

# Capstone Project

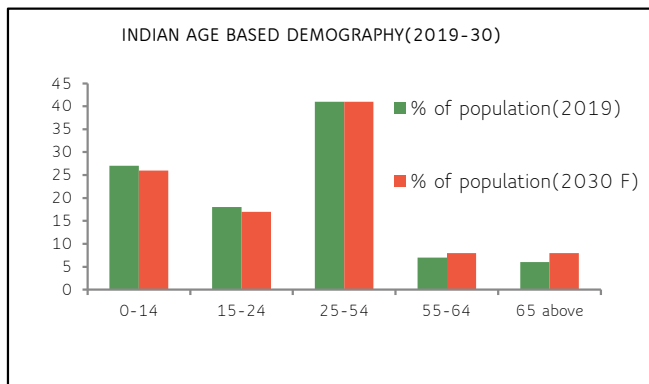
**The next store location for Decathlon in Delhi**

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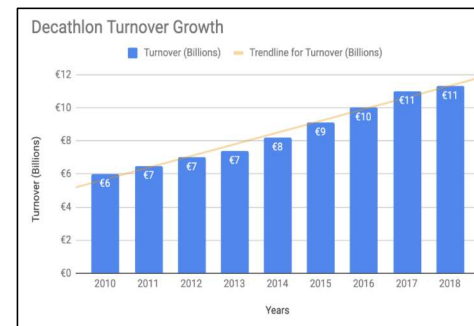
PRIYAM GHOSH

# Business Problem

INDIAN HOUSEHOLD INCOME DEMOGRAPHICS (Tier 1 city)			
Category	2019		2030*
	Household income/month	% of population	% of population
Low Poverty Level	<90\$	43	15
Poor	< 250\$	54	78
Lower middle class	<1200\$		
Upper middle class	< 3000\$		
Affluent class	>3000\$	3	7
Very Rich	>12,000		



- ❑ Decathlon is a French sporting goods retailer. With over 1,500 stores in 57 countries, it is the largest sporting goods retailer in the world.
- ❑ India has a burgeoning middle class and it is growing at a rapid pace
- ❑ **Decathlon has four stores in Delhi presently. The plan is to open a fifth store but a decision needs to be taken based on Data Science.**
- ❑ Broad Criteria for shortlisting locality-
  1. The location should be a popular one
  2. It should be far from the existing Decathlon store
  3. There should be plenty of infrastructure around



# Data Sources

1. Wikipedia to retrieve Shopping mall and its locations in Delhi ([https://en.wikipedia.org/wiki/List\\_of\\_shopping\\_malls\\_in\\_India#Delhi](https://en.wikipedia.org/wiki/List_of_shopping_malls_in_India#Delhi))
2. Location of Decathlon Stores in Delhi(<https://www.tiendeo.in/stores/delhi/decathlon> )
3. Four square API to explore neighbourhood

Name	Location	Year	Size (gross leasable area)
Ambience Mall, Vasant Kunj	Vasant Kunj	2008	1,200,000 sq ft (110,000 m2)
Vegas Mall	Sector-14, Dwarka	2019	650,000 sq ft (60,000 m2)
Parsvnath Mall, Azadpur	Azadpur metro station	2005	600,000 sq ft (56,000 m2)
Select Citywalk	Sector-6, Pushp Vihar, Saket	2007	600,000 sq ft (56,000 m2)
Pacific Mall, Tagore Garden	Tagore Garden, Subhash Nagar	2011	600,000 sq ft (56,000 m2)

## Decathlon Stores

Store	Address
Decathlon Khelgaon	Khel Gaon New Delhi
Decathlon CBD Shahdara	Shahdara
Decathlon Tagor Garden	Tagore Garden, Najafgarh
Decathlon Rohini	Rohini, New Delhi

**FOURSQUARE**

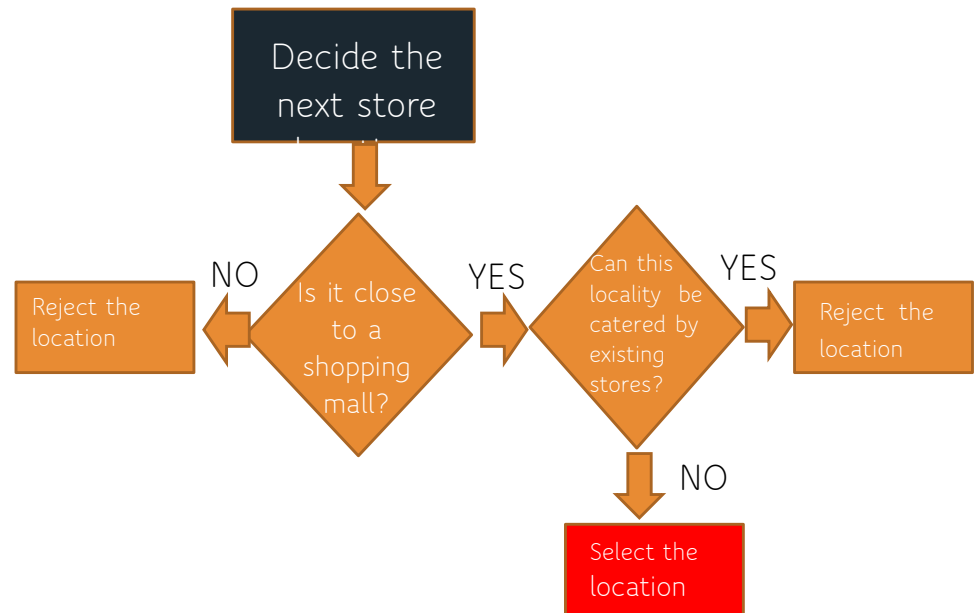


Shopping malls

# Approach

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1. The shopping malls in Delhi give a good idea about the popular localities in the city, generally surrounded by cafes, markets, hotels and often frequently visited by people with good disposable incomes.
2. Since Decathlon has few stores in Delhi, the best criteria to identify a locality is that it should be far from the existing stores to avoid customer redundancy so that an untapped geographical market segment can be reached.



# Workflow

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1. Data of Shopping malls across all neighbourhoods of Delhi loaded
2. Using GEOCODER retrieved latitude- longitude for all shopping malls in Delhi
3. Removed all extra columns from the Data frame that are not required
4. Data of all Decathlon store locations in Delhi loaded
5. Using GEOCODER retrieved latitude-longitude of the Decathlon stores
6. Plotted Decathlon stores and Shopping malls on a Delhi map
7. Using K Means clustering method divided all the shopping mall locations into FOUR major shopping and lifestyle zones
8. Based on distance (or distance index) from centroid of each cluster to each existing store, a comparative analysis of the relative distance of each cluster was ranked
9. The farthest popular location recommended for setting up the next store
10. Using Foursquare API, the neighbourhood of the selected locality explored for cafes, hotels etc

# Exploratory Data analysis & wrangling

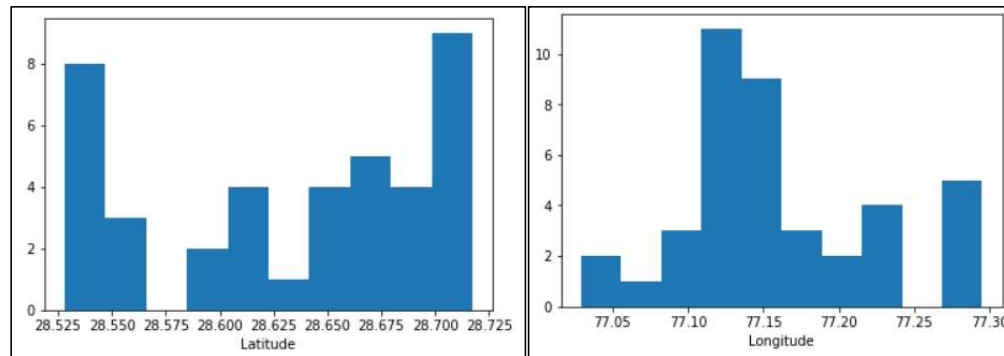
	Latitude	Longitude	Zone
count	40.000000	40.000000	40.000000
mean	28.632681	77.159411	0.900000
std	0.069833	0.069068	1.057331
min	28.527903	77.029238	0.000000
25%	28.551420	77.117074	0.000000
50%	28.647980	77.152640	1.000000
75%	28.696052	77.198090	1.250000
max	28.717453	77.294960	3.000000

```
df_mall.isnull().sum()#Searching Nan values
```

```
Name      0
Location  0
Year      4
Size (gross leasable area)  0
Latitude  0
Longitude  0
Zone      0
dtype: int64
```

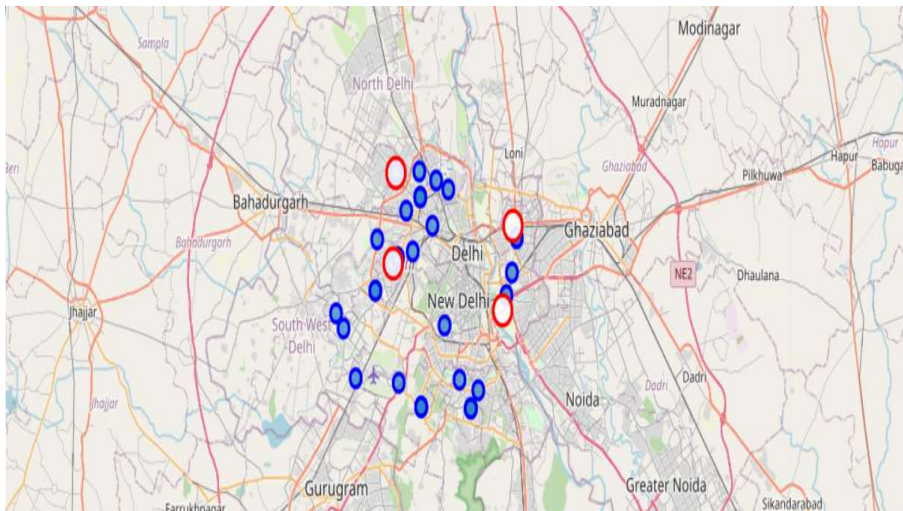
Some unnecessary columns were dropped like Year and Floor area.

The histogram and latitude and longitude which shows there are clusters existing laterally but not longitudinally

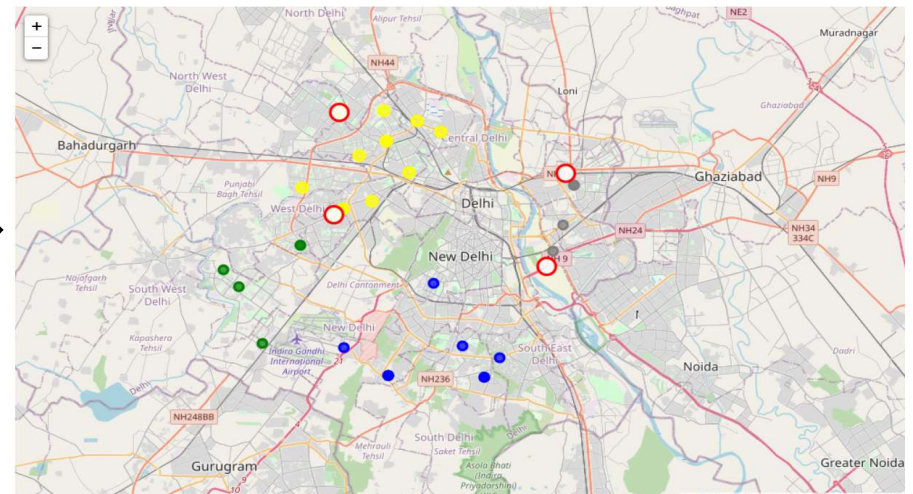
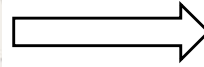


# Shopping mall & Decathlon store locations

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K Means  
clustering





# Data clustering

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Using K Means clustering- Delhi localities divided into 4 clusters

Centroid of clusters

	Name	Location	Latitude	Longitude	Zone
0	Ambience Mall, Vasant Kunj	Vasant Kunj	28.529249	77.154134	1
1	Vegas Mall	Sector-14, Dwarka	28.604197	77.029238	2
2	Parsvnath Mall, Azadpur	Azadpur metro station	28.710353	77.175901	0
3	Select Citywalk	Sector-6, Pushp Vihar, Saket	28.527903	77.226713	1
4	Pacific Mall, Tagore Garden	Tagore Garden, Subhash Nagar	28.643764	77.112845	0
5	Moments Mall	Kirti Nagar	28.653281	77.141773	0

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[[28.69111491 77.13509586]
 [28.53966315 77.1868041 ]
 [28.59842046 77.06072112]
 [28.64952837 77.29023249]]
```



# Result

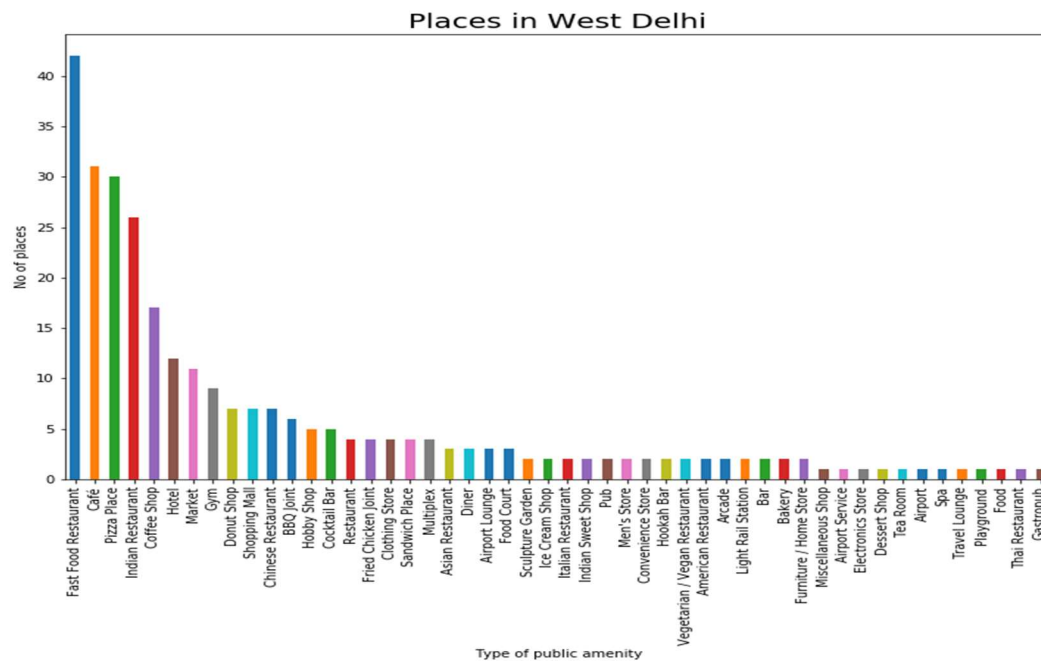
Distance Index used- Sum of the euclidean distance from all the 4 stores to each centroid of cluster

	Store	Address	Latitude	Longitude	Zone0	Zone1	Zone2	Zone3
0	Decathlon Khelgaon	Khel Gaon New Delhi	28.606650	77.274260	0.162791	0.110163	0.213698	0.045756
1	Decathlon CBD Shahdara	Shahdara	28.673333	77.289025	0.154953	0.168276	0.240280	0.023836
2	Decathlon Tagor Garden	Tagore Garden,Najafgarh	28.643764	77.112845	0.052318	0.127698	0.069087	0.177481
3	Decathlon Rohini	Rohini,New Delhi	28.716209	77.117074	0.030895	0.189818	0.130575	0.185553



West Delhi is the best place to set up a new store in Delhi as it is both popular destination and farthest from the existing stores. South Delhi can be the second most favourable location

# West Delhi exploration using Foursquare API



West Delhi neighbourhood was further explored for other public amenities, to ensure any biases in the findings as the only factor to identify popular cluster zones were done using shopping mall data. Using Foursquare Rest API, the other amenities were looked into using Venue search.

# Thank you

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