Coursera Capstone- "The Battle of Neighborhoods."

Comparative analysis using location data via Foursquare.

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Problem Statement

Delhi, officially the National Capital Territory of Delhi (NCT), is a city and a union territory of India. The NCT covers an area of 1,484 square kilometers having population of about 18.6 millions.

Delhi Metro Rail Corporation Limited(DMRC) is a Centre-state Public Sector company that operates the Delhi Metro having about 250 stations.

The mission of this project is to use Foursquare location data and regional clustering of venue information to determine what might be the 'best' metro stations in Delhi to start a business. I have found that there is not a lot of selection at many metro stations. This is supported by the fact that a review of Foursquare venues reveals no Indian Restaurant, Fast Food Restaurant, Pizza Place, Coffee shops at many metro stations as listed on the site.

My proposal, then, is an analysis of the metro stations in National Capital Territory(NCT) of Delhi for the consideration of starting a business. The objective is to have a location that is having very less businesses nearby and within a close enough range (500m) to a metro station.

Data Overview

The data that we will use for this analysis is a combination of a CSV file that has been prepared for the purposes of the analysis from multiple sources (DelhiMetroData.csv) and the location/venue information in foursquare.

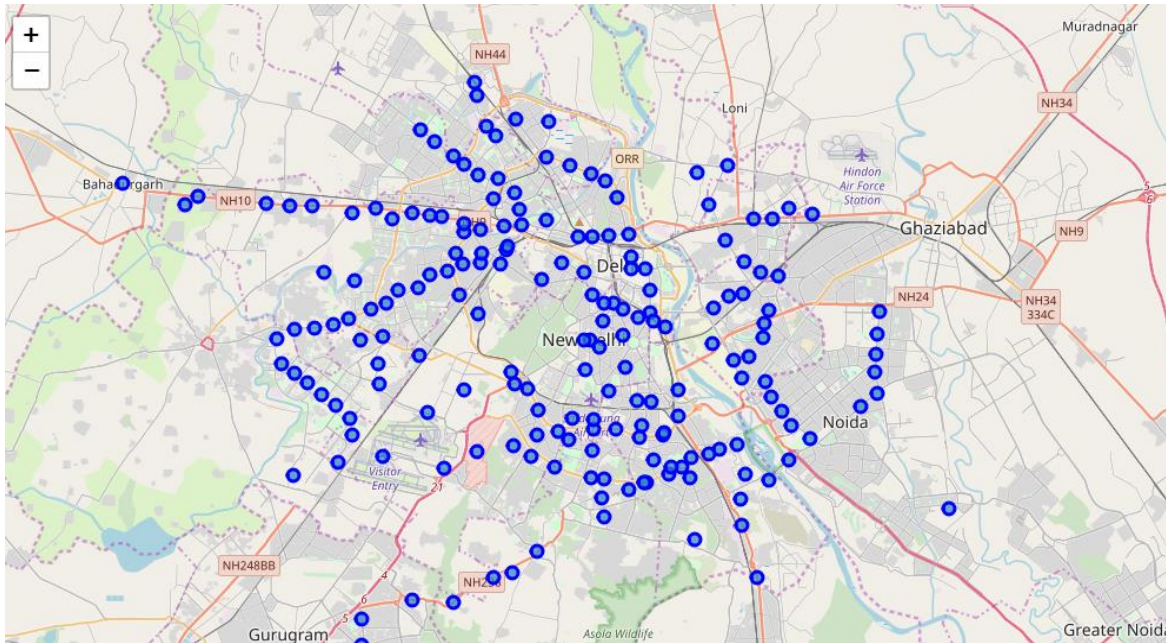### Source 1: DelhiMetroData.csv

Initially data was without latitude and longitude of each metro station. Using Foursquare I looked up latitude and longitude of each metro station and added to the data frame.

	StationName	Line	Opened	Layout	Latitude	Longitude
0	Adarsh Nagar	Yellow Line	2009-02-04	Elevated	28.614193	77.071541
1	AIIMS	Yellow Line	2010-09-03	Underground	28.569016	77.207612
2	Akshardham	Blue Line	2009-11-12	Elevated	28.612517	77.277318
3	Anand Vihar ISBT	Blue Line branch	2010-01-06	Elevated	28.646702	77.315509
4	Arjan Garh	Yellow Line	2010-06-21	Elevated	28.480716	77.125784
5	Ashok Park Main	Green Line	2010-04-02	Elevated	28.671633	77.155301
6	Ashram	Pink Line	2018-12-31	Underground	28.575177	77.256932
7	Azadpur	Yellow Line	2009-02-04	Elevated	28.707069	77.180383
8	Badarpur Border	Violet Line	2011-01-14	Elevated	28.493416	77.303334
9	Bahadurgarh City	Green Line	2018-06-24	Elevated	28.693324	76.933237
10	Barakhambha Road	Blue Line	2005-12-30	Underground	28.629753	77.224996
11	Bata Chowk	Violet Line	2015-09-06	Elevated	28.385836	77.313462
12	Bhikaji Cama Place	Pink Line	2018-08-06	Underground	28.567900	77.187016
13	Botanical Garden	Blue Line	2009-11-12	Elevated	28.563914	77.334350
14	Central Secretariat	Yellow Line	2005-07-03	Underground	28.614128	77.205615
15	Chandni Chowk	Yellow Line	2005-07-03	Underground	28.656265	77.229909
16	Chawri Bazar	Yellow Line	2005-07-03	Underground	28.650160	77.229501

The csv is stored can be found at: https://gist.github.com/anshuld27/

Using clustering techniques developed in prior exercises in the capstone project, we will examine the most common venues by neighborhood listed in Foursquare. When we cluster the data together and rank by 'most common', it appears that Indian Restaurant, Café, Fast Food Restaurant, Coffee Shop, Pizza Place venues not registered near many of the metro stations, so it is safe to assume there would be minimum competition if we start these business.
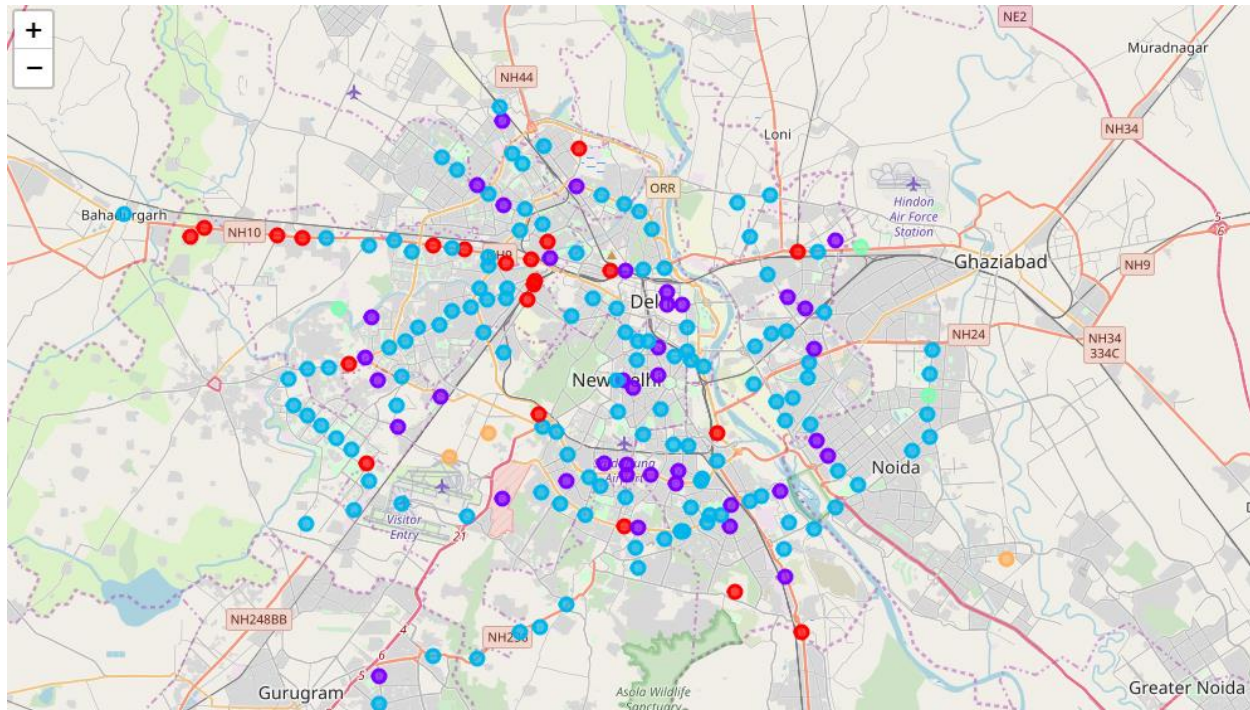

Map of Delhi Metro Stations using Folium

	StationName	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	AIIMS	Indian Restaurant	Memorial Site	Market	Restaurant	Yoga Studio
1	Adarsh Nagar	Indian Restaurant	Burger Joint	Yoga Studio	Fabric Shop	Food Truck
2	Akshardham	Athletics & Sports	Hindu Temple	Yoga Studio	Food Truck	Food Court
3	Anand Vihar ISBT	Clothing Store	Multiplex	Indian Restaurant	Café	Gym
4	Arjan Garh	Hotel	Light Rail Station	Furniture / Home Store	Yoga Studio	History Museum
5	Ashok Park Main	Train Station	Yoga Studio	Electronics Store	Food Truck	Food Court
6	Ashram	Dessert Shop	Bowling Alley	Bakery	Neighborhood	Yoga Studio
7	Azadpur	Indian Restaurant	Park	Bus Station	Yoga Studio	Electronics Store
8	Badarpur Border	IT Services	Train Station	Yoga Studio	Eastern European Restaurant	Food Court
9	Bahadurgarh City	Pharmacy	Bus Station	French Restaurant	Food Truck	Food Court
10	Barakhambha Road	Indian Restaurant	Hotel Bar	Coffee Shop	Molecular Gastronomy Restaurant	Gastropub
11	Bata Chowk	Asian Restaurant	Shopping Mall	Hotel	Multiplex	Food
12	Bhikaji Cama Place	Lounge	Hotel	Café	Asian Restaurant	Gym / Fitness Center
13	Botanical Garden	Bus Station	Hotel	Light Rail Station	Flea Market	Bakery
14	Central Secretariat	Music Venue	Indian Restaurant	Spiritual Center	Yoga Studio	Food Court
15	Chandni Chowk	Indian Restaurant	Market	Snack Place	Dessert Shop	Train Station

Data Exploration

We have clustered the metro station data into 5 clusters as shown below:

Clustered metro station map using folium

On further analysis, cluster metro stations have many businesses while in cluster 4 and 5, there were only 3 stations each. So cluster 4 and cluster 5 metro stations will be the preferred choice for starting a business with less competition.

	StationName	Opened	Layout	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
129	Noida Sector 59	2019-03-09	Elevated	28.606529	77.372642	3	Business Service	Electronics Store	Food Truck	Food Court	Food & Drink Shop
172	Shaheed Nagar	2019-03-08	Elevated	28.678230	77.335647	3	Business Service	Music Venue	Yoga Studio	Food Court	Food & Drink Shop
177	Shiv Vihar	2018-10-31	Elevated	28.648123	77.050612	3	Business Service	Electronics Store	Food Truck	Food Court	Food & Drink Shop

Data of cluster-4

	StationName	Opened	Layout	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
22	Delhi Cantonment	2018-03-14	Elevated	28.588856	77.132399	4	ATM	Electronics Store	Food Truck	Food Court	Food & Drink Shop
163	Sadar Bazaar Cantonment	2018-05-29	Elevated	28.577151	77.111153	4	ATM	Food	Electronics Store	Food Truck	Food Court
181	Sikandarpur	2010-06-21	Elevated	28.528424	77.415394	4	ATM	Electronics Store	Food Truck	Food Court	Food & Drink Shop

Data of cluster-5

Top Venue count

	Venue Category	Venue
0	Indian Restaurant	144
1	Hotel	80
2	Café	80
3	Fast Food Restaurant	70
4	Coffee Shop	68
5	Pizza Place	53
6	Chinese Restaurant	40
7	Restaurant	35
8	Shopping Mall	27
9	Bar	25
10	Bakery	23

To begin analysis, I fetched top existing venues using foursquare and there count.

From above data frame we get Indian Restaurant, Café, Fast Food Restaurant, Coffee Shop, Pizza Place, Chinese Restaurant are most common type of venues near metro stations.

Final Recommendation

Noida Sector 59, Shaheed Nagar, Shiv Vihar, Delhi Cantonment, Sadar Bazaar Cantonment and Sikandarpur are the station of our choice. All these metro stations, except Sikandarpur, are recently opened, in year 2018/19. Sikandarpur is opened in 2010 and not much developed so we are dropping it from consideration.

So to start any or all of the business like Indian Restaurant, Café, Fast Food Restaurant, Coffee Shop, Pizza Place, Chinese Restaurant at these metro stations will be profitable and having less competition from other business.

Delhi Cantonment and Sadar Bazaar Cantonment are crowded places, so here risk is very low to start business.

Conclusion:

In the end, Indian Restaurant, Café, Fast Food Restaurant, Coffee Shop, Pizza Place, Chinese Restaurant are the businesses to be considered and Noida Sector 59, Shaheed Nagar, Shiv Vihar, Delhi Cantonment, Sadar Bazaar Cantonment are the best places to start these businesses.