Capstone Project

The Battle Of Neighborhoods(Week 2)

Identifying the most ideal Toronto neighborhood to start an Indian restaurant

By

Gade Deepthi

1: Introduction / Business Problem:

1.1 Discussion of the problem and the background :

"Which Toronto neighborhood is the most ideal to start an Indian restaurant?"

My Canadian client, Mr.Deepak, owns a chain of Indian restaurants in various popular cities in Canada – including Montreal, and Vancouver. He now wishes to start an Indian restaurant in Toronto.

Mr.Deepak wanted me to consult him on which locality or neighborhood of Toronto is best suited to start his Indian restaurant. He had put forth the following criterion which needs to be satisfied in my work:

- The locality or the neighborhood ideally should be situated in Downtown Toronto. The second preference would be West Toronto.
- The neighborhood should not have any restaurant or eatery among its top 2 commonly visited places

The task here was to recommend the best possible location in Toronto which satisfies both the criteria above and allows Mr.Deepak to start a successful Indian restaurant in Toronto.

1.2 Target Audience

Toronto is one of the most ethnically diverse cities in Canada, with over 51% of the population belonging to a specific minority group. Per the survey conducted in 2016, approximately 12.6% of the population is South-Asian. Opening an Indian restaurant in Toronto could prove to be a profitable proposition for the client, given the popularity of the Indian cuisine not only among the south Asians, but all over the world

2: Data

2.1 Description of the data

This project relied mainly on the publicly available data from Wikipedia as well as Foursquare.

2.1.1 Dataset 1:

List of postal codes of Toronto along with the boroughs and neighborhoods

Since the focus of the project was the city of Toronto, I looked at procuring all the demographic information related to city, including all the boroughs and neighborhoods of Toronto along with their associated zip code.

To do this, I relied on the publicly available Wikipedia page for the same, titled List of postal codes of Canada: M (Link can found here). As can be seen from the description of the page:

“Postal codes beginning with M are located within the city of Toronto in the province of Ontario.”

We scraped this data from the Wikipedia page with the help of Python’s pandas and Wikipedia packages.

2.1.2 Dataset 2:

Geographical co-ordinates of the neighborhoods In order to plot the neighborhoods on the map, we also used the geographical co-ordinates of the neighborhoods of Toronto. Although this data could have been obtained using the Google Maps Geocoding API, given the unreliability of the package, I used the data from the following source: http://cocl.us/Geospatial_data.

2.1.3 Dataset 3:

Data called from through Foursquare API In this project, I leveraged the Foursquare API to obtain the geographical location data of various neighborhoods of Toronto. This data was used to explore the popular and commonly visited venues in each of the neighborhoods, which helped me to identify the best possible location for our client’s Indian restaurant.

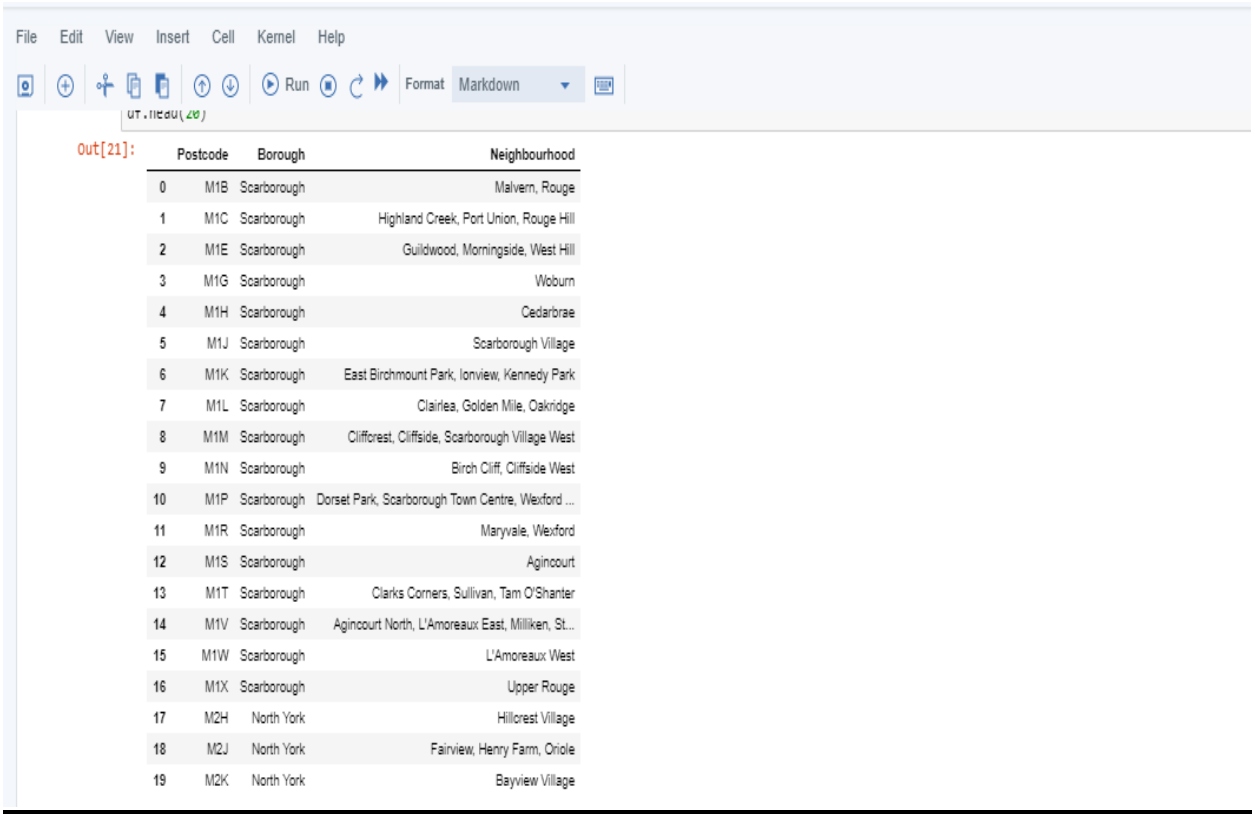
I identified the top 10 popular venues in each of the areas to satisfy the client’s requirement, that the chosen locality should not have a restaurant in the top 2 commonly visited venues. Due to the API restrictions set by Foursquare, the search for the number of venues was limited only to 100

2.1.4 Data Pre-processing

After scraping the initial data from Wikipedia, there were some improvements required before it could be used for analysis. Some modifications that were made to it were:

- Dropping all the rows from the derived table where boroughs were not assigned
- Combining different neighborhoods with the same postcode
- For neighborhoods with no name, assigning a borough name to it for the purposes of simplicity
- Concatenating the geospatial co-ordinates obtained from Dataset 2 to this dataframe.

The following is a sample of the final dataframe that was used for exploring the best neighborhood for the project:

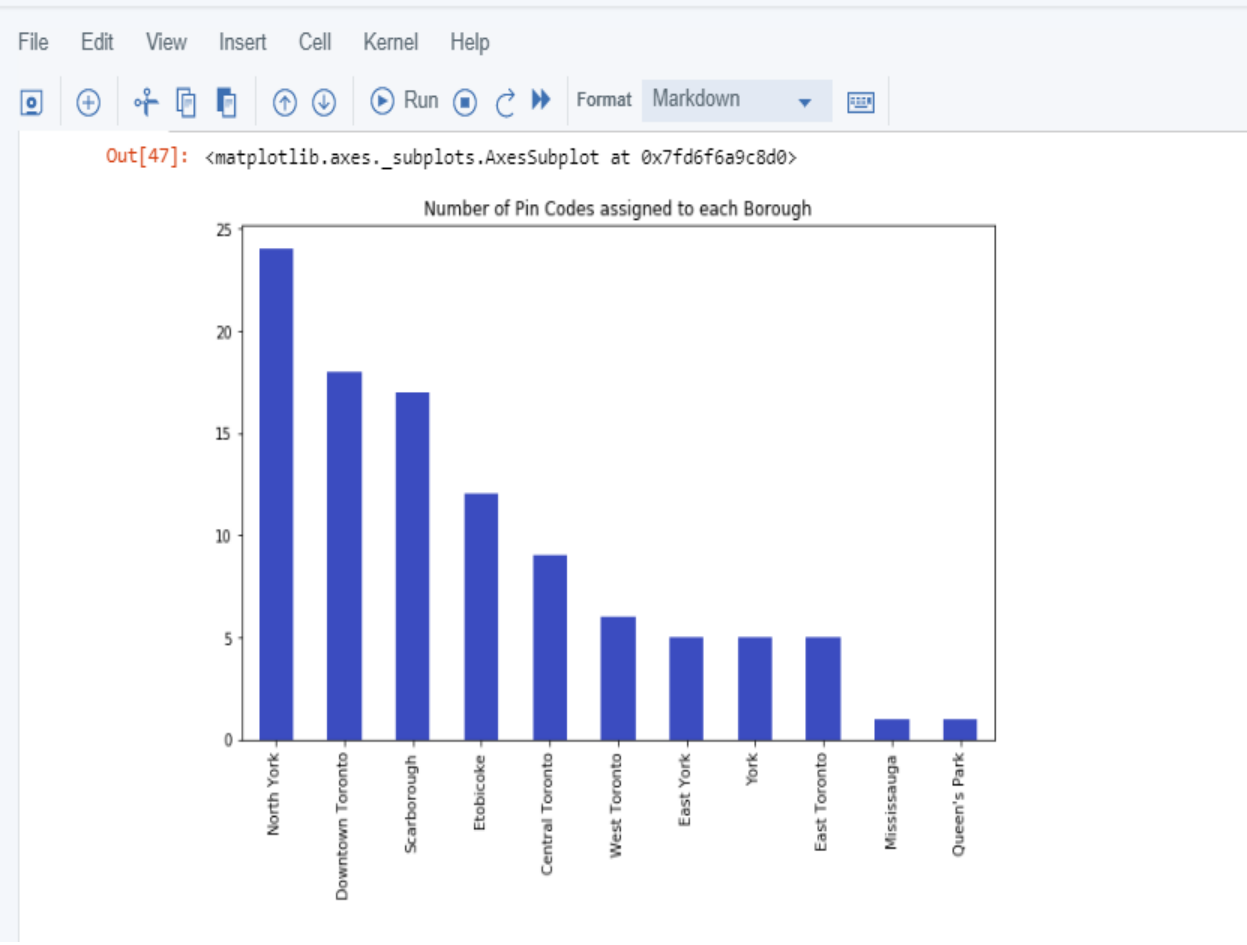


	Postcode	Borough	Neighbourhood
0	M1B	Scarborough	Malvern, Rouge
1	M1C	Scarborough	Highland Creek, Port Union, Rouge Hill
2	M1E	Scarborough	Guildwood, Morningside, West Hill
3	M1G	Scarborough	Woburn
4	M1H	Scarborough	Cedarbrae
5	M1J	Scarborough	Scarborough Village
6	M1K	Scarborough	East Birchmount Park, Ionview, Kennedy Park
7	M1L	Scarborough	Clairlea, Golden Mile, Oakridge
8	M1M	Scarborough	Cliffcrest, Cliffside, Scarborough Village West
9	M1N	Scarborough	Birch Cliff, Cliffside West
10	M1P	Scarborough	Dorset Park, Scarborough Town Centre, Wexford ...
11	M1R	Scarborough	Maryvale, Wexford
12	M1S	Scarborough	Agincourt
13	M1T	Scarborough	Clarks Corners, Sullivan, Tam O'Shanter
14	M1V	Scarborough	Agincourt North, L'Amoreaux East, Milliken, St...
15	M1W	Scarborough	L'Amoreaux West
16	M1X	Scarborough	Upper Rouge
17	M2H	North York	Hillcrest Village
18	M2J	North York	Fairview, Henry Farm, Oriole
19	M2K	North York	Bayview Village

3. Methodology

3.1 Exploratory Data Analysis

With the pre-processed data in place, the next step was to explore it to understand it better. The client's requirement was better understood when we explored the number of pin codes associated with each Toronto borough.



Why did the client prefer Downtown Toronto over other, more populated boroughs such as North York? The answer to this question was easy - A quick Wikipedia search on Downtown Toronto gives the answer - with a density of 11725/ km2 , it is

one of the most densely populated areas in North America. The dataframe was thus narrowed down to include only the neighborhoods in Downtown Toronto, as that was the preference given by the client.

3.2 Analyzing the Toronto neighborhoods

For the analysis, the K-Means Clustering approach was used.

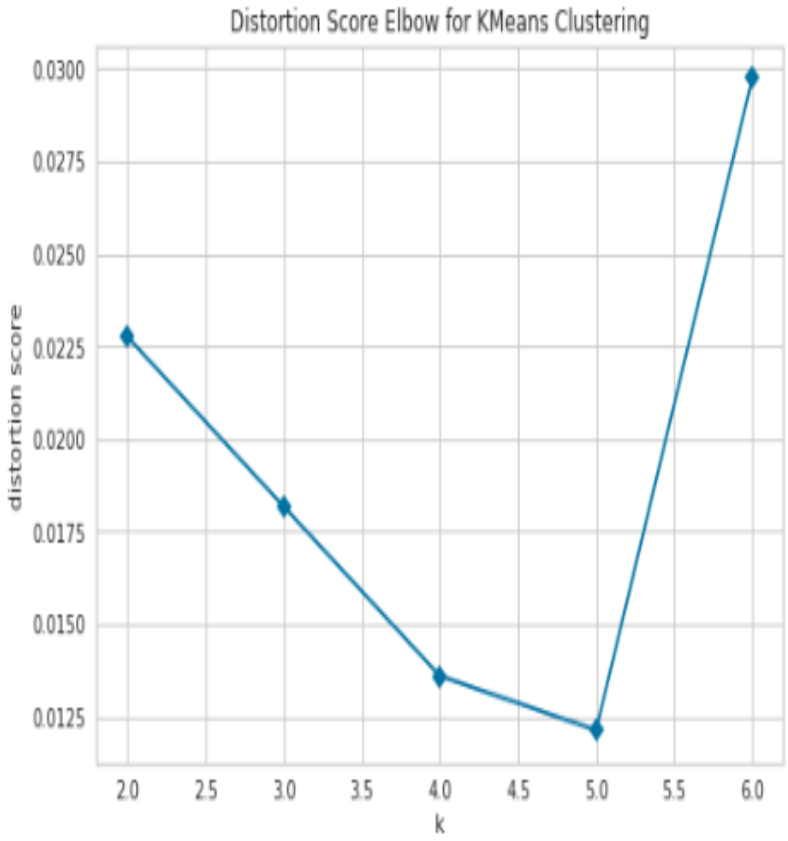
After using the one-hot encoding technique for all the columns in the source dataframe, we used the Foursquare API to extract the top 10 venues from each neighborhood, giving the following result:

Out[49]:

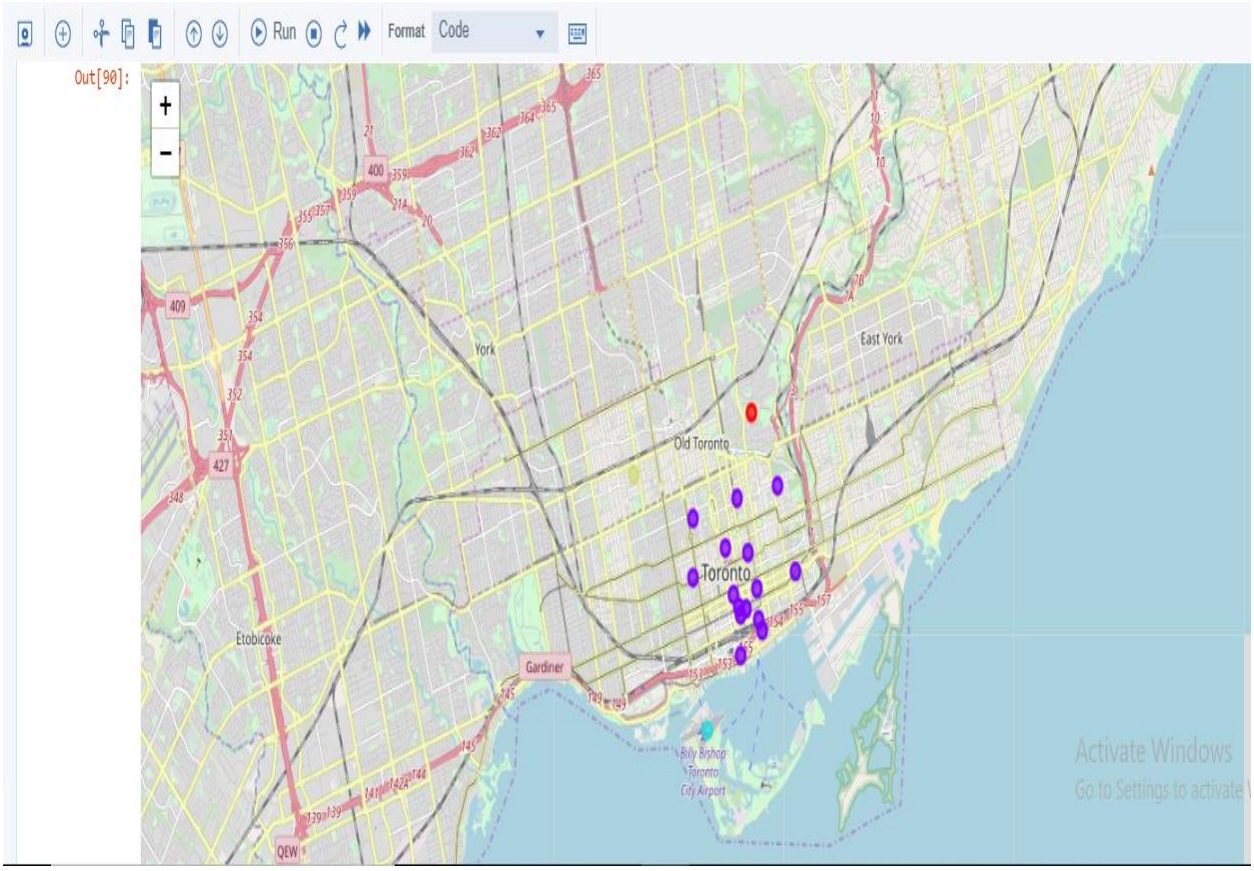
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th M Comm Venu
0	Adelaide, King, Richmond	Coffee Shop	Café	Steakhouse	Bar	American Restaurant	Bakery	Cosmetics Shop	Restaurant	Hotel
1	Bathurst Quay, CN Tower, Harbourfront West, Is...	Airport Terminal	Airport Lounge	Airport Service	Harbor / Marina	Boat or Ferry	Sculpture Garden	Bar	Plane	Bouti
2	Berczy Park	Coffee Shop	Cocktail Bar	Beer Bar	Bakery	Steakhouse	Seafood Restaurant	Cheese Shop	Italian Restaurant	Café
3	Cabbagetown, St. James Town	Coffee Shop	Restaurant	Bakery	Park	Pub	Pizza Place	Café	Italian Restaurant	Indiar Resta
4	Central Bay Street	Coffee Shop	Café	Italian Restaurant	Middle Eastern Restaurant	Sandwich Place	Burger Joint	Sushi Restaurant	Bubble Tea Shop	Bar
5	Chinatown, Grange Park, Kensington Market	Café	Vegetarian / Vegan Restaurant	Coffee Shop	Bakery	Mexican Restaurant	Bar	Dumpling Restaurant	Vietnamese Restaurant	Chine Resta
6	Christie	Grocery Store	Café	Park	Diner	Baby Store	Coffee Shop	Convenience Store	Italian Restaurant	Resta
7	Church and Wellesley	Coffee Shop	Japanese Restaurant	Sushi Restaurant	Gay Bar	Restaurant	Men's Store	Mediterranean Restaurant	Hotel	Gym
8	Commerce Court, Victoria Hotel	Coffee Shop	Café	Hotel	Restaurant	American Restaurant	Seafood Restaurant	Bakery	Steakhouse	Italiar Resta
9	Design Exchange, Toronto Dominion Centre	Coffee Shop	Café	Hotel	Restaurant	Italian Restaurant	Gastropub	Bakery	Deli / Bodega	Amer Resta

3.2.1 Clustering the neighborhoods

For clustering the elbow method was used to identify the most ideal number of clusters to be formed.



Once the clustering was successfully done, we mapped the clusters on the map of Toronto to get the clusters of neighborhoods to explore.



4. Results

The clustering algorithm efficiently clustered all the neighborhoods with similar top venues together. The segregation was done according to the following categories:

Cluster	Top 2 Common Venues
0(Red)	Coffee shop, Café
1(Purple)	Park, playground
2(Teal)	Grocery store, Café
3(Yellow)	Airport terminal, airport lounge

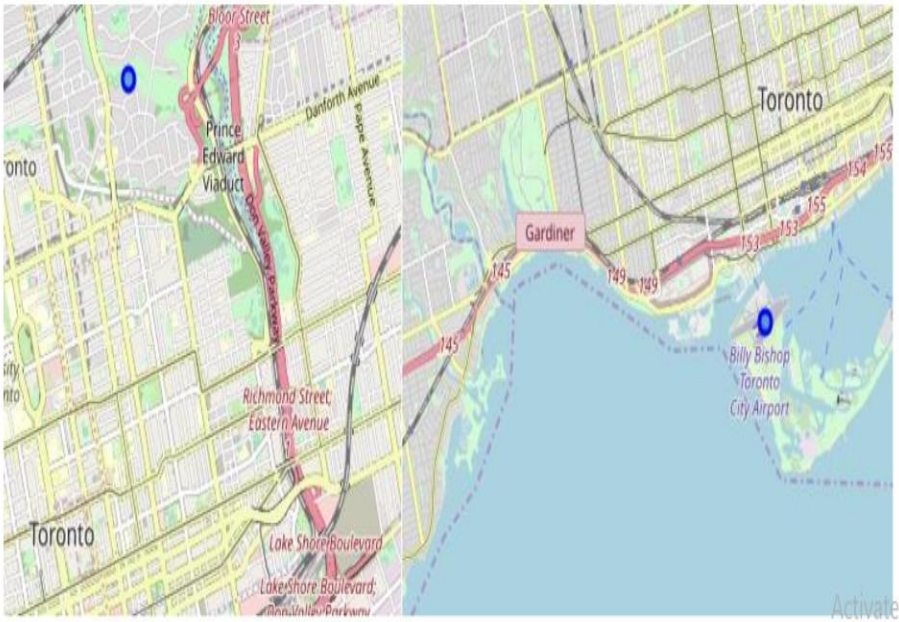
Clusters 0 and 2 were completely eliminated from the possibilities considering the neighborhoods in in had restaurants and eateries in abundance, and they did not meet the client's criteria of not having any eatery in the top 2 common venues.

Note: A café and a coffee shop were assumed to be eateries

The geographic locations of clusters 1 and 3 were considered, and the following factors were considered:

- Proximity with the other neighborhoods within Toronto
- Strategic positioning of the neighborhood

The clusters 1 and 3 were mapped to get the following results:



Cluster 3 was situated in the Toronto city airport, which explained the lack of restaurants and other eateries as compared to the other neighborhoods. Also, it was isolated from other neighborhoods of Toronto. The neighborhood in cluster 1, Rosedale, Downtown Toronto can thus be shortlisted as the best possible location for the Indian restaurant.

However, all of the 6 neighborhoods from Clusters 1 and 3 satisfy the client's requirement and can thus be taken into consideration while making a decision.

Shortlisted neighborhoods in cluster1:

:

	PostalCode	Borough	Neighborhood
50	M4W	Downtown Toronto	Rosedale

Shortlisted neighborhoods in cluster3:

Out[67]:

	Postcode	Borough	Neighbourhood
121	M5V	Downtown Toronto	Bathurst Quay
122	M5V	Downtown Toronto	CN Tower
123	M5V	Downtown Toronto	Harbourfront West
124	M5V	Downtown Toronto	Island airport
125	M5V	Downtown Toronto	King and Spadina

Since all of the 5 neighborhoods in Cluster 3 contained the same geographical co-ordinates, the suggested venues for all of them were the same.

5. Discussion

This analysis heavily relied on the data extracted from the FourSquare API. There is some scope for further improvement in the analysis by placing some additional filters such as:

- Population of the neighborhood
- Geographical coordinates of the neighborhoods as opposed to boroughs
- Average per-capita income of the population

 Consideration of the ratings of the restaurants in the neighborhood

 Crime rate of the neighborhoods

 Real-estate prices of the neighborhoods

In order to arrive at a more concrete conclusion, a thorough analysis on the above factors will be definitely helpful for the client to make a more informed decision.

6. Discussion

In this study, the neighborhoods of Toronto were explored and clustered to obtain the best and commonly visited venues in each of them, and accordingly the best possible neighborhood to start an Indian restaurant was determined. This was done in accordance with the preferences and conditions set by the client. However, this conclusion was subject to further refinement given a more thorough analysis of some other factors which could not be monitored in this study.