

Capstone Project

Setting up an Asian Restaurant in Lagos, Nigeria

Salako Samuel

Introduction and Business Problem

- In this project we will try to find an optimal location for a restaurant. Specifically, this report will be targeted to stakeholders interested in opening a **Restaurant in Lagos, Nigeria**.
- Since there are lots of restaurants in Lagos we will try to detect **locations that are not already crowded with restaurants**. We are also particularly interested in **areas with no restaurant in vicinity**. We would also prefer locations **as close to city center as possible**, assuming that first two conditions are met.
- We will use our data science powers to generate a few most promising neighborhoods based on this criteria. Advantages of each area will then be clearly expressed so that best possible final location can be chosen by stakeholders.

Data

Based on definition of our problem, factors that will influence our decision are:

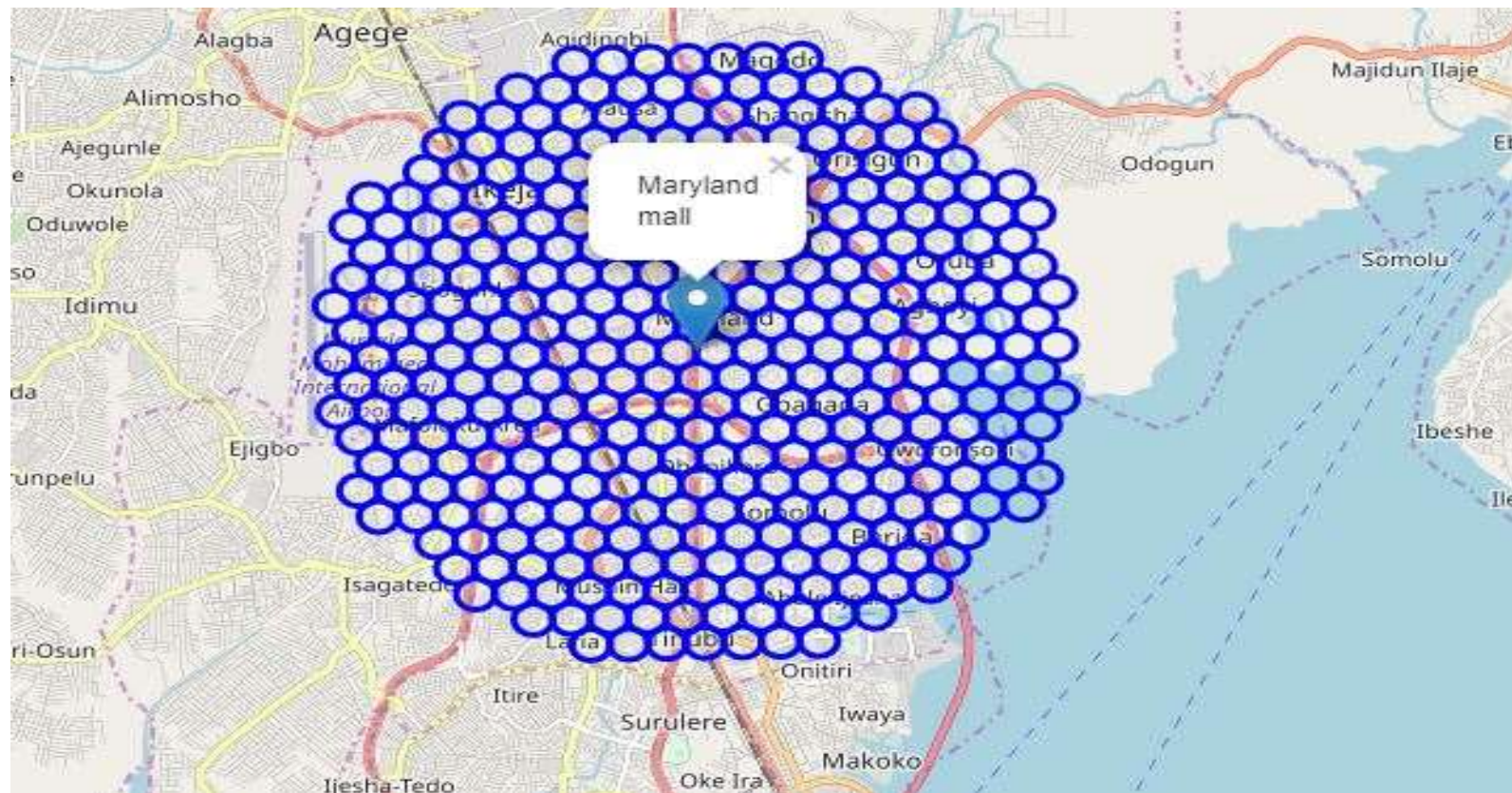
- number of existing restaurants in the neighborhood
- number of asian restaurants in the neighbourhood
- number of and distance to restaurants in the neighborhood, if any
- distance of neighborhood from city center

We decided to use regularly spaced grid of locations, centered around city center, to define our neighborhoods.

Following data sources will be needed to extract/generate the required information:

- centers of candidate areas will be generated algorithmically and approximate addresses of centers of those areas will be obtained using reverse geocoding
- number of restaurants and their type and location in every neighborhood will be obtained using Foursquare API
- coordinate of Lagos center will be obtained using geocoding of well known Lagos location (Maryland)

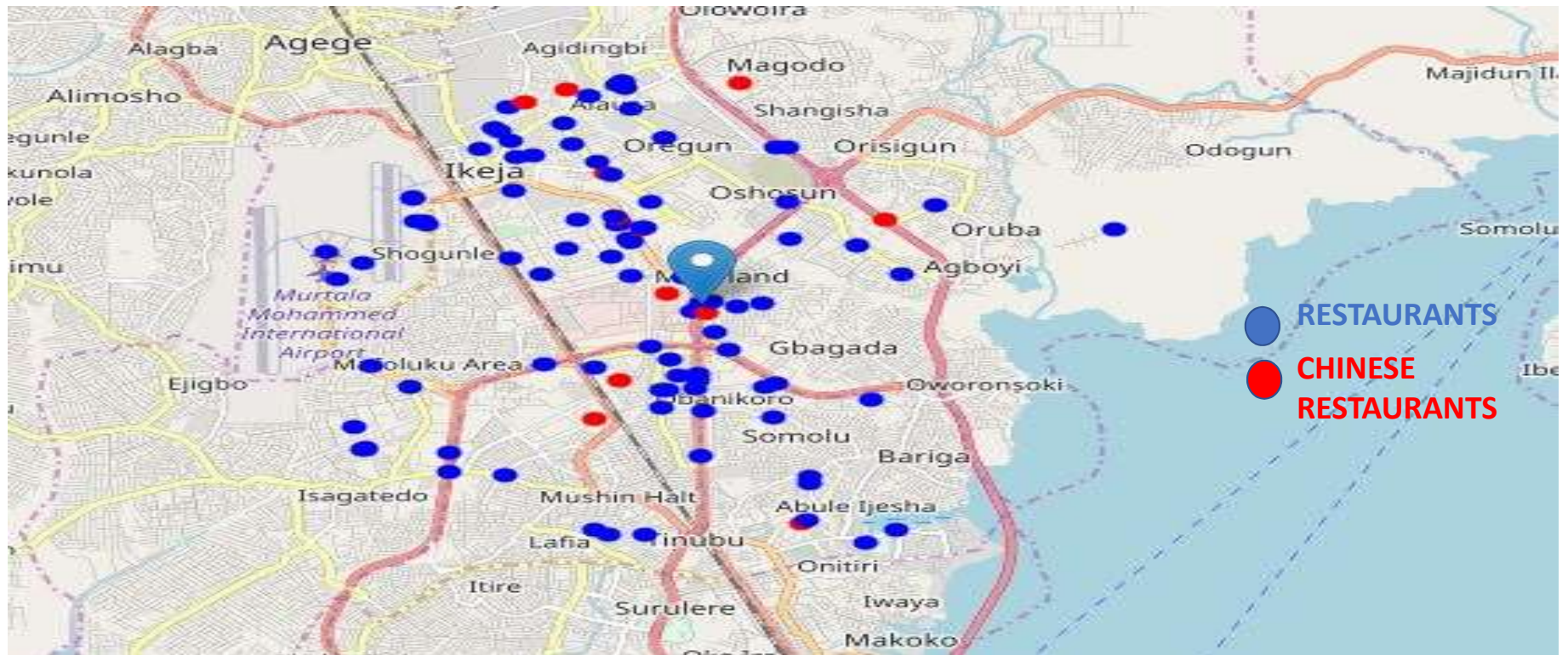
Visualizing City center Location and Candidate neighborhood centers:



Locations Candidates around Maryland

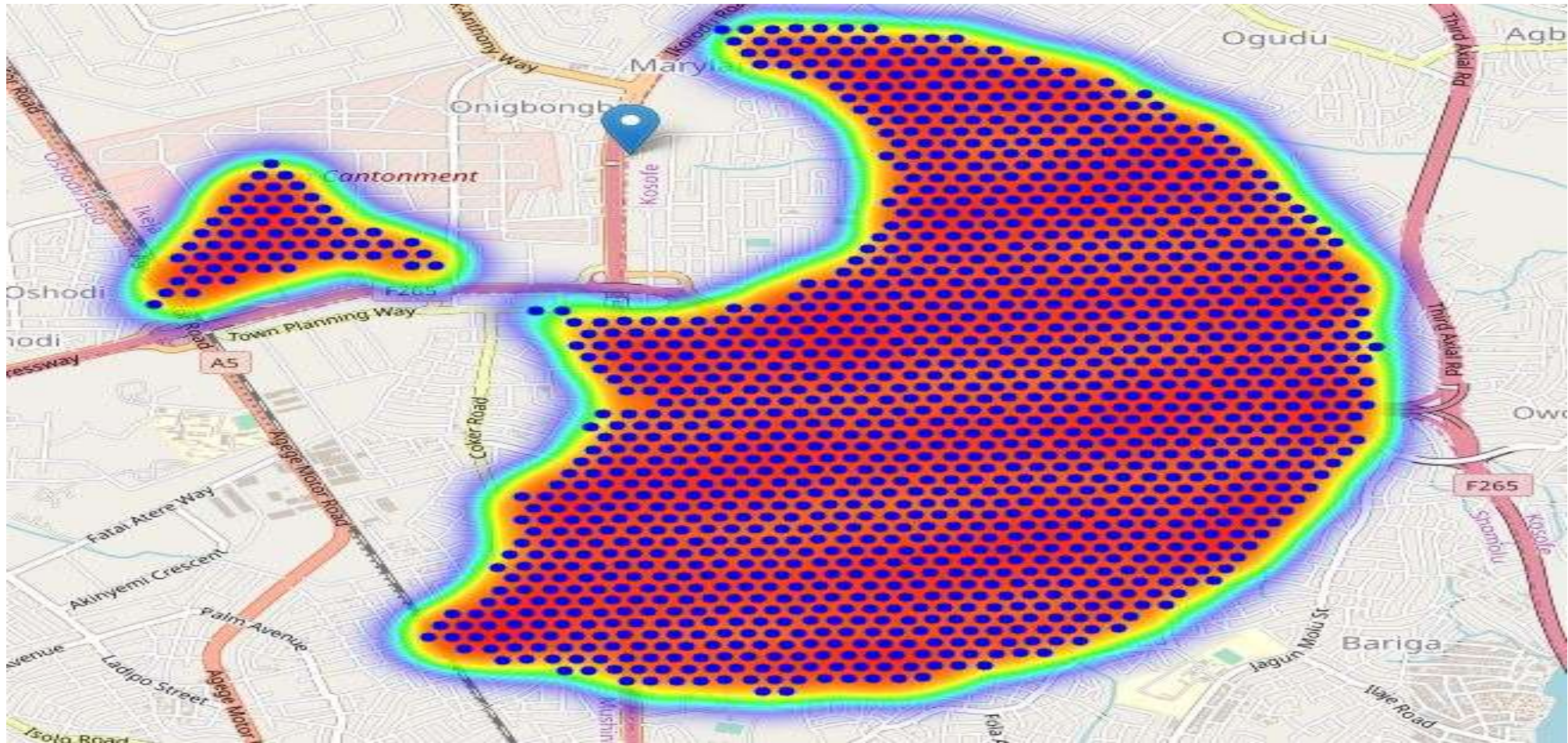
Address	Latitude	Longitude	X	Y
Tinubu, Obele, Mushin, Lagos, 101212	6.516105	3.352554	-796538.921331	735369.538714
Lawani Street, Tinubu, Suru-Lere, Mushin, Lago...	6.516230	3.357869	-795938.921331	735369.538714
Akinhanmin Street, Tinubu, Surulere, Mushin, L...	6.516354	3.363183	-795338.921331	735369.538714
Herbert Macaulay Street, Tinubu, Surulere, Mus...	6.516478	3.368498	-794738.921331	735369.538714
Herbert Macaulay Way, Yaba, Lagos Mainland, La...	6.516602	3.373813	-794138.921331	735369.538714
Central Avenue, Igbobi, Shomolu, Lagos, YABA	6.516726	3.379128	-793538.921331	735369.538714
Bariga, Shomolu, Lagos, YABA	6.516850	3.384442	-792938.921331	735369.538714
Tinubu, Obele, Mushin, Lagos, 101212	6.520522	3.344475	-797438.921331	735889.153956
Paul Okuntola Street, Tinubu, Obele, Mushin, L...	6.520646	3.349789	-796838.921331	735889.153956
LUTH, Ishaga Road, Tinubu, Obele, Mushin, Lago...	6.520770	3.355104	-796238.921331	735889.153956

Graphical spread of Restaurants



- Looking good. What we have now is a clear indication of zones with low number of restaurants in vicinity, and *no* Asian restaurants at all nearby.
- Let us now **cluster** those locations to create **centers of zones containing good locations**. Those zones, their centers and addresses will be the final result of our analysis.

Viabile Locations for Setting up the Restaurant



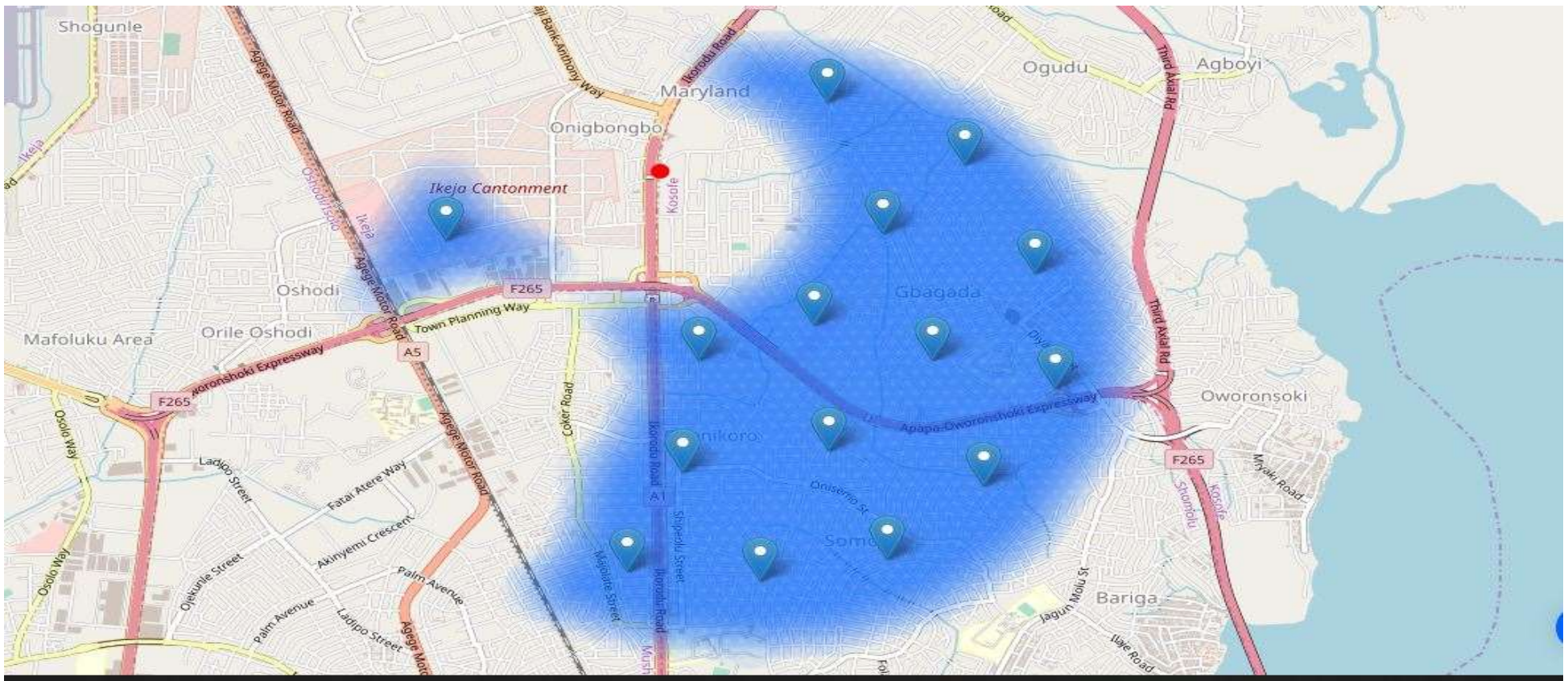
This concludes our analysis.

- We have created 15 addresses representing centers of zones containing locations with low number of restaurants and no asian restaurants nearby, all zones being fairly close to city center (all less than 4km from Maryland Mall, and about half of those less than 2km from Maryland Mall)
- Although zones are shown on map with a radius of ~500 meters (green circles), their shape is actually very irregular and their centers/addresses should be considered only as a starting point for exploring area neighborhoods in search for potential restaurant locations.

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Addresses of centers of areas recommended for further analysis
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Somolu, Obanikoro, Shomolu, Lagos, 100234	=> 3.4km from Maryland Mall
Somolu, Obanikoro, Shomolu, Lagos, 100234	=> 1.6km from Maryland Mall
Gbagada, Oworonsoki, Kosofe, Lagos, 100234	=> 2.4km from Maryland Mall
Apata Street, Somolu, Obanikoro, Shomolu, Lagos, 100234	=> 3.6km from Maryland Mall
Maryland, Opamore, Kosofe, Lagos, 100234	=> 1.2km from Maryland Mall
Somolu, Obanikoro, Shomolu, Lagos, 100234	=> 2.6km from Maryland Mall
Mushin, Lagos, 100234	=> 3.4km from Maryland Mall
Onigbongbo, Ikeja, Lagos, 100271	=> 1.5km from Maryland Mall
Gbagada, Kosofe, Lagos, 100234	=> 1.7km from Maryland Mall
Gbagada, Opamore, Kosofe, Lagos, 100234	=> 2.0km from Maryland Mall
Ijagbemi St, Somolu, Obanikoro, Shomolu, Lagos, 100234	=> 3.6km from Maryland Mall
Lateef Onigemo Street, Gbagada, Oworonsoki, Kosofe, Lagos, 100234	=> 2.6km from Maryland Mall
Ajayi Street, Somolu, Obanikoro, Shomolu, Lagos, 100234	=> 2.6km from Maryland Mall
Gbagada, Opamore, Kosofe, Lagos, 100234	=> 1.6km from Maryland Mall
Gbagada, Oworonsoki, Kosofe, Lagos, 100234	=> 3.2km from Maryland Mall

Graphical View of the 15 locations Created



Recommendation

- The following analysis can be improved with following extensions:
- Consider more categories. For example like "Night life" which is also a good source for customers
- In the Locality itself, it can also be computed the distance between all the venues in order to find a place with the most number of potential customers.
- Using smaller geographical areas like Neighborhoods could improve the accuracy for the scores.

Conclusion

- Purpose of this project was to identify Lagos areas close to center with low number of restaurants (particularly Asian restaurants) in order to aid stakeholders in narrowing down the search for optimal location for a new Asian restaurant. By calculating restaurant density distribution from Foursquare data we have first identified general boroughs that justify further analysis (Gbagada), and then generated 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.