Battle of The Neighborhoods

1. Introduction/Business Problem

New York is one of the most sought after tourist destinations. The number of visitors in this city keeps increasing year over year. The city is crowded with venues no one ever wants to miss out on. While there are some very well known attractions such as the Statue of Liberty, Central Park and so on, the city is also known for its broadway shows as well as the exquisite dining and shopping experience.

Tourists who visit New York are already burdened with a hefty price tag on their travel tickets and an expensive stay only adds to their worries. This leaves them a very narrow opportunity to splurge their expense on shopping or even fine dining at any one of the well known restaurants.

One cannot expect to finish exploring the city in 2-3 days. It won't justify the amount spent on the travel tickets alone.

A week will suffice to cover most of New York. However, staying in a cramped up hotel room for a whole week, and paying a fortune for it is pretty unwelcoming.

Tourists expect to stay in places that make them feel like they are at home but also without missing out on the ambience that a top notch hotel would provide. Surely there are expensive hotel suites which have connected rooms and other luxuries, but these cost a lot and they are also intended for business meetings and related intentions. But tourists who are on a budget also expect to stay in such facilities, only not as extravagant as the 10,000 Dollar hotel suites.

This is where large hotel chain operators could tap in...provide a suite like experience to tourists but at a lower cost.

As a pilot project, large hotel chains can purchase a one, two or even three family house and transform it into a very minimal but at the same time, an elegant place for tourists to stay. The locality must be such that the visitors have all the necessary amenities nearby. This is crucial as this can significantly reduce the operating charges of the hotel and hence provide stay for them at a comparatively lower price.

This analysis aims at finding an ideal location to start such a budget friendly stay facility for tourists.

The stakeholders here are hotel owners who would like to explore the possibilities of starting out such a budget friendly hotel service for tourists without sacrificing the quality and the experience of living in a suite. If implemented optimally, it can even disrupt the entire hotel industry.

The service is such that only stay is provided along with other basic necessities such as furniture, internet, etc.

2. Datasets:

The datasets used for this project are:

- **New York boroughs and neighborhoods dataset**
  - Source - https://cocl.us/new_york_datasets
  - On hitting the above url, a json response is obtained containing borough and neighborhood details of New York.
  - Borough, neighborhood names and their respective latitude and longitudes are filtered from the json which is then transformed into a pandas dataframe.
- **Top - 18 tourist spots in New York**
  - Source - https://en.wikipedia.org/wiki/Tourism_in_New_York_City
  - The above wikipedia page contains a table showing the top - 18 tourist attractions in New York. The web page is scraped using the BeautifulSoup package and the table is obtained.
  - The required columns (name, location) are then obtained from the table and transformed to a database.
  - However, the location for each row is given in degrees, minutes and seconds. Hence , this data is then converted to degrees format using a custom method defined.
- **Bus-station location**
  - The locations of various bus-stations in New York or any borough/neighborhood can be obtained from Foursquare API.
  - Url: https://api.foursquare.com/v2/venues/explore?categoryId={}&near={}&client_id={}&client_secret={}&v={}&limit=500
  - The missing details in the url are filled using the .format() method. These can be passed as arguments in a method which can be called whenever we need the details for any particular category.
  - Each venue has its own category id. The id for bus-station is 4bf58dd8d48988d1fe931735.
  - A json response is obtained on hitting the url with the required details from which, the name of the station as well as it's latitude and longitude details are filtered out.
  - The response is then converted to a pandas dataframe.
- **Train-station location**
  - Similar to bus-station, train-station details are also obtained using Foursquare API.
  - URL : https://api.foursquare.com/v2/venues/explore?categoryId={}&near={}&client_id={}&client_secret={}&v={}&limit=500
  - Data processing procedures done for obtaining bus-station details are done here similarly.

- ○ The only difference lies in the category id used which is 4bf58dd8d48988d129951735
- **Restaurant location**
  - ○ These details are also obtained from Foursquare API with the same url template used for locating bus-stations and train-stations.
  - ○ URL: https://api.foursquare.com/v2/venues/explore?categoryId={}&near={}&client_id={}&client_secret={}&v={}&limit=500
  - ○ Here, the restaurant name, location as well as the category is filtered from the response json.
  - ○ Category id: 4d4b7105d754a06374d81259
- **Property sales price dataset**
  - ○ Source - https://data.cityofnewyork.us/resource/5ebm-myj7.json
  - ○ This dataset contains the lowest, highest and the median house sale price in different neighborhoods and boroughs of New York.
  - ○ The data is downloaded as a json which is then converted to a pandas dataframe.
  - ○ From this dataset, we are only considering the median sales price as it gives a better approximation of property value in a particular location.
  - ○ The dataset may not have details of all neighborhoods. However, it gives a good estimation of what values can be expected at a particular location.
  - ○ The dataset also contains median prices for one, two and three family homes for certain neighborhoods. These are then averaged so that the average price for each neighborhood is obtained.

3. Methodology:

Using Folium, a map of New York is generated on which we add markers of different colours to identify its boroughs and neighborhoods. Once we mark the top-18 tourist spots in New York onto the same map, we will be able to visualize the borough or even the neighborhood that could be identified as a potential option to start a hotel.
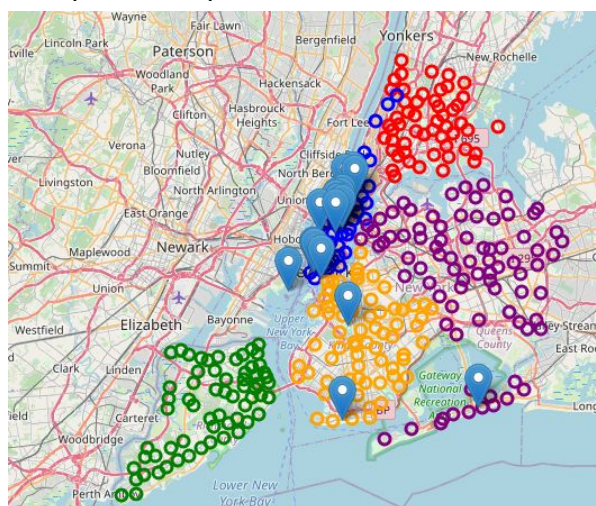
Fig 1: Map of New York marked with Boroughs, Neighborhoods and tourist spots

Let us map the colored markings to their representations in a tabular form.

Marker	Representation
Red circle marker	Bronx
Blue circle marker	Manhattan
Orange circle marker	Brooklyn
Purple circle marker	Queens
Green circle marker	Staten Island
Blue bubble icon	Top-18 tourist spots

Table 1: Mapping different markers on New York Map

As we can see from Fig 1, most of the popular spots are in and around the blue circle markers which represent Manhattan.
Now that we were able to narrow down our search to just one Borough, which is Manhattan, the next analysis is to search for locations/neighborhoods in this particular borough having facilities such as train-stations, bus-stations and restaurants.

 Since the hotel service concerned provides only a stay facility, it is important to ensure that some basic facilities are available nearby. As discussed earlier, this also ensures that the operating charges are further reduced and hence can be leased at a lower charge.

The following exploratory analysis is very crucial as it explores the availability of certain must-needed facilities for tourists. This involves the presence of bus-stations, train-stations and restaurants in the locality. Since the stay doesn't provide bus/cab shuttle service to various spots of New York, the hotel must ensure that the visitors residing there have ample options to aid them in moving around the city.
The tourists may also be coming from different parts of the world.Therefore, it is imperative to have restaurants serving multiple cuisines. This also ensures that the tenants have a much wider choice of food rather than being restricted to what the hotel provides which is usually the case with the traditional hotels.
Fig 2 describes the presence of bus-stations, train-stations, restaurants in different neighborhoods of Manhattan. Here, the train-stations, bus-stations and restaurants are represented by icons of colours red, green and orange respectively. The markers in blue represent the different neighborhoods. On analyzing the figure, we could find plenty of restaurants, bus-stations and train-stations towards the south of the Central Park. As we move towards the north, it's mostly bus-stations and also a good number of restaurants and similar characteristics are also seen in the east and west sides of Central Park.
It is the responsibility of the hotel owner to make sure that ample options are given to the visitors and not restrict them in any way in terms of making services and facilities available to them.

Fig 2: Markers pointing at bus-stations, train-stations, restaurants and Boroughs

Hence, if we zoom in further to Midtown South as shown in Fig 3, we can find a decent number of venues of all three categories (bus-stations, train-stations, restaurants) in its vicinity.

Fig 3: Midtown South

Now that we have found that Midtown South is a potential location for starting out this business, let us now analyze property prices in this particular locality.

For this, we make use of the property sales price dataset which was discussed in the dataset section. Although it doesn't have data to all neighborhoods, it can give us an expected price of a property in a certain location. For this, we use K-means to segment the neighborhoods based on the median sales price value. A k-value of 3 was used in the analysis as we wanted to segment the neighborhoods based on low, medium and expensive categories.

On analysing, the neighborhoods were segmented fairly well. Table 2 illustrates the price ranges of different groups and their marker colors in Fig 3.

GROUP	PRICE RANGE
Group - 0 (Red)	$3 million - $7 million
Group - 1 (Blue)	$11 million - $15 million
Group - 2 (Green)	$550,000 - $2 million

Table 2: Price range for different groups segmented using K-means

Fig 3: Neighborhoods segmented based on median property sales price

From Fig 3, we can infer that the neighborhoods around Central Park cost around $3 million - $7 million and the costs are less as we move towards the north where it lies between

$ 550,000 and $2 million. However, the scenario is a bit different in the south. As the figure illustrates, we can see some pockets where the property price exceeds $11 million and the price further reduces to $2 million and lower as we move further south to the tip.

The fairly high property price in Midtown gives us confidence about how much the locality is approved in general by the public.

In order to further prove that Midtown South is indeed a perfect option to start this service, let us explore venues around this neighborhood in a radius of 2 Km.

The bar chart in Fig 4 illustrates the various venues in and around Midtown South. Although most of the venues are related to theatre, there are also plenty of other venues that would be useful for tourists. Along with the train station, we can notice the presence of restaurants of different cuisines including America, Mediterranean, Korean, Japanese, Italian to name a few.

The locality also has a supermarket and a pharmacy enabling tenants to buy certain essentials during their New York stay.
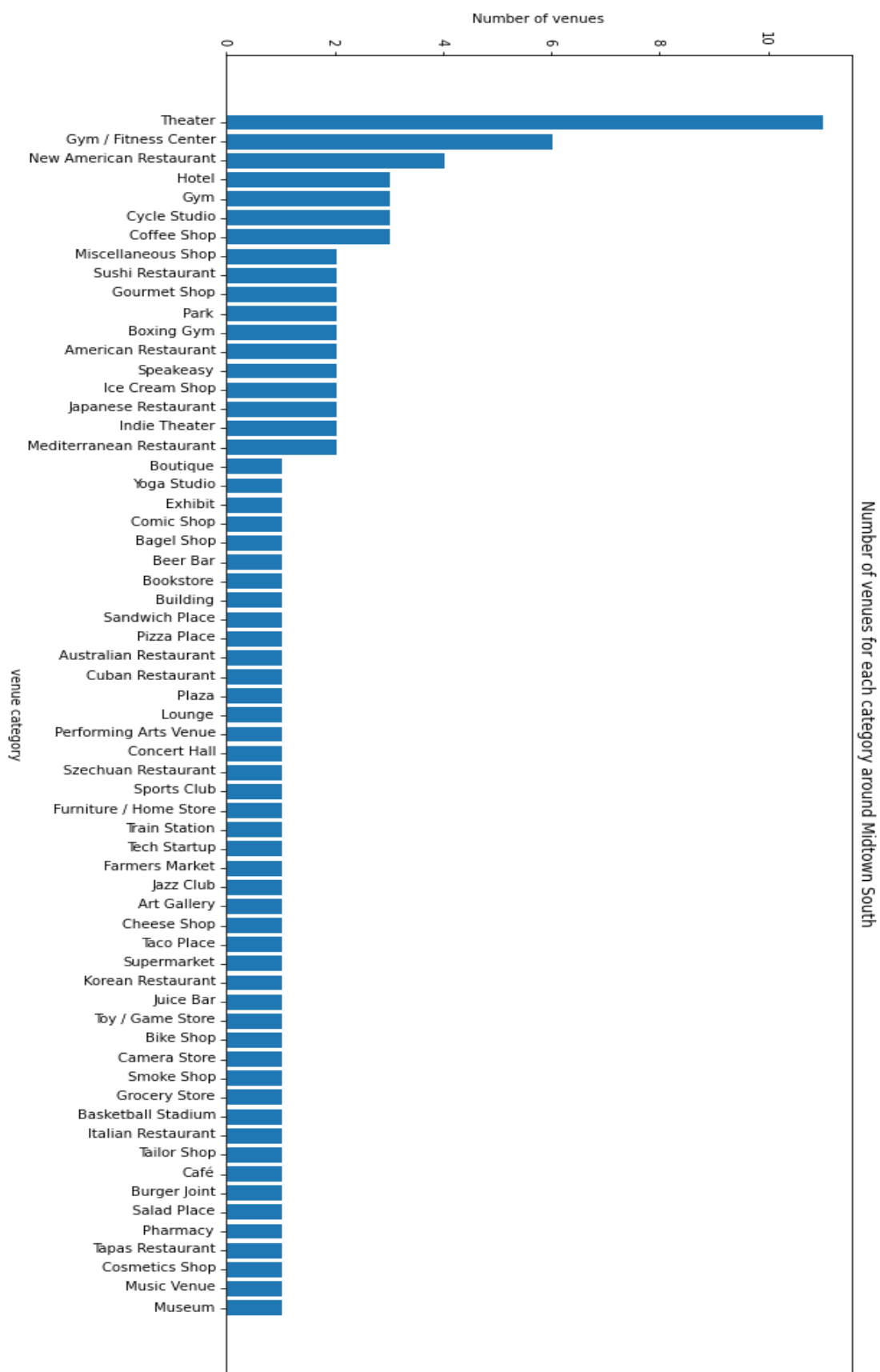
Fig 4: Venues around Midtown South

4. Results And Discussion:

- Most of the top-18 tourist attractions in New York are located within Manhattan.

- Since a few of them are present in the north side and the rest are in the middle and south, the centre of Manhattan would be an ideal location to start a hotel service.

- A good number of facilities such as bus-stations, train-stations and restaurants could be found in the vicinity of Midtown South hence making it a recommended location for the hotel service.

- Property prices are expected to be over $3 million.

- On exploring further, a number of venues could be found near Midtown South.

- Although most of the venues are for theatre, the locality also has plenty of restaurants serving a wide variety of cuisines from different parts of the world. Along with this, there are also cafes, supermarkets, pharmacies and other essential stores nearby.

- Other potential neighborhoods could be Murray Hill and the Upper West Side of Manhattan.

5. Conclusion:

To conclude, a compelling region to start this budget friendly hotel service would be Midtown South due to its proximity to amenities such as bus-stations, train-stations and restaurants. The presence of these facilities around the neighborhood would mean that the hotel need not provide them explicitly to the visitors and hence a major portion of the cost which incorporates meals, shuttle service and part of customer service(since there are no in-person interaction with the customers) can be slashed off which in turn would mean providing stay at a lower cost for the tourists.