Compare the neighborhoods of two cities of New York and Toronto.

Background:

The City of New York, usually called either New York City (NYC) or simply New York (NY), is the most populous city in the United States. With an estimated 2018 population of 8,398,748 distributed over a land area of about 302.6 square miles (784 km2), New York is also the most densely populated major city in the United States. A global power city, New York City has been described as the cultural, financial, and media capital of the world, and exerts a significant impact upon commerce, entertainment, research, technology, education, politics, tourism, art, fashion, and sports.

Toronto is the provincial capital of Ontario and the most populous city in Canada, with a population of 2,731,571 in 2016. Current to 2016, the Toronto census metropolitan area (CMA), of which the majority is within the Greater Toronto Area (GTA), held a population of 5,928,040, making it Canada's most populous CMA. Its economy is highly diversified with strengths in technology, design, financial services, life sciences, education, arts, fashion, business services, environmental innovation, food services, and tourism.

Problem:

New York City and the city of Toronto are financial capitals of their respective countries of USA and Canada. Both of the city host multi-cultural environments.
New York and Toronto are huge cities. We are going to use data to find out how similar or dissimilar they are to each other. This information is going to be useful for anyone who plans on visiting or living in these cities.

Data acquisition

Data Sources

These two cities are huge and the number of factors/features that can be compared between them are too many. We are going to limit the number of data point that we are going to use. We will use sources like rent jungle to scrap of average rental information in these two cities.
But we will be primarily using Foursquare for getting the location information of venues (features).
We will use some or all of these features. The features we are shortlisting are

- Monument / Landmark
- Theaters / art galleries
- Coffee
- Food
- Parks / Trails
- Nightlife

Here are the data and its sources that would be used in this solution.

1. **Neighborhood information:** For base map and location.

    a. **Toronto**
    Source: For the Toronto neighborhood data, a Wikipedia page exists that has all the information we need to explore and cluster the neighborhoods in Toronto. We will scrape the Wikipedia page and wrangle the data, clean it, and then read it into a pandas dataframe.
    The below diagram shows Neighborhood data and coordinates information merged together.

	PostalCode	Borough	Neighborhood	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	Harbourfront,Regent Park	43.654260	-79.360636
3	M6A	North York	Lawrence Heights,Lawrence Manor	43.718518	-79.464763
4	M7A	Queen's Park	Queen's Park	43.662301	-79.389494

    (sample data)

    b. **New York city**
    Source: The 5 boroughs and the neighborhoods that exist in each borough as well as the latitude and longitude coordinates of each neighborhood.
    This dataset exists for free on the web. here is the link to the dataset:
    https://geo.nyu.edu/catalog/nyu_2451_34572

	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

(sample data)

2. **Foursquare Data:**
   We make calls to the Foursquare API for this purpose of getting feature information. We will URL to send a request to the API to search for a specific type of venues like, to explore each particular venue (Monument / Landmark, Theaters / art galleries, Coffee, Food, Parks / Trails and Nightlife. Also, we will use the visualization library, Folium, to visualize the results.
   For example:
   Shown below is the sample dataset for venue of Monument / Landmark for both New York and Toronto respectively.
   a. **New York**

	name	categories	address	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country
0	Nathan Hale Monument	Monument / Landmark	City Hall Park	40.712010	-74.005686	[{'label': 'display', 'lat': 40.71201038109373...	84	10007	US	New York	NY	United States
1	African Burial Ground National Monument	Monument / Landmark	290 Broadway	40.714990	-74.005530	[{'label': 'display', 'lat': 40.71498975306652...	255	10007	US	New York	NY	United States
	Mirman.		291									

(sample data)

   b. **Toronto city**

	name	categories	lat	lng	labeledLatLngs	distance	cc	country	formattedAddress	address	crossStreet	city	state
1	Sir Adam Beck Monument	Other Great Outdoors	43.651011	-79.387152	[{'label': 'display', 'lat': 43.65101102690917...	328	CA	Canada	[250 University Ave (Queen St), Toronto ON, Ca...	250 University Ave	Queen St	Toronto	ON
2	Landmark Jewellery	Jewelry Store	43.647640	-79.382905	[{'label': 'display', 'lat': 43.64764, 'lng': ...	784	CA	Canada	[121 King St W, Concourse/underground (King An...	121 King St W, Concourse/underground	King And York	Toronto	ON
3	Egerton Ryerson Monument	Monument / Landmark	43.657864	-79.378758	[{'label': 'display', 'lat': 43.65786400153166...	807	CA	Canada	[Toronto ON, Canada]	NaN	NaN	Toronto	ON

(sample data)

3. **Average rental information:**
   Source: The data for rents of 1bedroom, 2 bedroom and 3-bedroom averages are available on rentjungle.com. The data for Toronto is limited to few years when compared with New York city. So we will only use data for year that are available for both cities.

https://www.rentjungle.com/average-rent-in-toronto-rent-trends/
https://www.rentjungle.com/average-rent-in-new-york-rent-trends/

Toronto

Month	All Beds	1 Beds	2 Beds
4/2016	1,338	1,295	1,561
5/2016	1,336	1,325	1,541
6/2016	1,339	1,260	1,530
7/2016	1,339	1,268	1,493
8/2016	1,336	1,233	1,489
9/2016	1,325	1,221	1,502
10/2016	1,317	1,248	1,414
11/2016	1,319	1,252	1,403
12/2016	1,362	1,253	1,571
1/2017	1,320	1,233	1,489
2/2017	1,296	1,224	1,489
3/2017	1,311	1,265	1,448
4/2017	1,328	1,276	1,470
5/2017	1,351	1,251	1,495

New York City

Month	All Beds	1 Beds	2 Beds
4/2016	3,224	2,832	3,618
5/2016	3,248	2,852	3,646
6/2016	3,262	2,848	3,631
7/2016	3,271	2,852	3,653
8/2016	3,253	2,834	3,635
9/2016	3,226	2,837	3,619
10/2016	3,208	2,829	3,618
11/2016	3,111	2,747	3,522
12/2016	3,064	2,700	3,469
1/2017	3,076	2,698	3,461
2/2017	3,073	2,698	3,457
3/2017	3,061	2,711	3,454
4/2017	3,074	2,732	3,510
5/2017	3,109	2,765	3,516

(sample data)