1. Introduction

The project is based upon to see the facilities available in 3 major cities of the world. The three cities are Toronto in Canada, New York City in USA and London in United Kingdom. The business case is that a financial company XYZ needs to open a branch office in the downtown of one of these major cities. It has presently its head office situated in Paris, France. Now it wants to open its branch office. It wants to know what are the facilities available around the city? What are the hanging spots? What are the major restaurants? etc. All these will affect its decision to open the branch office in the city to attract proper local talents to work for its company and also to increase its business interest in the zonal area.

2. Data

Following data is used for the project. The data of each of the major three cities are collected for the below mentioned details and then modified as per our requirements.

1. Downtown City Location.
2. Venue Name.
3. Venue Latitude.
4. Venue Longitude.
5. Venue Category.
6. Venue Distance.

The source of data used for the project is taken from the Foursquare website. To acquire data on venues and their categories, Foursquare API is used. Foursquare is one of the world largest sources of location and venue data. To retrieve the venues and their categories in a given neighborhood, the coordinates—the latitude and the longitude—of the neighborhood are sent in the API request. The API-request URL looks like the following:

```
https://api.foursquare.com/v2/venues/search?
&client_id=1234&client_secret=nnnn&v=20180605& ll=40.9888867,-
72.3333567&radius=500&limit=100
```

where search indicates the API endpoint used, client_id and client_secret are credentials used to access the API service and are obtained when registering a Foursquare developer account, v indicates the API version to use, ll indicates the latitude and longitude of the desired location, radius is the maximum distance in meters between the specified location and the retrieved venues, and limit is used to limit the number of returned results if necessary.

The result of this data-acquisition-and-preparation stage is one table (in dataframe) that specify the venues of the major city Toronto. Below is a part of the Toronto Downtown area table. In these tables, one neighborhood might take many rows depending on the number of retrieved venues for that neighborhood. Here in this report, we have considered one major city location and popular venues across.

	name	categories	lat	lng	distance
0	Downtown Toronto	Neighborhood	43.653232	-79.385296	113
1	Nathan Phillips Square	Plaza	43.65227	-79.383516	138
2	Indigo	Bookstore	43.653515	-79.380696	260
3	Chatime ????	Bubble Tea Shop	43.655542	-79.384684	237
4	Textile Museum of Canada	Art Museum	43.654396	-79.3865	230
5	LUSH	Cosmetics Shop	43.653557	-79.3804	284
6	UNIQLO ????	Clothing Store	43.65591	-79.380641	378
7	CF Toronto Eaton Centre	Shopping Mall	43.65454	-79.380677	287
8	Ed Mirvish Theatre	Theater	43.655102	-79.379768	380
9	Four Seasons Centre for the Performing Arts	Concert Hall	43.650592	-79.385806	355
10	Japango	Sushi Restaurant	43.655268	-79.385165	222
11	Elgin And Winter Garden Theatres	Theater	43.653394	-79.378507	437

Several data-preparation techniques were used to arrive at this table. The details are all specified in the project report.

3. Methodology

Following methodology is used for evaluating the project.

1. Each Major City Name is defined. Like the location of downtown of Toronto, New York city and London, UK is determined one by one. Then using Foursquare API, the location latitude and longitude is pulled out. We get the following result as an example.

```
The geographical coordinate of Toronto city are 43.6534817, -79.383934
```

2. Based on the City location, nearby venues are pulled out using foursquare API. Using foursquare API developer account requires Client id, Client secret and version of the foursquare.

```
'https://api.foursquare.com/v2/venues/explore?&client_id=mmm???&client_secret=nnnn???&v=20180604&ll=43.6534817,-79.3839347&radius=1000&limit=100'
```

3. Request is made to the foursquare API to pull out the relevant information which pertains to the important 100 nearby venues of the city downtown area.

```
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
 'venue': {'id': '5227bb01498e17bf485e6202',
  'name': 'Downtown Toronto',
  'location': {'lat': 43.65323167517444,
   'lng': -79.38529600606677,
   'labeledLatLngs': [{'label': 'display',
     'lat': 43.65323167517444,
     'lng': -79.38529600606677}],
   'distance': 113,
   'cc': 'CA',
   'city': 'Toronto',
   'state': 'ON',
 'country': 'Canada',
```

4. Following specific details are pulled into a dataframe.
   a. Venue Name.
   b. Venue Category.
   c. Venue Latitude.
   d. Venue Longitude.
   e. Distance from the major location.

	name	categories	lat	lng	distance
0	Downtown Toronto	Neighborhood	43.653232	-79.385296	113
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5. The dimension of the dataframe is evaluated. The below example shows there are five columns and 100 rows in the dataframe. It is 100 rows because we have limited it for 100 venues, which is the maximum for foursquare API.

```
(100, 5)
```

6. Then total number of unique venue categories are checked. The following example shows there are 63 venue categories that were pulled from the foursquare API for Toronto downtown area.

```
There are 63 uniques categories.
```

7. The dataframe is then grouped according to the each venue categories in descending order. Following dataframe is generated, which is grouped by each venue category in decreasing order.

	categories	Toronto
0	Coffee Shop	11
1	Café	9
2	Restaurant	4
3	Japanese Restaurant	3
4	Gastropub	3
...	...	...
58	Spa	1
59	Gym / Fitness Center	1
60	Speakeasy	1
61	General Travel	1
62	Yoga Studio	1

8. A bar graph is plotted showing the number of counts of each venue category. The graph shows the count of each venue category.
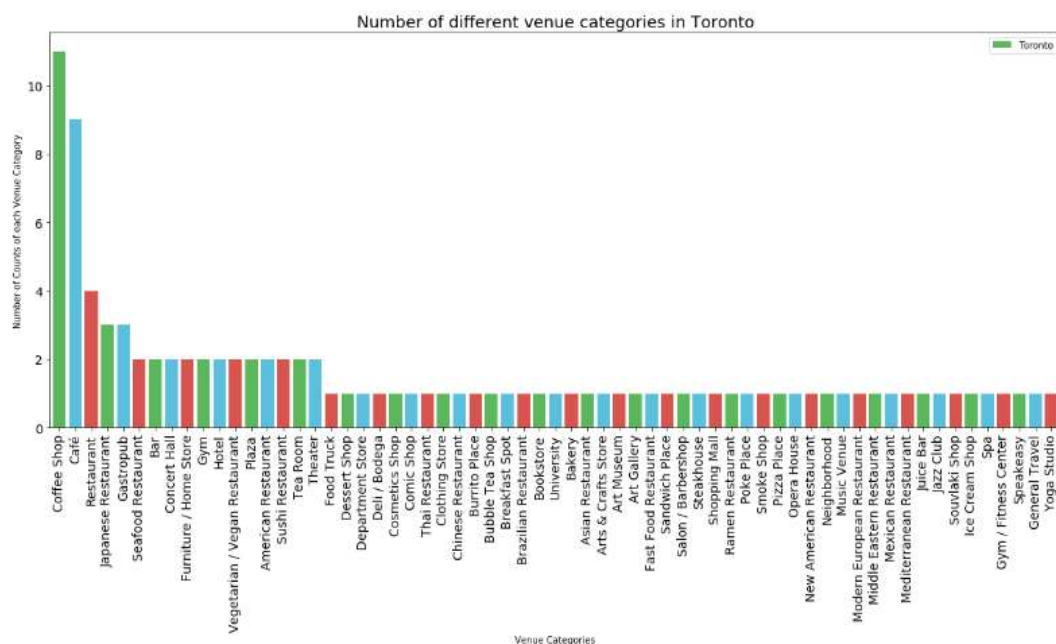
9. The above steps from 1 to 8 is repeated for all the three major cities, Toronto, New York city and London UK.
10. Finally, all the three major city dataframes are combined to show the distribution in a combined dataframe. The combined dataframe is then used for further analysis to solve the business case.
11. In the end, a bar graph is plotted to show the combined counts of venue in each of the major cities.

4. Result

Following is the result of the analysis.

1. **TORONTO**: Toronto, city, capital of the province of Ontario, southeastern Canada. It is the most populous city in Canada, a multicultural city, and the country's financial and commercial center. With a recorded population of around 2.7 Million, it is the most populous city in Canada and the fourth most populous city in North America. The Greater Toronto Area (GTA) as a whole have a population of 6.8 Million. The city covers an area of 630.20 square kilometres (243.32 sq. miles) and is comprised of six districts – 1) East York 2) Etobicoke 3) North York 4) Old Toronto 5) Scarborough and 6) York. The city is the anchor of the Golden Horseshoe, an urban agglomeration of 9.5 Million people surrounding the western end of Lake Ontario. Toronto is an international center of business, finance, arts, and culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world. Following is the analysis of the Toronto downtown area where the different venues are analyzed.

   a. Restaurants and Bars: There are different cuisine and types of restaurants and bars in Toronto downtown area which forms around 25% of all the venue categories. This is because there are many office locations in downtown area and the office professionals would need to have lunch and breakfast to work and network during the office time. Toronto has French Restaurant, American Restaurant, Japanese Restaurant, Asian Restaurant and Australian Restaurant.

Fig 1A : Restaurants & Bar in Toronto	
Restaurants and Bars	**Count**
Italian Restaurant	3
Hotel	3
French Restaurant	2
Falafel Restaurant	2
New American Restarant	2
Cocktail Bar	1
Hotel Bar	1
Wine Bar	1
Australian Restaurant	1
Asian Restaurant	1
Roof Deck	1
Veg/ Vegan Restaurant	1
Shushi Restaurant	1
Shanghai Restaurant	1
Restaurant	1
Gastronomy Restaurant	1
American Restaurant	1
	24
	24.7%

b. Coffee and Fast Food Centers: Coffee Shops and fast food centers are plenty across Toronto city downtown area, making almost another 24% of all the venue categories, where it becomes easy for the busy professionals to pick-up their meal quickly and can get back to business without have to spend much time in ordering and eating food if that is not required.

Fig 2A : Coffee/ Fast Food in Toronto	
Coffee & Fast Foods	**Count**
Coffee Shop	9
Café	2
Pizza Place	2
Ice Cream Shop	2
Sandwich Place	2
Burger Joint	1
Bakery	1
Breakfast Spot	1
Bagel Shop	1
Taco place	1
Juice Bar	1
	23
	23.7%

c. Art and Entertainment Centers: There are not many Art and Entertainment centers across downtown Toronto center. It forms around 4% of the total venues.

Fig 3A : Art/ Entertainment in Toronto	
Art & Entertainment Centres	**Count**
General Entertainment	1
Auditorium	1
Dance Studio	1
Speak Easy	1
	4
	4.1%

d. Parks and Visit places: The downtown area has also got 3 parks, 3 memorial and monument centers which shows the area has plenty of greenery and visiting spots to spend quality time and for introspection. The parks and the vising spots in the Toronto downtown area makes unto 10% of the total venue. The city is a good visiting spot.

Fig 4A : Parks/ Visit Cites in Toronto	
Parks & Visit Cites	**Count**
Memorial Site	3
Parks	3
Building	1
Harbour/ Marina	1
Monument/ Landmark	1
Scenic Lookout	1
	10
	10.3%

e. Shopping centers: There are plenty of shopping areas across entire downtown area which forms around 22% of the total venues areas. These shopping area are for both men and women apparels, electronic shops, antiques, wine shop, office supplies etc.

Fig 5A : Shopping Centres in Toronto	
Malls & Shops	**Count**
Farmers Market	2
Wine Shop	2
Gourmet Shop	1
Antique Shop	1
Furniture/ Home Store	1
Clothing Store	1
Electronics Store	1
Bookstore	1
Comic Shop	1
Grocery Store	1
Shopping Mall	1
Plaza	1
Paper/ Office Supplies	1
Optical Shops	1
Men's Store	1
Laundry Service	1
Kid's Store	1
Jewellery Store	1
Women's Store	1
	21
	21.6%

f. Gymnasium and Fitness spots: Apart from this the city downtown area has lot of health and fitness areas where there are Gymnasiums, Fitness centers and Spas. The city downtown area has 16% of the total visiting sites. These includes Gymnasium, spas, yoga studios etc.

Fig 6A : Gymnasium & Spas in Toronto	
Gym, Fitness Centre & Spa	**Count**
Gymnasium	4
Fitness Centres	4
Spa	3
Cycle Studio	2
Nail Salon	1
Yoga Studio	1
	15
	15.5%

Following is the bar chart of the number of venues in the Toronto city area.
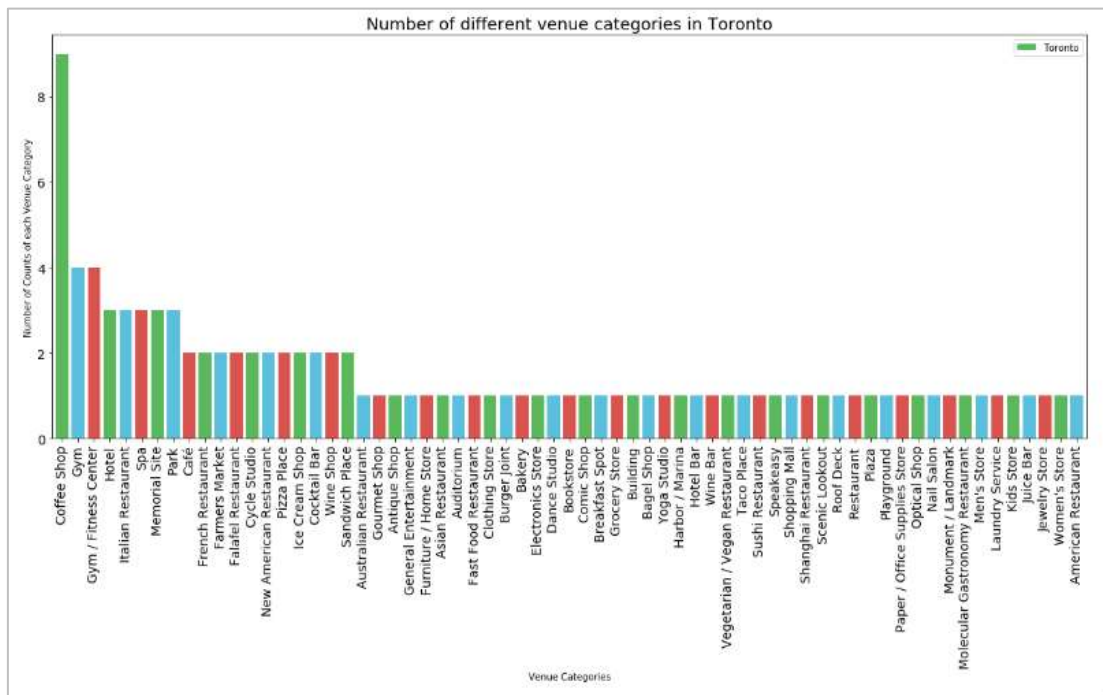
2. **LONDON, UK**: London is the capital and largest city of England and the United Kingdom, and is the largest urban area in Greater London. London is the biggest city in western Europe, and the world's largest financial center. London is about 2000 years old. The population of the London is 8.63 million and its area is 607 sq. miles. It is one of the most multi-cultural and financial hub of the European continent.

Following is the details of some of the important venues in and around London area.

a. Restaurants and Bars: There are different cuisine and types of restaurants in London downtown area ranging from quite a lot of Indian Restaurants, one French Restaurant and one Japanese Restaurant. The various restaurants and bars form around 25% of the total venue categories.
There are 6 Wine and Alcohol bars within the downtown area, which makes it an interesting spot to hang around within the city. There is a gay bar also available in the downtown area.

Fig 1B: Restaurants/ Bar in London	
Restaurants & Bar	**Count**
Hotel	4
Indian Restarant	3
Steakhouse	3
Restaurant	2
Beer Bar	2
Cocktail Bar	1
French Restaurant	1
Bar	1
Japanese Restaurant	1
Street Food Gathering	1
Gay bar	1
Pub	1
Wine Bar	1
Hotel Bar	1
Roof Deck	1
Ramen Restaurant	1
Total	**25**
	25.0%

b. Tea, Coffee and fast Food Centers: The city has got around 4 Tea/ Coffee Shops around the downtown London area which is seems to be less for a city like London. Also there are many fast food centers in the downtown area. It forms around 15% of the total venue categories where the busy professionals can pick-up their meal quickly and can get back to their businesses without have to waste much of their time in waiting for food to be served.

Fig 2B: Coffee and Fast Foods in London	
Coffee and Fast Foods	**Count**
Ice Cream Shop	3
Coffee Shop	3
Lounge	2
Pizza Place	2
Sandwich Place	2
Tea Room	1
Bakery	1
Bar	1
Total	**15**
	15.0%

c. Art and Entertainment centers: The city downtown area has plenty of cultural centers and performing art activities. Infact it forms around 24% of the total venue categories. This forms the largest part of the city downtown area, which shows that the city is culturally enriched.

Fig 3B: Art & Entertainment in London	
Art and Entertainment Centre	**Count**
Theatre	8
Event Space	2
Indie Movie Theater	2
Art Museum	2
Art Gallery	2
Dance Studio	1
Concert Club	1
Comedy Club	1
Opera House	1
Art & Crafts Store	1
Multiplex	1
Jazz Club	1
Performing Arts Venue	1
Total	**24**
	24.0%

d. Parks and Visit places: The downtown area has also got 3 parks, 3 memorial and monument centers which shows the area has plenty of greenery and visiting spots to spend quality time and for introspection. The city is a good visiting spot.

Fig 4B: Parks and Visit Places in London	
Parks and Visit Places in Cities	**Count**
Park	2
Garden	2
Scenic lookout	2
Fountain	1
Neighborhood	1
Multiplex	1
Monument/ Landmark	1
Total	**10**
	10.0%

e. Shopping Centers: There are plenty of shopping areas across entire downtown area which forms around 34% of the total venues. This makes it an interesting place to spend time and get some good shopping done. The shopping area contains a wide array of shopping centers from shopping malls to electronics shop, music stores and children's shopping choices.

Shopping Area in London		
Plaza		5
Clothing Store		3
Bookstore		3
Electronic Store		1
Department Store		1
Comic shop		1
Shopping Plaza		1
Video Store		1
Music Store		1
Lingerie Store		1
Grocery Store		1
Gourmet Shop		1
Gift Shop		1
Total		**21**
		33.9%

f. Health and Fitness areas: Apart from this the city downtown area has few health and fitness areas where there are Gymnasiums, Fitness centers forms around 2% of the total venues.

Fig 6B : Gymnasium & Spas in London	
Gym, Fitness Centre & Spa	**Count**
Gymnasium	1
Skate Park	1
	2
	2.0%

Following is the bar chart of the venues in London downtown area.

Number of different venue categories in London, United Kingdom
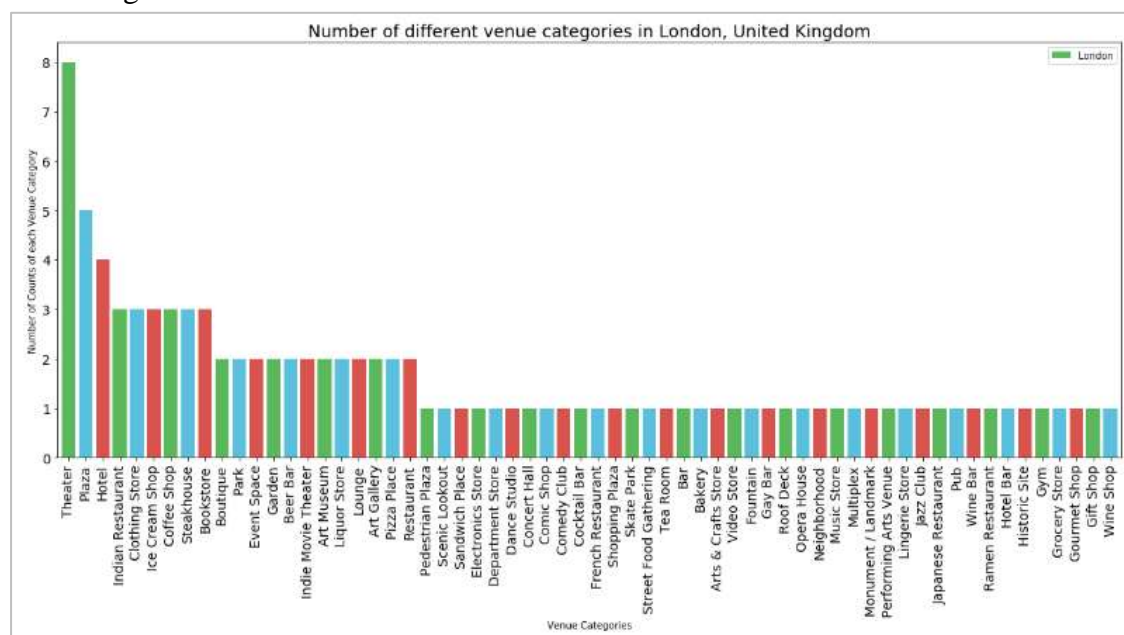
3. **NEW YORK CITY**: New York city is the most populous city of the United States. It has an estimated population of 8.3 million distributed over 302.6 square miles. New York is the most densely populated major cities of the United States. New York city is described as the cultural, financial and media city of the world. It is also the home of the head quarters of United Nations. New York is the important center for international diplomacy.

   Also the distribution of New York City is also similar to the Toronto city. The number of coffee shops are higher in the city. Some of the main features in the New York city downtown area are as follows:

   a. Coffee Shops are plenty across the New York city Downtown area, making almost 14% of all the venue categories.
   b. There are different cuisine and types of restaurants in New York which forms around 30% of all the venue categories. This is because there are many office locations in downtown area and the office professionals would need to have lunch and breakfast to work and network during the office time.
   c. Also there are many fast food centers in the downtown area. It forms around 20% of the total venue categories where the busy professionals can pick-up their meal quickly and can get back to business.
   d. The downtown area has also got 3 parks, 3 memorial and monument centers which shows the area has plenty of greenery and visiting spots to spend quality time and for introspection. The city is a good visiting spot.
   e. There are 6 Wine and Alcohol bars within the downtown area, which makes it an interesting spot to hang around within the city.
   f. There are plenty of shopping areas across entire downtown area which forms around 15% of the total shopping areas. These shopping area are for both men and women apparels.
   g. Apart from this the city downtown area has lot of health and fitness areas where there are Gymnasiums, Fitness centers and Spas.

   Following is the bar chart of the venues in the New York city area.

Number of different venue categories in New York City
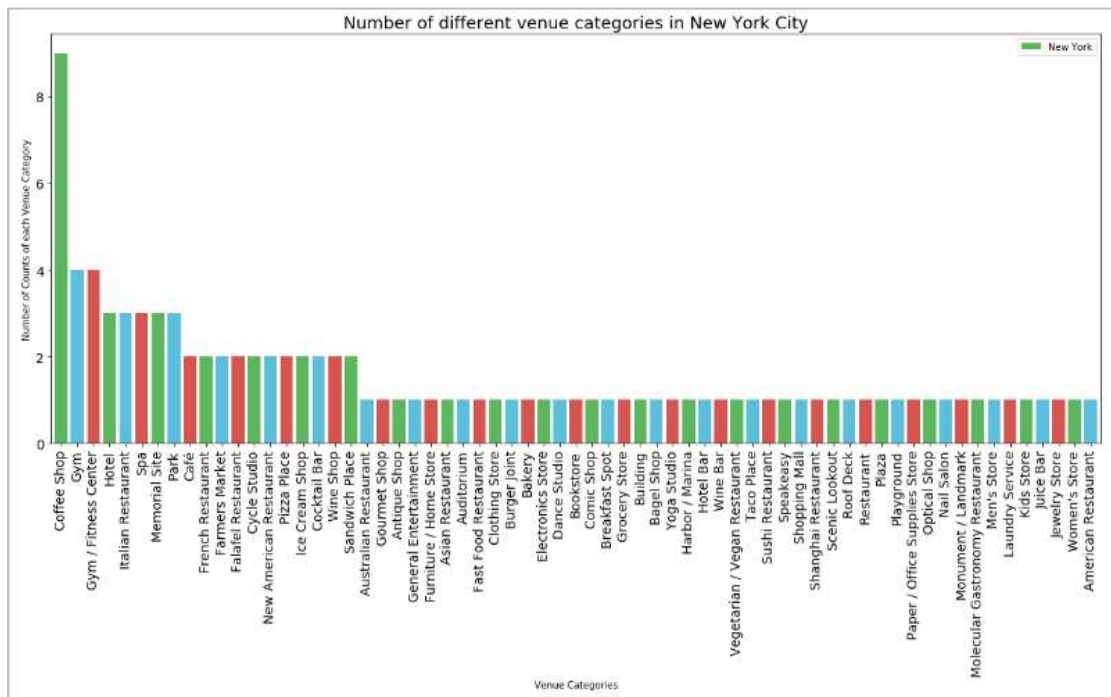
5. Discussion

Following is the discussion on the results. The discussion points out the similarities and dissimilarities among three major cities in the world.

1. The city of London has much more theatrical venues as London is more culturally enriched than the North American cities. The number art and culture centers are more in London. This makes the city more interesting for variety of entertainment and cultural activities.

Fig. 3A: The Cultural Centres in London, United Kingdom
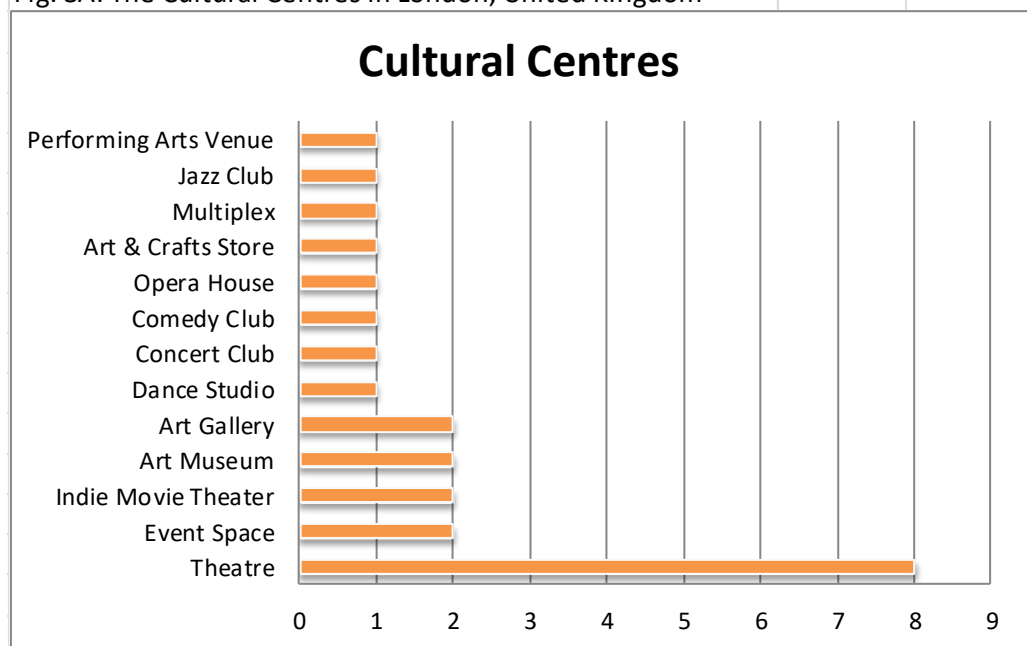
2. The parks are more in North American cities (like Toronto and New York City) than in London. The North American cities are more environment friendly than London, although there are not too much of difference. The North American cities are good place to relax and introspect.

Fig. 3B: Park/ Visit Cities			
	Toronto	**London**	**New York**
Parks	3	2	3
Others	7	8	7
Total	**10**	**10**	**10**

3. All the three cities have plenty of different cuisines to taste in variety of restaurants within the city. The three cities have variety of different cuisines and restaurants and eating out places. Though city of London has more number of bars than Toronto and new York. This shows that all these cities are good place for business activities and networking activities.

Fig. 3C: Restaurants and Bars			
	Toronto	**London**	**New York**
Restaurants	21	17	21
Bars	3	8	3
Total	**24**	**25**	**24**

4. Although all the three cities have same number of fast food outlets where the busy professionals can take away the foods without having to wait long enough for the food getting ready. However, NYC and Toronto have very high number of Coffee drinks which makes it interesting spots.

Fig. 3D: Coffee/ Drinks & Fast Foods			
	Toronto	**London**	**New York**
Coffee/ Drin	12	4	12
Fast Foods	11	11	11
Total	**23**	**15**	**23**

5. There is a wide array of shopping malls and groceries in all the three cities. It seems from fig 3E that the other shopping centers are far higher than the groceries. This makes the major cities interesting as professionals can easily shop in their nearby areas for some kind of gifts or for simply stress relieving.

Fig. 3E: Shopping Centres and Malls			
	Toronto	**London**	**New York**
Grocery	3	2	3
Others	18	22	18
Total	**21**	**24**	**21**

6. Conclusion

Based on the above results and discussion on the results, following conclusions can be made in choice of setting up branch office for the XYZ finance company.

1. The New York City and Toronto are very similar major cities. These cities have more professional outlook and business like environment. They are financial capitals of their respective countries.
2. London is also the financial capital of United Kingdom, but the downtown has more cultural oriented with lot of cultural activities. London is a old city with many old traditions. Although it has developed into a major business hub of Europe, but since the city is old, there are many things which are associated with the older times.
3. On the other hand, New York and Toronto are relatively new business cities with all the resources available to set up a branch office like restaurants, shopping malls, shops, parks, buildings etc. New York and Toronto compare to each other in terms of the resources available to the city.
4. Among New York and Toronto, the choice of Toronto is better because Toronto has lower property prices than New York. With lower property prices, the amenities are similar and the resources are same as New York city.
5. Moreover, Toronto and New York city has similar weather due to almost same geographical location.
6. So Toronto downtown is the best choice of setting up a new branch office of XYZ financial company.