The Battle of Neighbourhoods

New York vs Toronto

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1. Introduction

1.1 Problem statement

New York city and city of Toronto are very diverse and are the financial capitals of their respective countries. Both cities have very huge population and traffic. **Gold's Gym** International, Inc. is an American chain of international co-ed fitness is planning to open a gym in any of the New York and Toronto cities.

Comparing both the cities and their neighbourhoods to find the city with a smaller number of gyms would be helpful for setting up new gym in any one of the cities. This project aims at comparing the New York city and Toronto, to find the best city to set up **Gold's Gym**.

2. Data

2.1 Data Sources

Data is the deciding factor in the project to solve our problem statement. We can use the Four Square API to get the location data and related details. In addition to the API, we can do a web scrape of the related web pages to gather the required data.

2.2 Data Cleaning

Once the location data of both the cities is available in the JSON format from the Four Square API, we can convert the JSON data into the pandas data frame to perform the data manipulations. Pandas data frame would give the city neighbourhood details, existing gyms along with the latitudes and longitudes.

3. Methodology

New York:

- Downloaded the required data of neighbourhoods using:

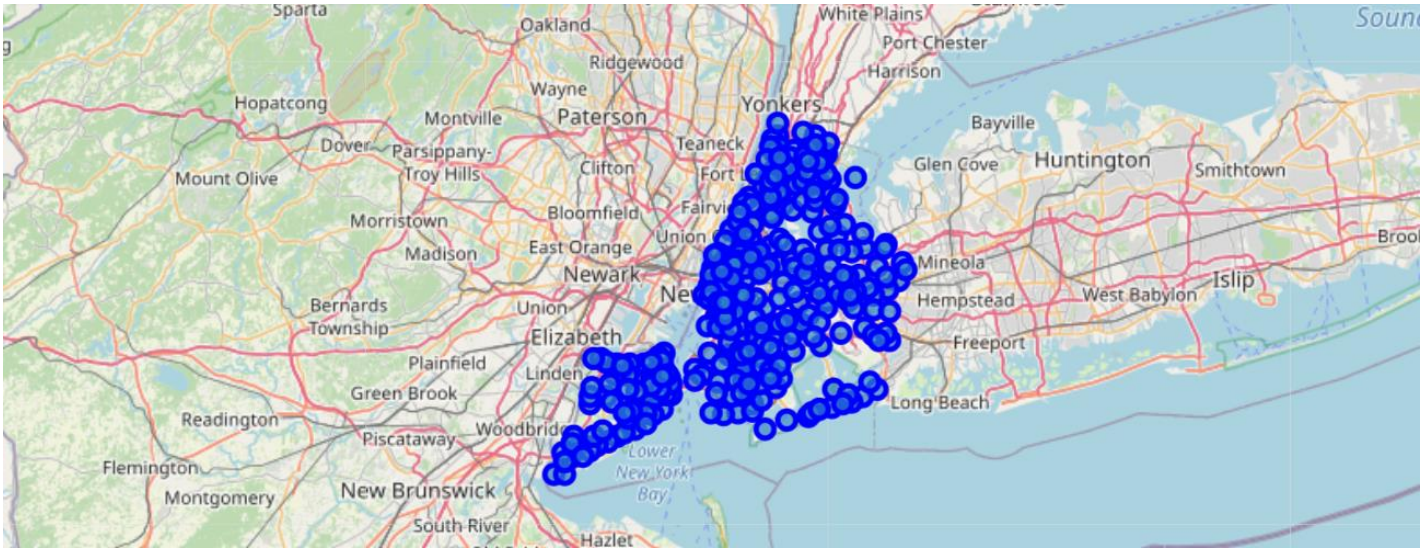
https://cfcoursesdata.s3.us.cloudobjectstorage.appdomain.cloud/IBMDeveloperSkillsNetwork-DS0701EN-SkillsNetwork/labs/newyork_data.json

- Transformed the data into pandas data frame as shown below:

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

- The New York data frame has 5 boroughs and 306 neighbourhoods.

- Using Folium, we have plotted a map graph of New York city:



- The geographical coordinate of New York City is 40.7127281, -74.0060152.
- Using Four Square API we can get to know the different venues around 500 meters in the New York city.

API:

'https://api.foursquare.com/v2/venues/explore?&client_id=BDWNVVEV5WKNK3P0DXIBX5IGDT4WANBVEDBWB0MLTE41BRTY&client_secret=K2AQNDDH3YCQ3SS5QFPJVKIQ2F0KMME2MVSKQVGNAME3CCZN&v=20180605&ll=40.7127281,-74.0060152&radius=500&limit=100'

- Output of the API is in JSON format:


```
{'meta': {'code': 200, 'requestId': '60047f4c720fd13177af2a26'},
 'response': {'suggestedFilters': {'header': 'Tap to show:',
   'filters': [{'name': 'Open now', 'key': 'openNow'},
    {'name': '$-$$$$', 'key': 'price'}]},
  'headerLocation': 'Downtown Manhattan',
  'headerFullLocation': 'Downtown Manhattan, New York',
  'headerLocationGranularity': 'neighborhood',
  'totalResults': 113,
  'suggestedBounds': {'ne': {'lat': 40.7172281045, 'lng': -74.00008952063419},
   'sw': {'lat': 40.7082280955, 'lng': -74.0119408793658}},
  'groups': [{'type': 'Recommended Places',
    'name': 'recommended',
    'items': [{'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
```


- Then converted into a pandas data frame:

	name	categories	lat	lng
0	The Bar Room at Temple Court	Hotel Bar	40.711448	-74.006802
1	The Beekman, A Thompson Hotel	Hotel	40.711173	-74.006702
2	Alba Dry Cleaner & Tailor	Laundry Service	40.711434	-74.006272
3	City Hall Park	Park	40.711893	-74.007792
4	Gibney Dance Center Downtown	Dance Studio	40.713923	-74.005661
5	The Wooly Daily	Coffee Shop	40.712137	-74.008395

- The obtained data frame has many venues with different categories like Hotel, Bar, Park, Coffee Shop etc. But we are looking for a venue category with **'Gym'.**

Toronto:

- Scraping the Wikipedia for the data of neighbourhoods using the URL:

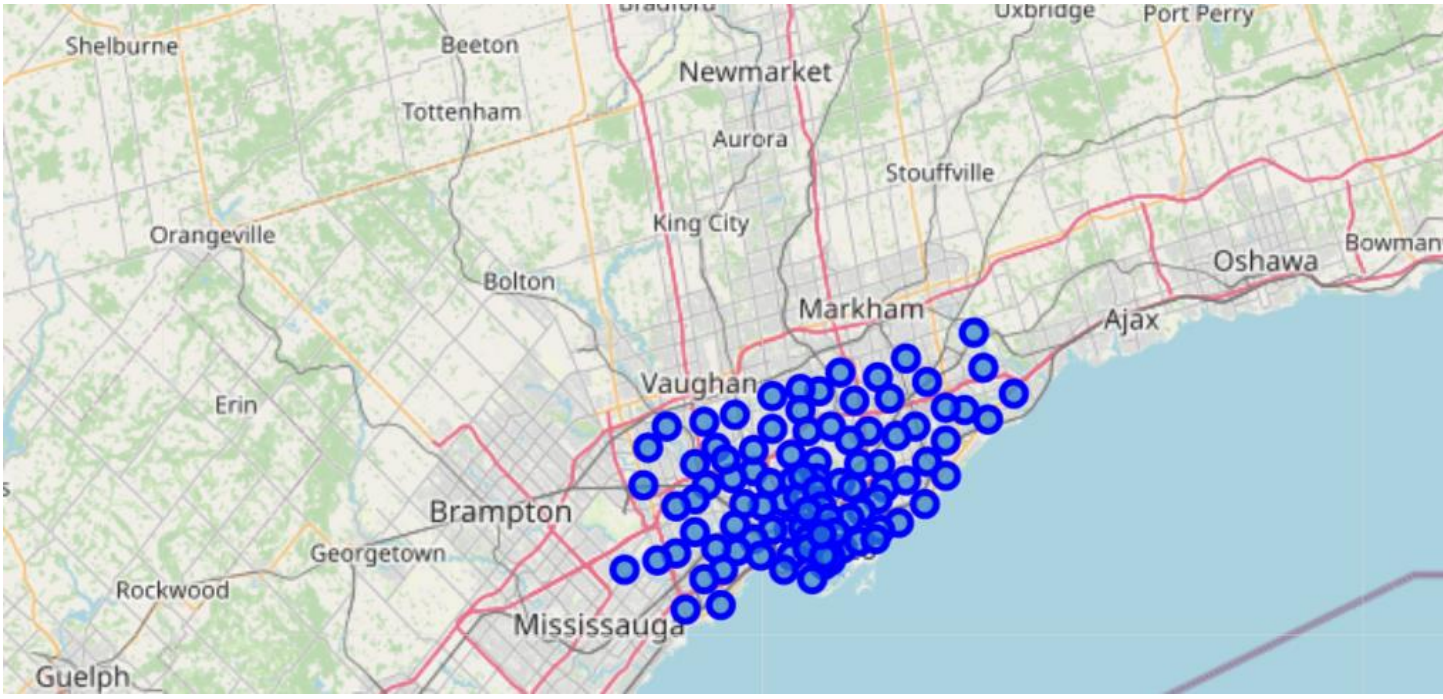
'https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M'

- Transformed the data into pandas data frame as shown below:

	Postcode	Borough	Neighbourhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494
5	M9A	Etobicoke	Islington Avenue, Humber Valley Village	43.667856	-79.532242

- The New York data frame has 10 boroughs and 103 neighbourhoods.

- Using Folium, we have plotted a map graph of Toronto city:



- The geographical coordinate of New York City is 43.6534817, -79.3839347.
- Using Four Square API we can get to know the different venues around 500 meters in the New York city.

API:

'https://api.foursquare.com/v2/venues/explore?&client_id=BDWNVVEV5WKNK3P0DXIBX5IGDT4WANBVEDBWB0MLTE41BRTY&client_secret=K2AQNDDH3YCQ3SS5QFPJVKIQ2F0KMME2MVSKQVGNAME3CCZN&v=20180605&ll=43.6534817,-79.3839347&radius=500&limit=100'

- Output of the API is in JSON format:


```
{'meta': {'code': 200, 'requestId': '60047f4d0070522c68a4b0b5'},
 'response': {'suggestedFilters': {'header': 'Tap to show:',
   'filters': [{'name': 'Open now', 'key': 'openNow'}]},
  'headerLocation': 'Bay Street Corridor',
  'headerFullLocation': 'Bay Street Corridor, Toronto',
  'headerLocationGranularity': 'neighborhood',
  'totalResults': 72,
  'suggestedBounds': {'ne': {'lat': 43.6579817045, 'lng': -79.37772678059432},
   'sw': {'lat': 43.6489816955, 'lng': -79.39014261940568}},
  'groups': [{'type': 'Recommended Places',
    'name': 'recommended',
    'items': [{'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '5227bb01498e17bf485e6202',
       'name': 'Downtown Toronto',
       'location': {'lat': 43.65323167517444,
```


- Then converted into a pandas data frame:

	name	categories	lat	lng
0	Downtown Toronto	Neighborhood	43.653232	-79.385296
1	Nathan Phillips Square	Plaza	43.652270	-79.383516
2	Japango	Sushi Restaurant	43.655268	-79.385165
3	Poke Guys	Poke Place	43.654895	-79.385052
4	Indigo	Bookstore	43.653515	-79.380696
5	Chatime 日出茶太	Bubble Tea Shop	43.655542	-79.384684

- The obtained data frame has many venues with different categories like Hotel, Bar, Park, Coffee Shop etc. But we are looking for a venue category with **'Gym'.**

4. Results

New York vs Toronto data results table:

City	Total Venues in 500 meters radius	Number of Gyms
New York	100	3
Toronto	72	0

5. Observations and Recommendations

1. New York city has the highest density with 5 boroughs and 306 neighbourhoods
2. Toronto has only 10 boroughs and 103 neighbourhoods.
3. There are around 100 different venues like coffee shops, hotels, restaurants in New York city around 500 meters radius.
4. There are around 72 different venues like coffee shops, hotels, restaurants in Toronto city around 500 meters radius.
5. Among the venues there are 3 gyms located in New York city around 500 meters radius.
6. Among the venues there are 0 gyms located in Toronto city around 500 meters radius.

6. Conclusion

Based on the observations and results it's clear that Toronto city is the best choice to set up the new Gold's Gym as there are no gyms in 500 meters city radius.