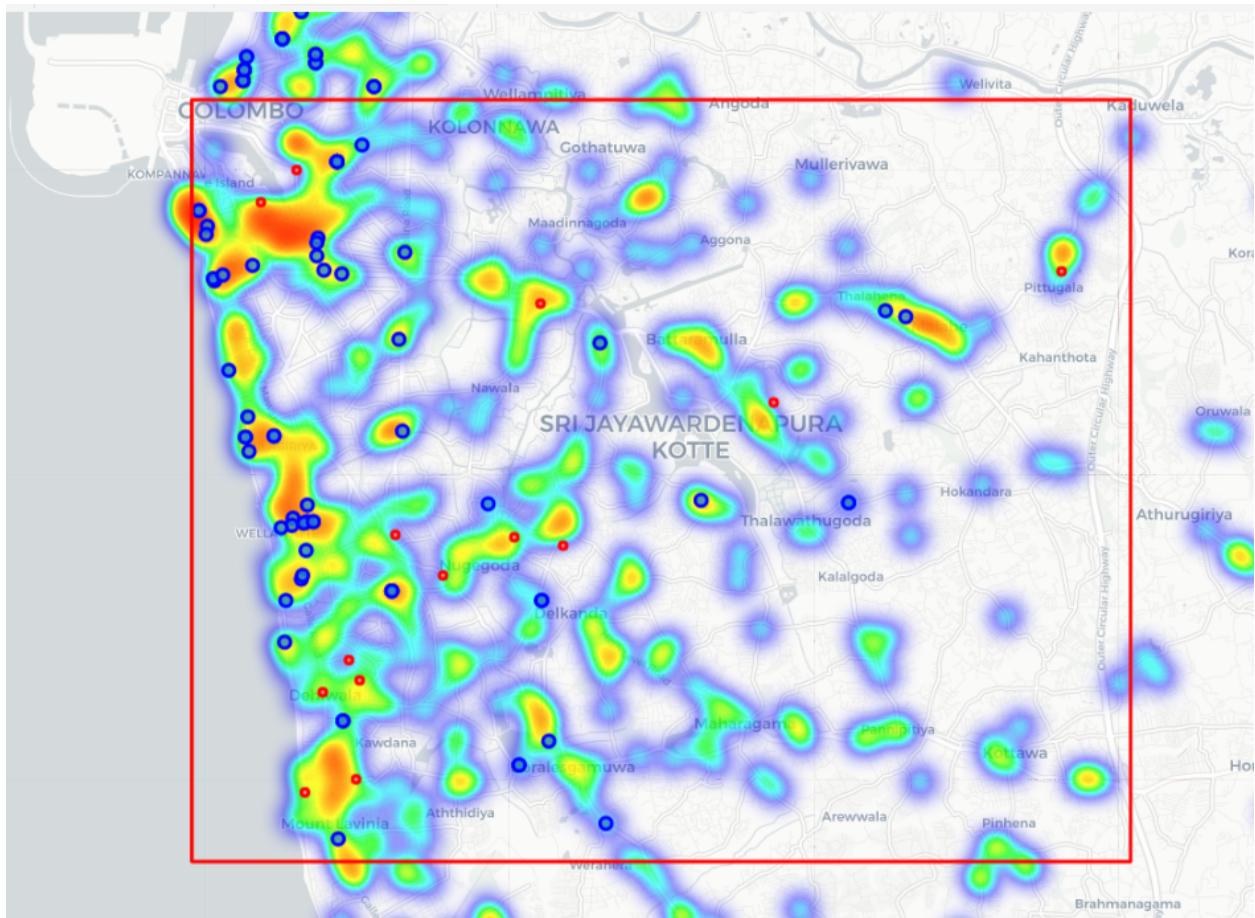
This image shows a heat map based on all the restaurants in Colombo district.



The blue dots signifies indian restaurants .

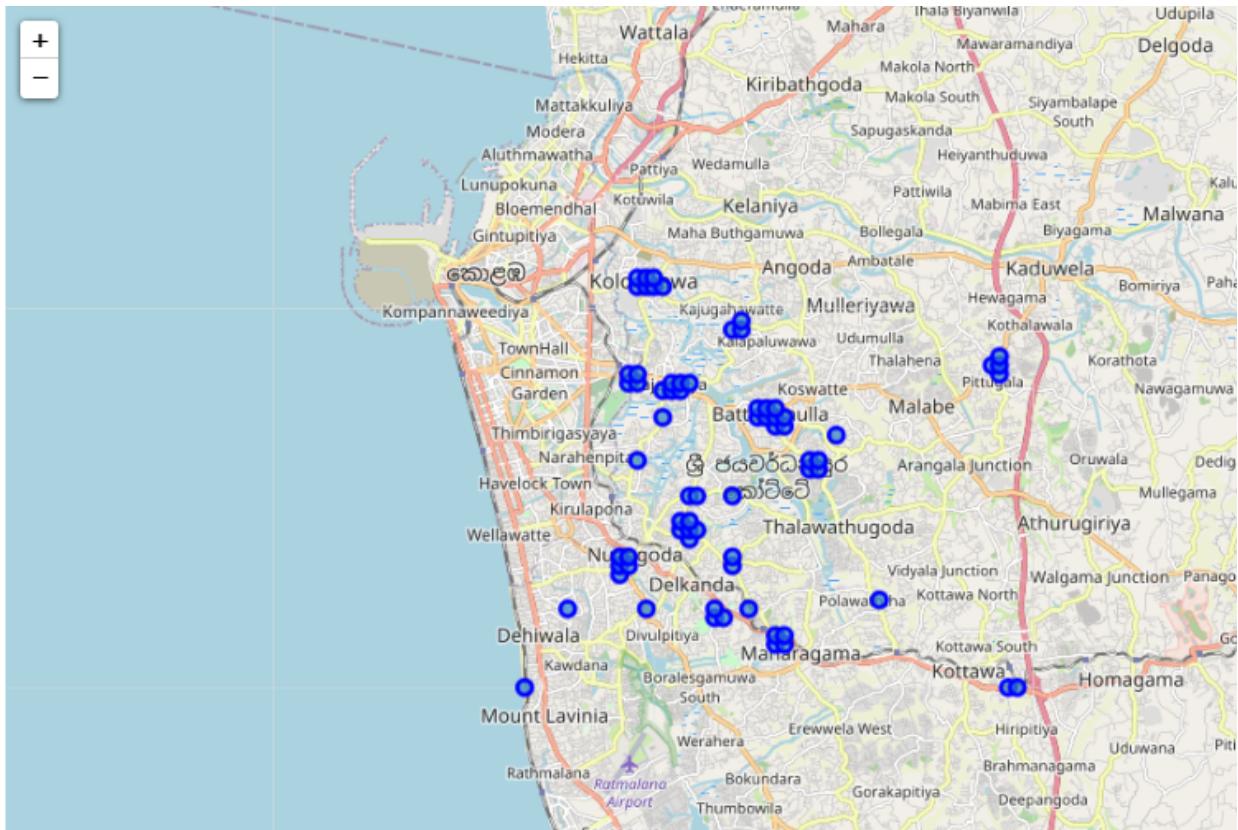


Based on the above results lets limit our area or search to boundaries created by potential neighbourhoods. Please see Red Rectangle in the following image.



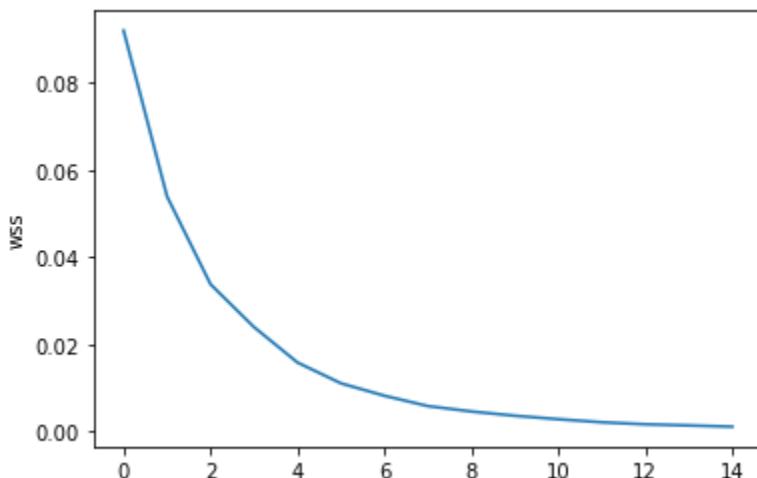
Then fine grid coordinates were created (100m apart) and derived number of restaurants within 250m and distance to the nearest Indian restaurant for each grid point. 3740 grid points were created.

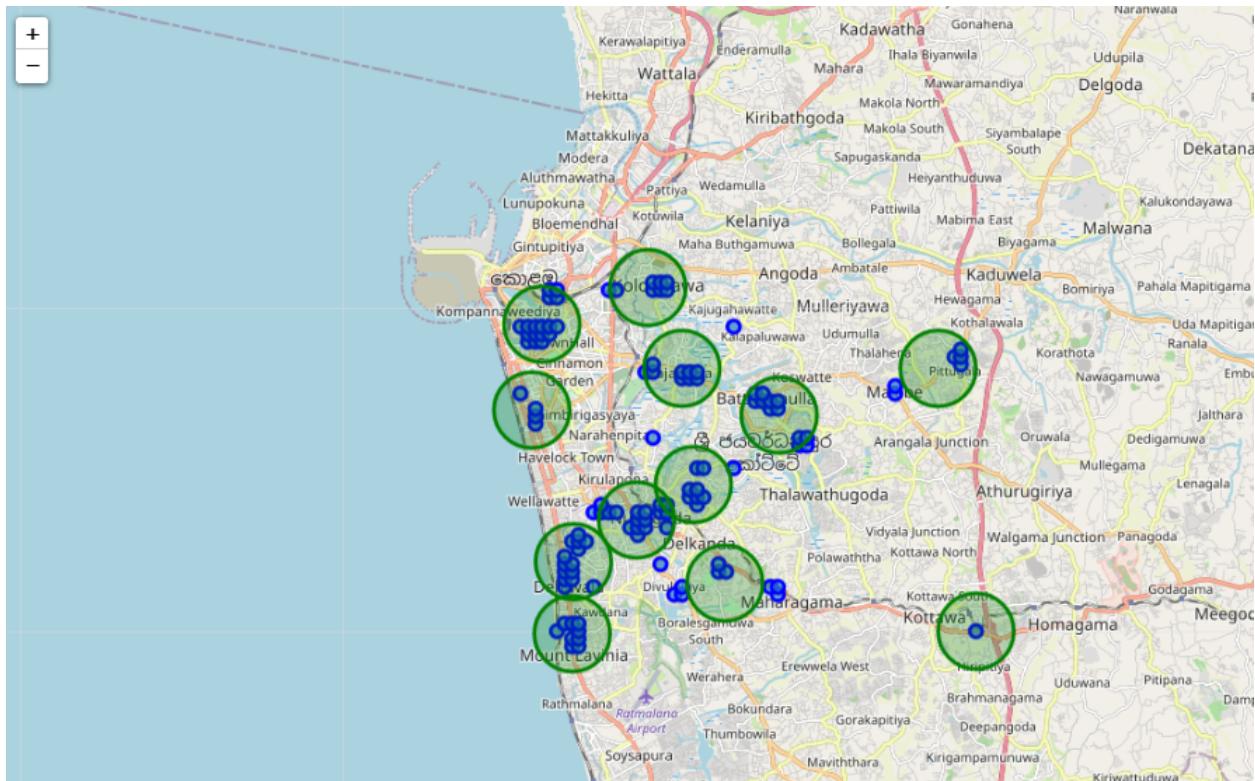
Then later on these points filtered by location where points having more than 5 restaurants in a radius of 250 meters, but no Indian restaurants in a radius of 500 meters. Following image shows these point in blue markers.



4.2 K-Means Clustering¶

Above points data is clustered using the K-Means algorithm to identify potential zones. “Within cluster sum of squared errors” is calculated for each cluster to determine the best k value.





12 zones were identified and following are the address list for each zone.

	lat	long	Address
0	6.869550	79.980703	Healhline, 15 Pietersz Pl, Nugegoda 10250, Sri Lanka
1	6.932300	79.980703	12 Gunathilaka Rd, Sri Lanka
2	6.897884	79.980703	137 Battaramulla - Pannipitiya Rd, Battaramulla 10120, Sri Lanka
3	6.922491	79.980703	00200, 199 Vauxhall St, Colombo 01000, Sri Lanka
4	6.910550	79.980703	411/B Athurugiriya Rd, Malabe, Sri Lanka
5	6.858122	79.980703	25 Sri Mahabodhi Rd, Dehiwala-Mount Lavinia, Sri Lanka
6	6.852439	79.980703	31 Pasal Mawatha, Dehiwala-Mount Lavinia, Sri Lanka
7	6.910350	79.980703	200 Welikada-Nawala Rd, Sri Jayawardenepura Kotte, Sri Lanka
8	6.879187	79.980703	343 Kotte Rd, Nugegoda 10100, Sri Lanka
9	6.839550	79.980703	Bus Stop, Pannipitiya, Sri Lanka
10	6.838884	79.980703	17 Hotel Rd, Dehiwala-Mount Lavinia 10370, Sri Lanka
11	6.899050	79.980703	506 Colombo - Galle - Hambantota - Wellawaya Hwy, Colombo, Sri Lanka

5. Results and Discussion

Colombo district there are around 1300 food places, as per foursquare data. As we shown in earlier maps most of restaurants are aligned in beach areas from Colombo Fort to Moratuwa. And there are some key places like Kollupitiya, Bambalapitiya ,Wellawatta and ibbanwala most of these areas within the commercial area of Colombo. interestingly we can see some more restaurant areas in Rajagiriya , pittugala , plwatta and kohuwala area.

After our initial exploratory analysis we decided ROI area of 10km x 15Km where we noticed food places are majorly located.Then we create dense grid location candidate spaced around 100m and generate data for each point such that number of restaurant nearby (250m) and distance to the nearest Indian Restaurant.There are 3740 place as such. Later on we filter having at least 6 restaurant within 250m and distance to next indian restaurant more than 500m. These location candidates were then clustered to create zones of interest which contain the greatest number of location candidates. Address of centres of those zones were also generated using google reverse geocoding API.

we identified 12 zones containing largest number of potential new restaurant location based on number of other restaurant in vicinity and enough far away from other Indian Restaurants.Other factors should be considered such as rent price of the area and availability good sizable building with parking.

6. Conclusion

Purpose of this project was to identify Colombo areas which are popular foodie locations in order to aid stakeholders in narrowing down the search for the optimal location for a new Indian restaurant. By calculating restaurant density distribution from Foursquare data we have first identified general distribution of restaurants and then generated an extensive collection of locations which satisfy some basic requirements regarding existing nearby restaurants. Clustering of those locations was then performed in order to create major zones of interest (containing greatest number of potential locations) and addresses of those zone centers were created to be used as starting points for final exploration by stakeholders. Final decision on optimal restaurant location will be made by stakeholders based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location (proximity to park or water), levels of noise / proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood etc.