

A low-angle, upward-looking photograph of several modern skyscrapers with glass facades, reaching towards a bright blue sky with scattered white clouds. The perspective creates a sense of height and scale, with the buildings' lines converging towards the top of the frame.

Similarity between Downtown, Toronto and Manhattan from a Tourist point of view

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Introduction

- Goal: To determine how similar Downtown Toronto, Canada and Manhattan, New York are when it comes to tourism.
- It will
 - ✓ Assist tourists by providing them with the information needed to travel, comparing two place.
 - ✓ Help them make a decision depending on their choice or priority.

Data Acquisition and Cleaning

- For Downtown Toronto, we will web scrape city data from https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
- For Manhattan, New York city data available at https://geo.nyu.edu/catalog/nyu_2451_34572.

Exploratory Data Analysis

- Extract Data of Toronto from Wikipedia and New York from the New York University webpage.
- Combine neighborhoods of each dataframe that have the same geographical coordinates at each borough and sorted against the concerned borough.
- Use Foursquare API for data verification and to get the coordinates of Downtown Toronto and explore its neighborhoods.
- Characterize the neighborhoods as venues and venue categories.

Methodology

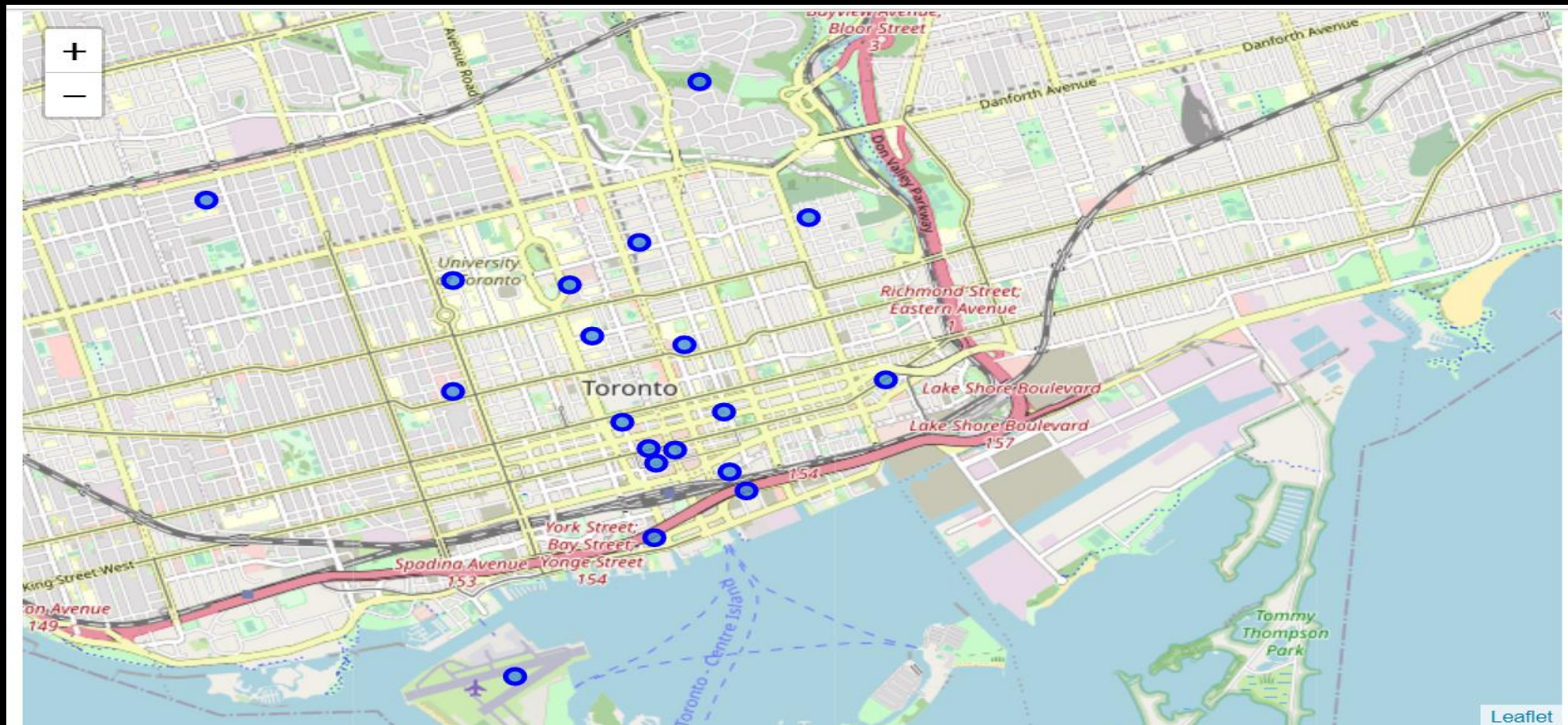
- Focus on Manhattan, New York, and Downtown Toronto from data extracted using the webpages and the Foursquare API services.
- K-means Clustering machine learning algorithm to compare the two places Manhattan, New York, and Downtown, Toronto, and find the similarities.
- One hot encoding is used to calculate the mean of each neighborhood's frequency of occurrence in Downtown Toronto and Manhattan to measure the foot traffic in these places.

Downtown Toronto Before Clustering

```
[8]: # create map of Toronto using latitude and longitude values
map_downtown_toronto = folium.Map(location=[latitude_Downtown_Toronto, longitude_Downtown_Toronto], zoom_start=10)
# add markers to map

for lat, lng, label in zip(downtown_toronto_data['Latitude'], downtown_toronto_data['Longitude'], downtown_toronto_data['Neighbourhood']):
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=5,
        popup=label,
        color='blue',
        fill=True,
        fill_color='#3186cc',
        fill_opacity=0.7,
        parse_html=False).add_to(map_downtown_toronto)
map_downtown_toronto
```

Downtown Toronto Before Clustering



Downtown Toronto After Clustering

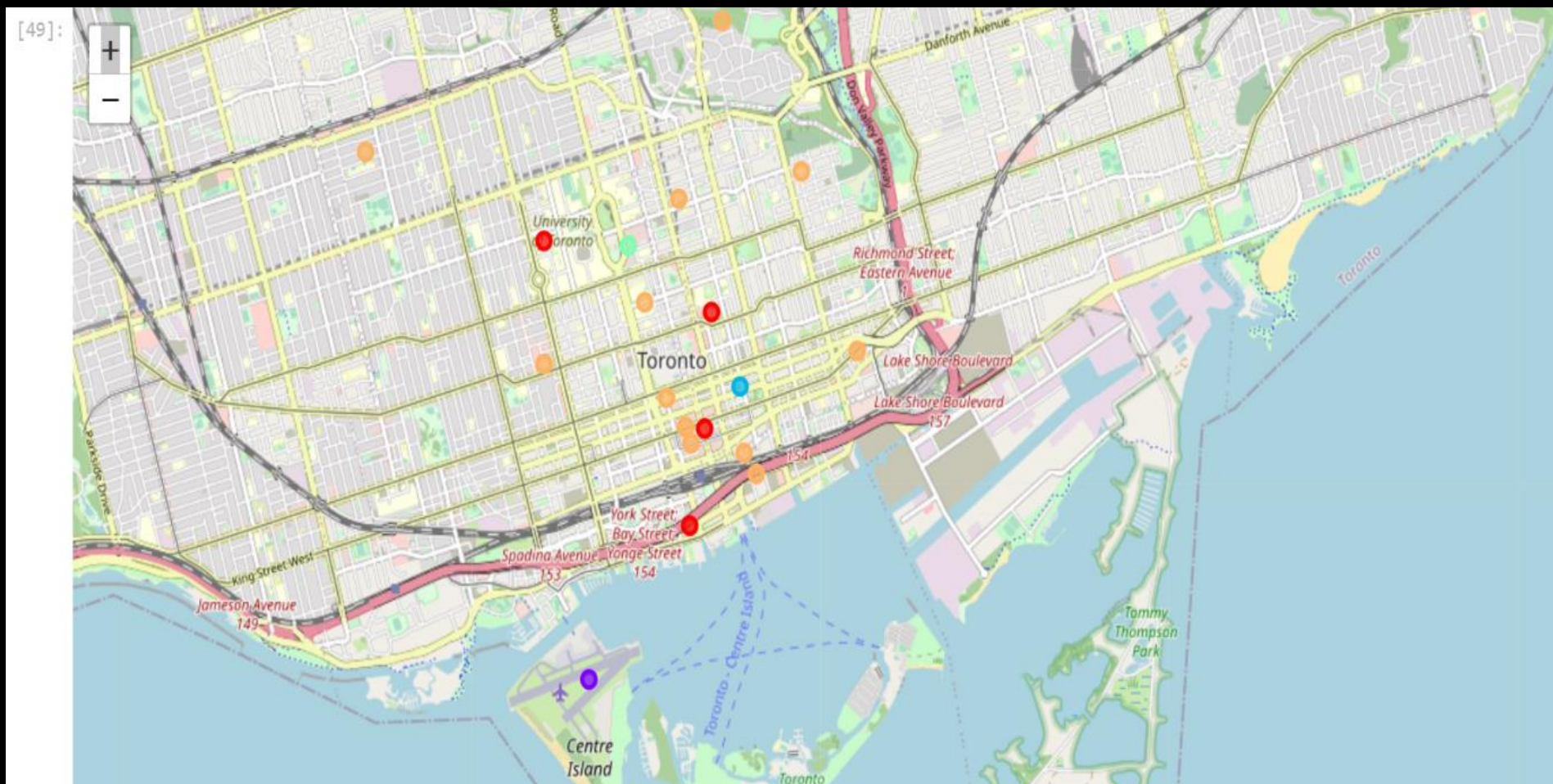
```
[49]: # create map
map_clusters = folium.Map(location=[latitude_Downtown_Toronto, longitude_Downtown_Toronto], zoom_start=11)

# set color scheme for the clusters
x = np.arange(kclusters)
ys = [i+x*(i*x)**2 for i in range(kclusters)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

# add markers to the map
markers_colors = []
for lat, lon, poi, cluster in zip(downtown_toronto_merged['Latitude'], downtown_toronto_merged['Longitude'], downtown_toronto_merged['Neighbourhood'], d
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=True)
    folium.CircleMarker(
        [lat, lon],
        radius=5,
        popup=label,
        color=rainbow[cluster-1],
        fill=True,
        fill_color=rainbow[cluster-1],
        fill_opacity=0.7).add_to(map_clusters)

map_clusters
```


Downtown Toronto after Clustering



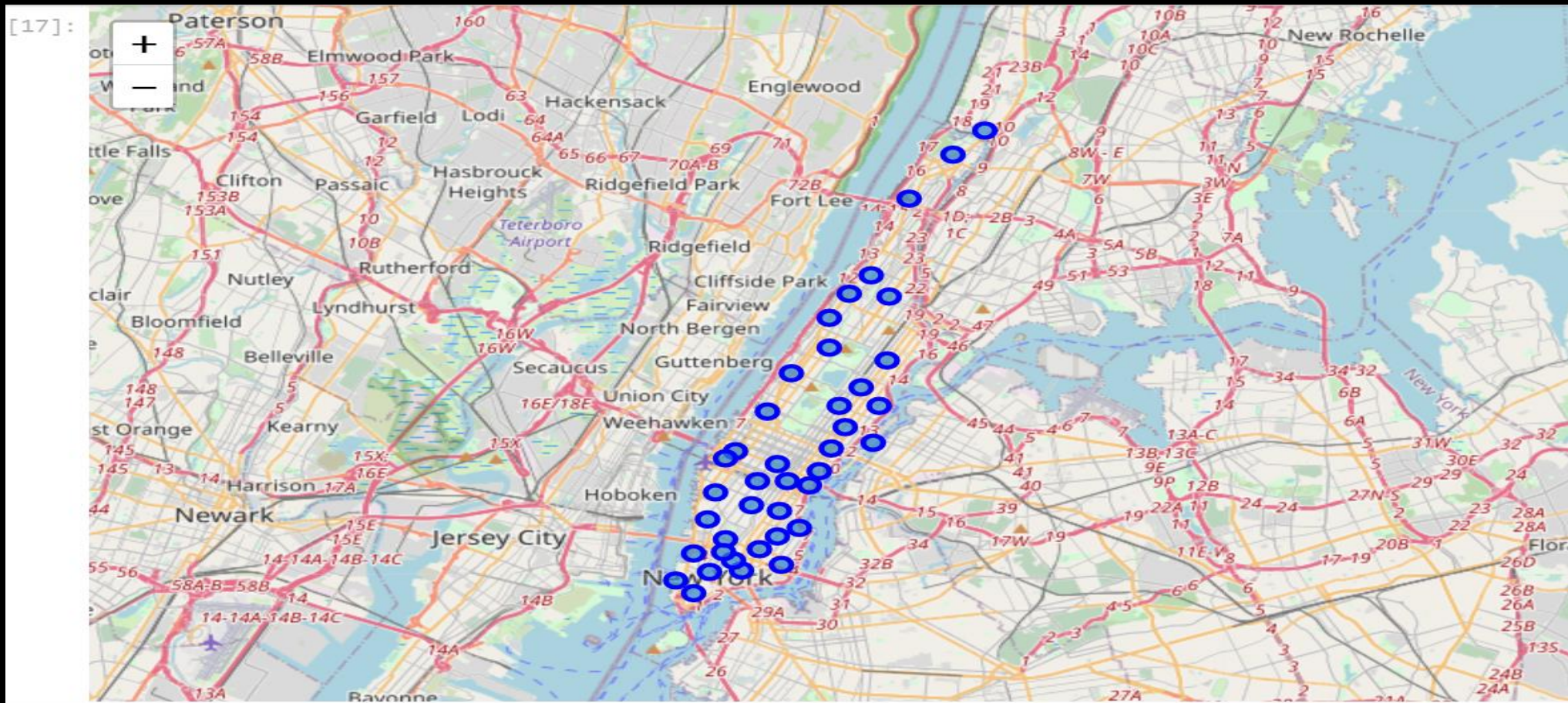
Manhattan Before Clustering

```
[17]: # create map of Manhattan using latitude and longitude values
map_manhattan = folium.Map(location=[latitude_Manhattan, longitude_Manhattan], zoom_start=11)

# add markers to map
for lat, lng, label in zip(manhattan_data['Latitude'], manhattan_data['Longitude'], manhattan_data['Neighborhood']):
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=5,
        popup=label,
        color='blue',
        fill=True,
        fill_color='#3186cc',
        fill_opacity=0.7,
        parse_html=False).add_to(map_manhattan)

map_manhattan
```


Manhattan Before Clustering



Manhattan After Clustering

```
[67]: # create map
map_clusters = folium.Map(location=[latitude_Manhattan, longitude_Manhattan], zoom_start=11)

# set color scheme for the clusters
x = np.arange(kclusters)
ys = [i+x+(i*x)**2 for i in range(kclusters)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

# add markers to the map
markers_colors = []
for lat, lon, poi, cluster in zip(manhattan_merged['Latitude'], manhattan_merged['Longitude'], manhattan_merged['Neighborhood'], manhattan_merged['Cluster']):
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=True)
    folium.CircleMarker(
        [lat, lon],
        radius=5,
        popup=label,
        color=rainbow[cluster-1],
        fill=True,
        fill_color=rainbow[cluster-1],
        fill_opacity=0.7).add_to(map_clusters)

map_clusters
```


Results

- Downtown Toronto and Manhattan, New York both the places have venues that tourists would be attracted to explore.
- The neighborhoods are similar to venues like Theaters, opera houses, food places, clubs, museums, parks, etc.
- The only dissimilarity is that their unique historical places and monuments.

Observations

- Downtown Toronto has Historical places and Airport facilities, a harbor, a Sculpture garden, and ferry services.
- Manhattan has monument or landmark venues, Nightlife, Climbing gym, and Museums.

Recommendation

Downtown Toronto will be a tourist's priority to visit. This is because the airport facility is available in Downtown Toronto which saves time but also saves money.

Conclusion

Downtown Toronto and Manhattan neighborhoods have similar venues except the historical venues which are unique.

Thank you