IBM DATA SCIENCE PROFESSIONAL CERTIFICATE

APPLIED DATA SCIENCE CAPSTONE PROJECT

Opening a New Shopping Mall in Bangalore, India

By: -

J PRINCE KELVIN

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OUTLINE

- Introduction
- Business Problem
- Data
- Methodology
- Results
- Discussion
- Recommendations
- Conclusion
- Appendix

Introduction

- Shopping malls are the place where people tend to go very frequently in a city like Bangalore.
- They are like a one-stop destination for all types of shoppers.
- There are many shopping malls in the city of Bangalore any many more are being built.
- Opening a new shopping mall in a city like Bangalore is really a Challenging task.
- The objective of this capstone project is to analyze and select the best locations in the city of Bangalore, India to open a new shopping mall.

Business Problem

- This project will be particularly useful to property developers and investors who are looking to open or invest in new shopping mall in the Silicon Valley of India i.e., Bangalore.
- This project is timely as the city is currently suffering from oversupply of shopping malls.
- Business question
  - ***In Bangalore, if a property developer is looking to open a new shopping mall, where would you recommend them to open?***

Data

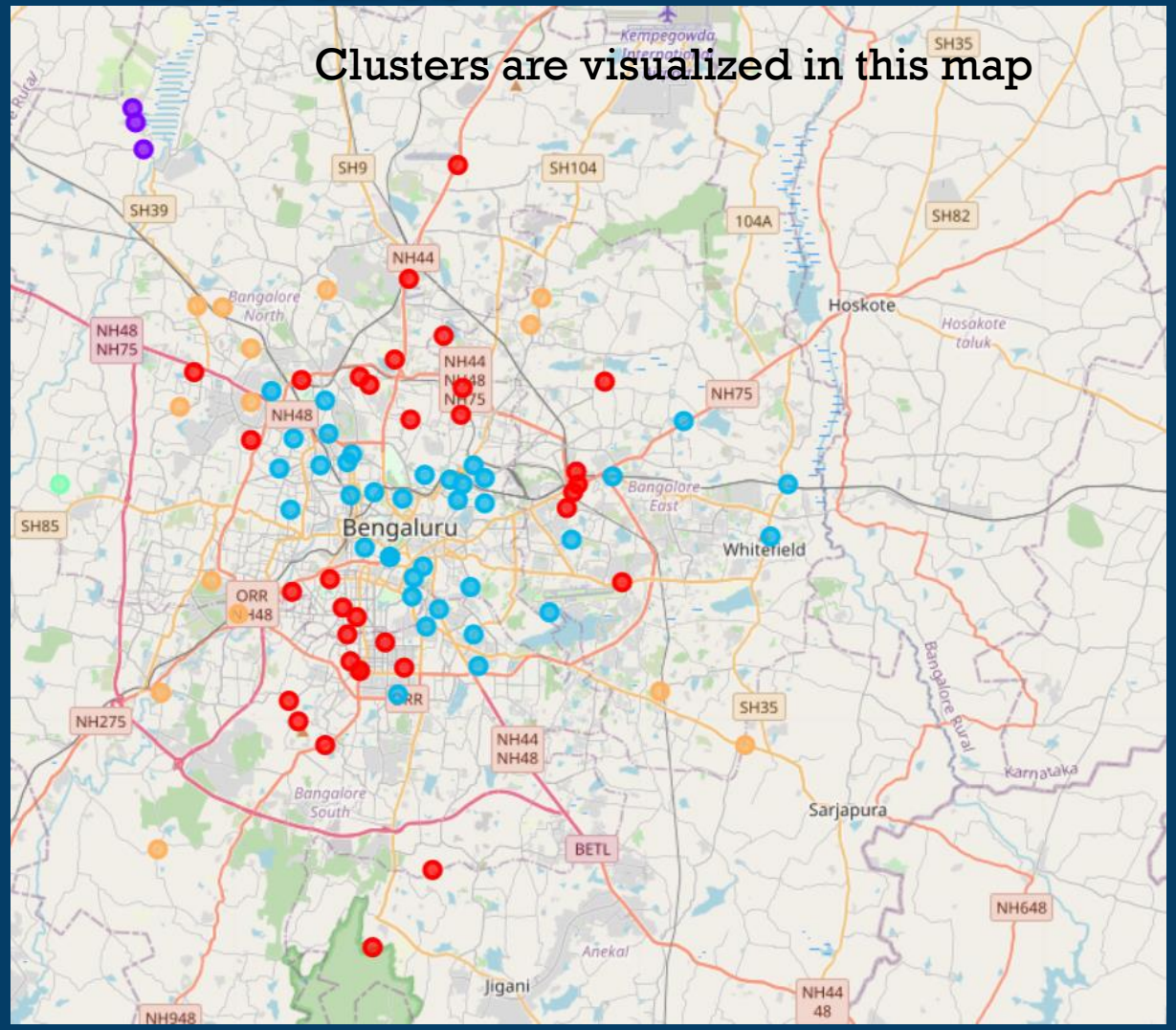
- **Data Required for**
  - List of Neighborhoods of Bangalore.
  - Geographical Coordinates of Neighborhoods.
  - Venue Data of Shopping Malls.

- **Data source:**
  - For Neighborhoods- https://www.kaggle.com/hegdetapan/bangaloreareaspincodewithlatitudelongitude
  - Geocoder package for getting Latitude and Longitude coordinates.
  - Foursquare API for getting Venue Data.

Methodology

- Obtain the Data of Neighborhoods.
- Get Latitude and Longitude coordinates using Geocoder.
- Use Foursquare API to get venue data.
- Group data by neighborhood and taking the mean of the frequency of occurrence of each venue category.
- Filter venue category by Shopping Mall.
- Perform clustering on the data by using k-means clustering.
- Visualize the clusters in a map using Folium

Results



- Categorized the neighborhoods into 5 clusters based on the frequency of occurrence for "Shopping Mall"
  - ✓Cluster 1 & 3: - Neighborhoods has high concentration of shopping malls.
  - ✓ Cluster 2 & 4: - Neighborhoods has low number to no existence of shopping malls.
  - ✓Cluster 5: - Has Moderate number of shopping malls.

Discussion

- By observing the map in the Results section, we can notice that, most of the shopping malls are concentrated in the central area of Bangalore city.
- Highest number of malls in Cluster 1 and 3 (more than 30 malls) and moderate number of malls in Cluster 5 (which is around 14 malls).
- Cluster 2 and 4 has very low number of malls.
- This shows that the oversupply of shopping malls mostly happened in the central Bangalore, with the suburb area still have very few shopping malls.

Recommendation

- Open new shopping malls in neighborhoods in Cluster 2 and 4 with little to no competition.
- Property Developers & Investors can also open new shopping malls in neighborhoods in Cluster 5 with moderate competition, if they have unique selling propositions to stand out from the competition
- And they are advised to avoid neighborhoods in Cluster 1 and 3 which already have high concentration of shopping malls and suffering from intense competition.

Conclusion

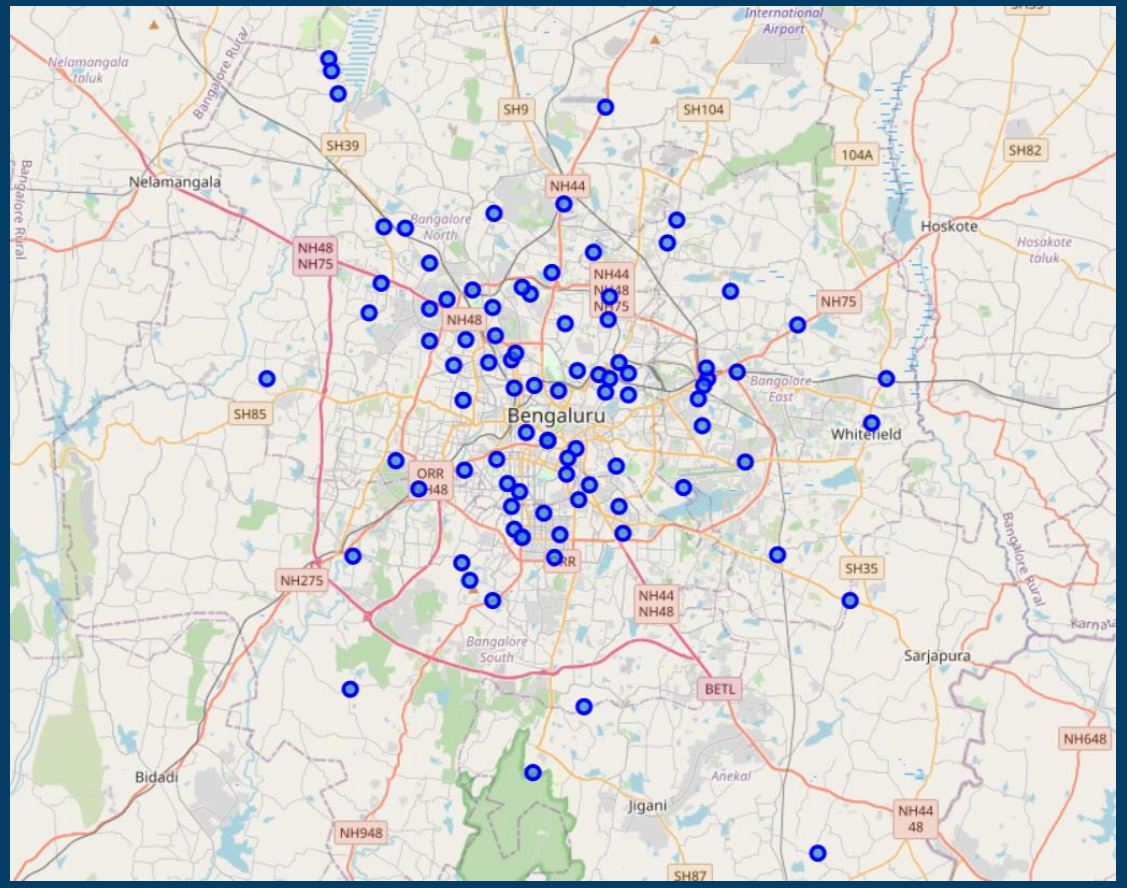
- Answer to Business question: The neighborhoods in cluster 2 & 4 are the most preferred locations to open a new shopping mall.
- The findings of this project will help the relevant stakeholders to capitalize on the opportunities on high potential locations while avoiding overcrowded areas in their decisions to open a new shopping mall.

Appendix

Original Data Set

	Area	Pincode	Latitude	Longitude
0	BangaloreG.P.O.	560001	12.887035	77.74105
1	BangaloreCityH.O.	560002	12.966180	77.58690
2	Malleswaram	560003	13.006320	77.56840
3	Vyalikaval	560003	13.037920	77.61863
4	Basavangudi	560004	12.941120	77.57236

Bangalore Map



Clusters

Cluster 1

Total number of Shopping malls is = 33

	Neighborhood	Shopping Mall	Cluster Labels	Pincode	Latitude	Longitude
44	JayanagarSouth	0.010000	0	560041	12.930140	77.584960
25	Dooravaninagar	0.022222	0	560016	12.997445	77.668300
28	Gandhinagar	0.000000	0	560009	13.026430	77.617510
29	GavipuramExt.	0.000000	0	560019	12.945280	77.566340
30	GokulaExtension	0.019608	0	560054	13.041120	77.548290
33	HebbalAgri.Farm	0.000000	0	560024	13.049810	77.589030
37	HospitalTownWest	0.023810	0	560015	12.905700	77.542720
43	JayanagarEast	0.010000	0	560069	12.919330	77.592690
87	Yelhanka	0.000000	0	560064	13.084356	77.594929
23	Doddakallasandra	0.000000	0	560062	12.886610	77.558720
53	Mahadevapura	0.000000	0	560048	12.994090	77.666330
61	Nagasandra	0.100000	0	560073	13.044870	77.501510
62	Nagashettyhalli	0.000000	0	560094	13.042500	77.573960
63	NandhiniLayout	0.025641	0	560096	13.015749	77.526730
67	RTNagar	0.000000	0	560032	13.024450	77.595830

Cluster 2 - (Lesser Concentration of shopping malls)

Total number of Shopping malls is = 3

	Neighborhood	Shopping Mall	Cluster Labels	Pincode	Latitude	Longitude
34	Hesaraghatta	0.0	1	560088	13.13928	77.47976
35	HesaraghattaLake	0.0	1	560089	13.15029	77.47639
36	HospitalTownEast	0.0	1	560014	13.15665	77.47514

Cluster 3

Total number of Shopping malls is = 38

	Neighborhood	Shopping Mall	Cluster Labels	Pincode	Latitude	Longitude
69	RichmondTown	0.010000	2	560025	12.962330	77.601230
68	Rajajinagar	0.020000	2	560010	13.005440	77.556930
22	DharmaramCollege	0.010000	2	560029	12.936750	77.602640
8	BangaloreUniversity	0.030000	2	560056	12.996940	77.618430
59	Mathikere	0.010000	2	560054	13.032340	77.558640
58	Maruthisevanagar	0.034091	2	560033	13.000130	77.627790
6	BangaloreCityH.O.	0.020000	2	560002	12.966180	77.586900
65	NewTippasandra	0.010000	2	560075	12.973600	77.665650
74	St.ThomasTown	0.030000	2	560084	13.005020	77.623250

Cluster 4- (Lesser Concentration of shopping malls)

Total number of Shopping malls is = 1

	Neighborhood	Shopping Mall	Cluster Labels	Pincode	Latitude	Longitude
52	MagadiRoad	0.0	3	560023	12.996875	77.443065

Cluster 5

Total number of Shopping malls is = 14

	Neighborhood	Shopping Mall	Cluster Labels	Pincode	Latitude	Longitude
38	Indiranagar	0.125000	4	560038	13.030060	77.495260
20	Chikkabanavara	0.000000	4	560090	13.072135	77.513750
64	Nayandahalli	0.000000	4	560039	12.942050	77.521000
49	Kothanur	0.000000	4	560077	13.064560	77.647820
7	BangaloreG.P.O.	0.000000	4	560001	12.887035	77.741050
46	Kengeri	0.000000	4	560060	12.908680	77.487180
80	Vijayanagar	0.000000	4	560040	13.076000	77.652400
17	Carmelram	0.000000	4	560035	12.909638	77.704379
41	Jalahalli	0.166667	4	560013	13.054500	77.526580
60	Nagarbhavi	0.000000	4	560072	12.956240	77.509360
1	Agaram	0.000000	4	560007	12.842920	77.485820
51	Kumbalgodu	0.000000	4	560074	13.072610	77.503210
66	PeenyaS.I.	0.111111	4	560058	13.031880	77.526540
79	Vidyaranyapura	0.000000	4	560097	13.079290	77.559120

THANK YOU