Comparison of London, Toronto and New York

How similar they are?

- *We have already explored the neighborhoods of New York and Toronto previously, it's natural to ask how similar they are and how similar other global city is to them*

- *Comparison of these three cities would deepen our knowledge of Toronto and New York, as well as provide us a chance to know London*

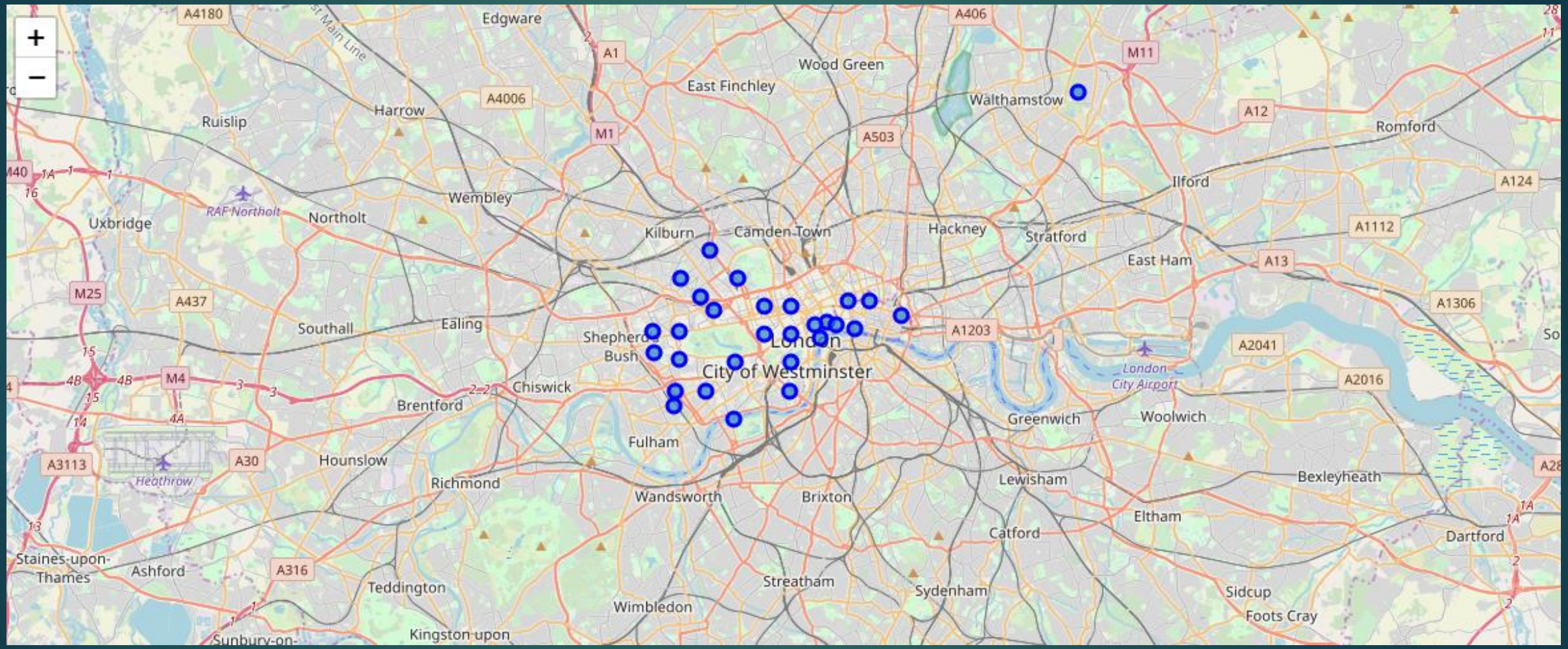
Data: Data Source

- *Information about the neighborhoods of London will be scraped from https://en.wikipedia. org/wiki/List_of_areas_of_London#Sub-districts*
- *Geographical coordinates of London Neighborhoods will be obtained using OsGridConverter.*
- *Venues near the neighborhoods will be obtained using Foursquare API.*
- *Information about neighborhoods in New York will be imported from Neighborhood Analysis of New York, lab notebook of this course to explore the neighborhoods in New York.*
- *Information about neighborhoods in Toronto will be imported from Neighborhood Clustering of Toronto, notebook of the week 3 assignment of this course to explore the neighborhoods in Toronto.*

Data: Data Acquisition and Processing

- *Scrape table containing the information of neighborhoods in London was from https://en.wikipedia.org/wiki/List_of_areas_of_London#Sub-districts*
- *Transform this Table into dataframe*
- *Obtain the latitude and longitude of each neighborhood using package OSGridConverter and added to our dataframe*

Data: London Neighborhood Analysis



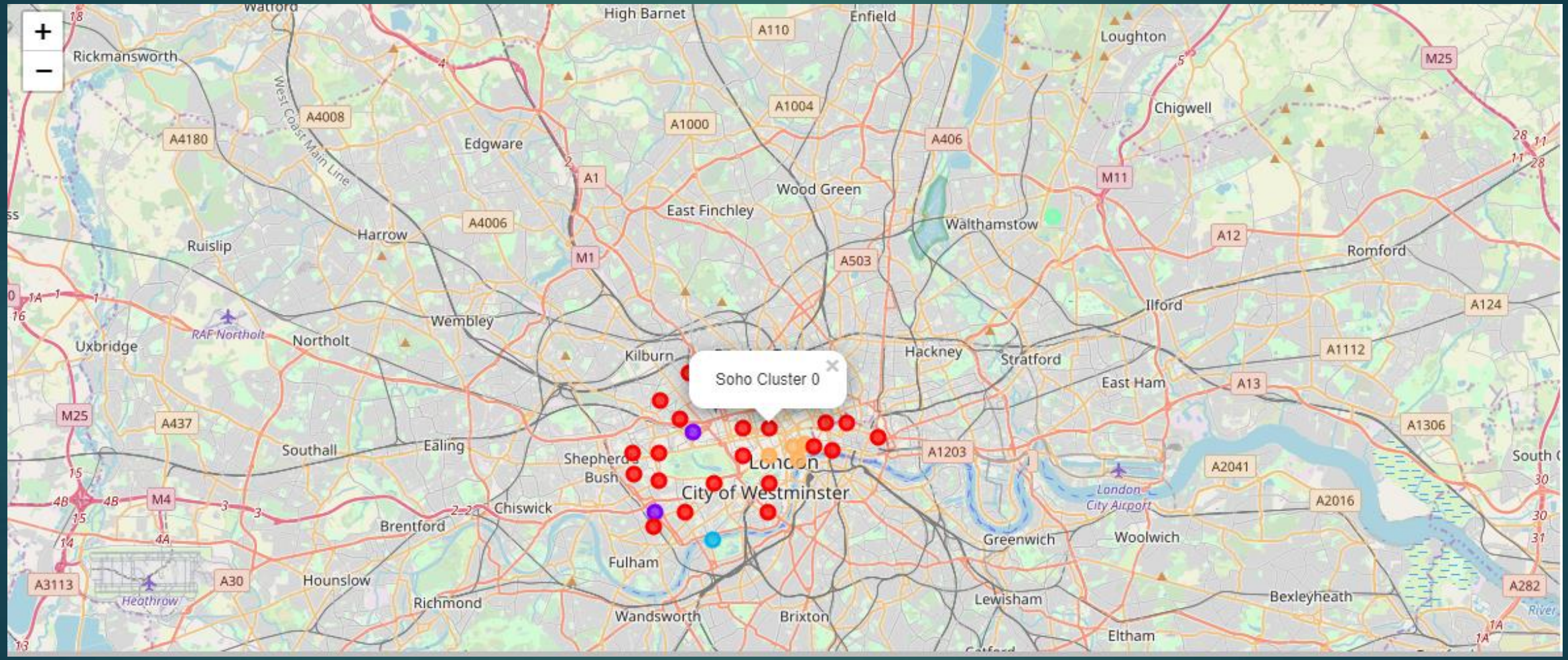
The neighborhood of London

Data: London Neighborhood Analysis

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Aldgate	Coffee Shop	Hotel	Pub	Salad Place	Cocktail Bar	Indian Restaurant	Thai Restaurant	Italian Restaurant	Japanese Restaurant	Sushi Restaurant
1	Aldwych	Theater	Coffee Shop	Hotel	Dessert Shop	Tea Room	Burger Joint	Restaurant	Pub	Bakery	History Museum
2	Barbican	Coffee Shop	Food Truck	Gym / Fitness Center	Hotel	Sushi Restaurant	Art Gallery	Turkish Restaurant	Vietnamese Restaurant	Indie Movie Theater	Concert Hall
3	Bayswater	Pub	Coffee Shop	Grocery Store	Greek Restaurant	Chinese Restaurant	Hotel	Yoga Studio	Thai Restaurant	Italian Restaurant	Gym / Fitness Center
4	Belgravia, Brompton, Knightsbridge	Boutique	Café	Italian Restaurant	Hotel	Coffee Shop	Clothing Store	Japanese Restaurant	Jewelry Store	Shoe Store	Tea Room

Top 10 venues of London neighborhoods

Data: London Neighborhood Analysis



Labeled neighborhoods of London

Data: London Neighborhood Analysis

Cluster 2

```
lon_merged.loc[lon_merged['Cluster Labels'] == 1, lon_merged.columns[[0] + list(range(5, lon_merged.shape[1]))]]
```

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
10	Earls Court	1	Hotel	Café	Pizza Place	Pub	Grocery Store	Garden	Burger Joint	Chinese Restaurant	Thai Restaurant	Lebanese Restaurant
14	Lisson Grove	1	Café	Hotel	Flower Shop	Pub	Hookah Bar	Coffee Shop	Thai Restaurant	Grocery Store	Lake	Snack Place
21	Paddington	1	Hotel	Café	Coffee Shop	Italian Restaurant	Pub	Sandwich Place	Indian Restaurant	Grocery Store	Beer Bar	Thai Restaurant

Cluster 4

```
lon_merged.loc[lon_merged['Cluster Labels'] == 3, lon_merged.columns[[0] + list(range(5, lon_merged.shape[1]))]]
```

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
8	Chinatown, Snaresbrook	3	Home Service	Construction & Landscaping	Lounge	Athletics & Sports	Flea Market	Falafel Restaurant	Farmers Market	Fast Food Restaurant	Fish & Chips Shop	Flower Shop

Some of neighborhood clusters in London

Data: London Neighborhood Analysis - Defining Categories of Clusters

- *Cluster 1: coffee shop, pub and hotel*
- *Cluster 2: hotel, cafe, pub*
- *Cluster 3: pub, garden, gym/ fitness center*
- *Cluster 4: home service, construction landscaping, lounge*
- *Cluster 5: theater*

Methodology

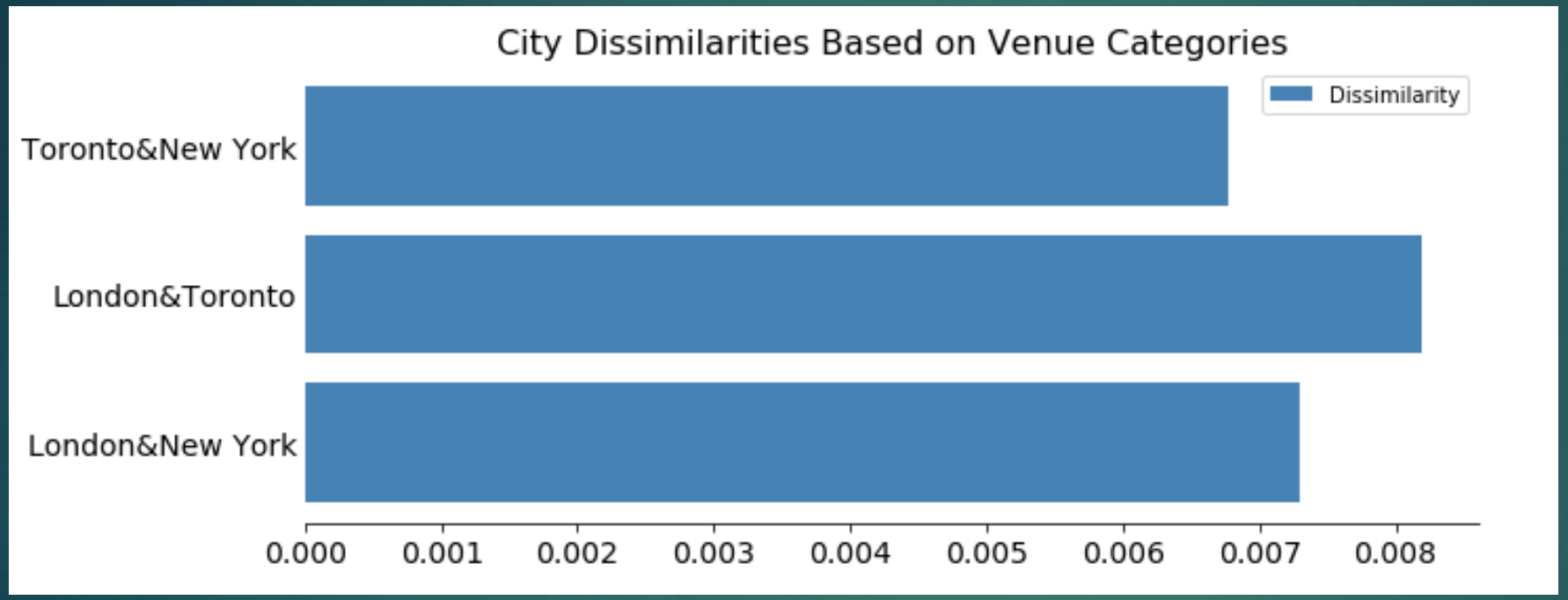
- *Calculate city dissimilarity based on venue category frequency:*

$$DF = (vf1 - vf2) \cdot (vf1 - vf2)$$

- *Use the square of Euclidian distance between the proportion of each type of cluster of city to represent the dissimilarity:*

$$DP = (vp1 - vp2) \cdot (vp1 - vp2)$$

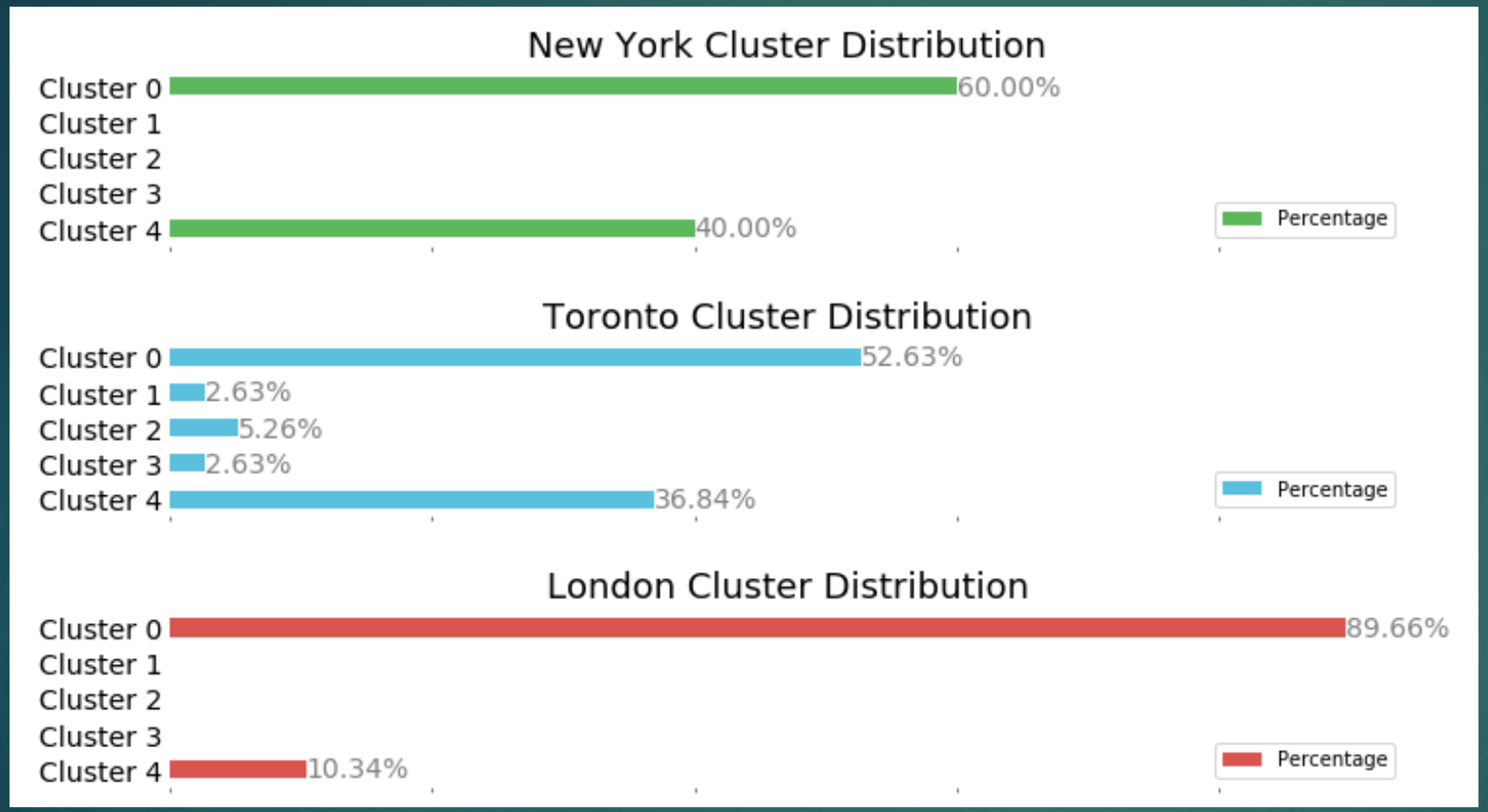
Analysis



Dissimilarity based on frequency of venue categoty

Similarity order: T.O.&NYC > LDN&NYC > LDN&T.O.

Analysis

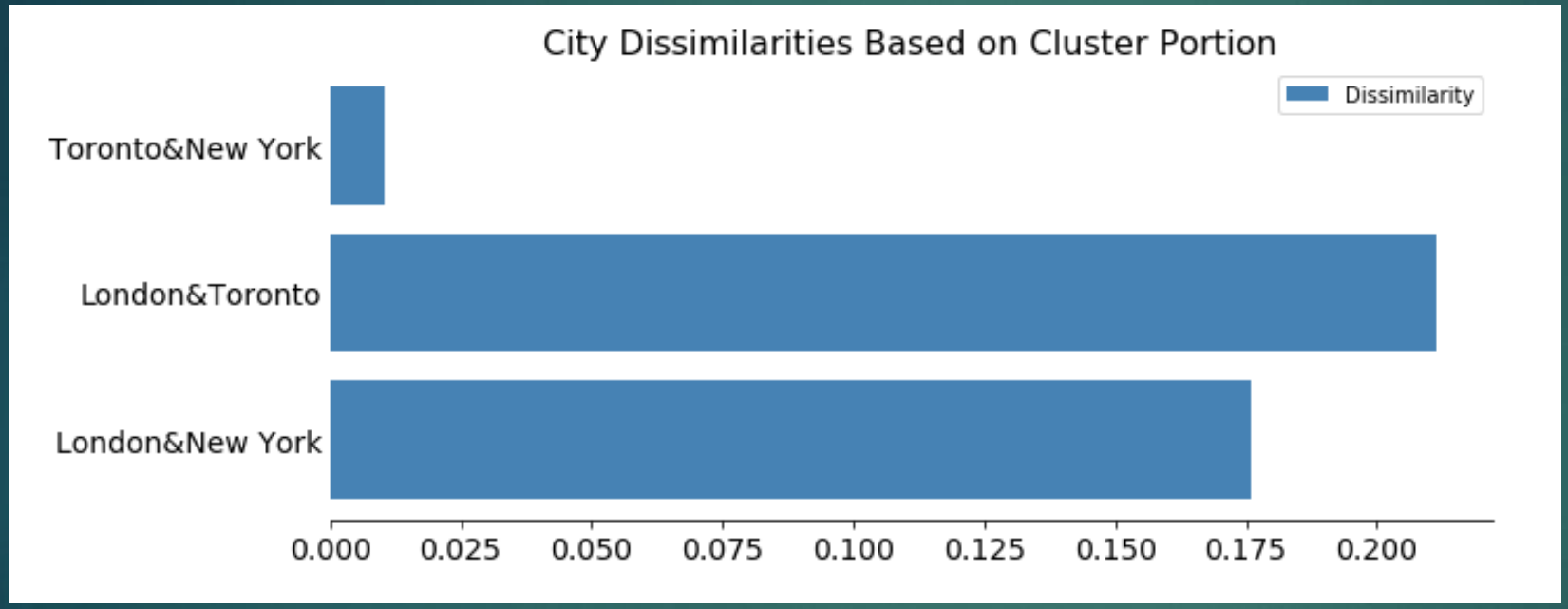


Cluster distribution in the three cities

Similarity Order:

T.O.&NYC > LDN&NYC > LDN&T.O.

Analysis



City dissimilarity based on cluster proportion

Similarity order:
T.O.&NYC
>
LDN&NYC
>
LDN&T.O.

Results and Discussion

- *Based on venue category frequency, dissimilarities between these cities are 0.00729 for London and New York, 0.00819 for London and Toronto, and 0.00676 for Toronto and New York => Toronto and New York are most similar, followed by London and New York, and the least similar pair would be London and Toronto*

- *Based on Cluster proportion, dissimilarities between these cities are 0.176 for London and New York, 0.211 for London and Toronto, and 0.011 for Toronto and New York => Toronto and New York are most similar, followed by London and New York, and the least similar pair would be London and Toronto*

Conclusion and Outlook

- *Conclusion : Toronto and New York are most similar, followed by London and New York, and the least similar pair would be London and Toronto*

- *Outlook 1: Conduct research in the whole neighborhoods of these cities*
- *Outlook 2: Compare these cities from other perspectives, such as criminal rate of neighborhood*