Young Population And Venues Data: Analysis Of Toronto City

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FOR THE PURPOSE OF IBM CAPSTONE PROJECT

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Neighbourhoods (geojson file) loaded using geopandas lib

	_id	AREA_ID	AREA_ATTR_ID	PARENT_AREA_ID	AREA_SHORT_CODE	AREA_LONG_CODE	AREA_NAME	AREA_DESC	X	Y	LONGITUDE	LATIT
0	8961	25886861	25926662	49885	94	94	Wychwood (94)	Wychwood (94)	None	None	-79.425515	43.67
1	8962	25886820	25926663	49885	100	100	Yonge-Eglinton (100)	Yonge-Eglinton (100)	None	None	-79.403590	43.70
2	8963	25886834	25926664	49885	97	97	Yonge-St.Clair (97)	Yonge-St.Clair (97)	None	None	-79.397871	43.68
3	8964	25886593	25926665	49885	27	27	York University Heights (27)	York University Heights (27)	None	None	-79.488883	43.76
4	8965	25886688	25926666	49885	31	31	Yorkdale-Glen Park (31)	Yorkdale-Glen Park (31)	None	None	-79.457108	43.71

Neighbourhoods (geojson file) cleaned to

|	Neighbourhood	Longitude	Latitude	Geometry
0	Yorkdale-Glen Park (31)	-79.457108	43.714672	POLYGON ((-79.43969 43.70561, -79.44011 43.705...
1	York University Heights (27)	-79.488883	43.765736	POLYGON ((-79.50529 43.75987, -79.50488 43.759...
2	Yonge-St.Clair (97)	-79.397871	43.687859	POLYGON ((-79.39119 43.68108, -79.39141 43.680...
3	Yonge-Eglinton (100)	-79.403590	43.704689	POLYGON ((-79.41096 43.70408, -79.40962 43.704...
4	Wychwood (94)	-79.425515	43.676919	POLYGON ((-79.43592 43.68015, -79.43492 43.680...

Neighbourhoods census csv file loaded using pandas

	_id	Category	Topic	Data Source	Characteristic	City of Toronto	Agincourt North	Agincourt South-Malvern West	Alderwood	Annex	...	Willowdale West	Willowridge-Martingrove-Richview	Wobu
0	1	Neighbourhood Information	Neighbourhood Information	City of Toronto	Neighbourhood Number	NaN	129	128	20	95	...	37	7	1
1	2	Neighbourhood Information	Neighbourhood Information	City of Toronto	TSNS2020 Designation	NaN	No Designation	No Designation	No Designation	No Designation	...	No Designation	No Designation	N
2	3	Population	Population and dwellings	Census Profile 98-316-X2016001	Population, 2016	2,731,571	29,113	23,757	12,054	30,526	...	16,936	22,156	53,4
3	4	Population	Population and dwellings	Census Profile 98-316-X2016001	Population, 2011	2,615,060	30,279	21,988	11,904	29,177	...	15,004	21,343	53,3
4	5	Population	Population and dwellings	Census Profile 98-316-X2016001	Population Change 2011-2016	4.50%	-3.90%	8.00%	1.30%	4.60%	...	12.90%	3.80%	0.3

Created Neighbourhoods population profile for (0-24 year olds) using loaded data

	Neighbourhood	Population density per square kilometre	Land area in square kilometres	Children (0-14 years)	Youth (15-24 years)	Children + Youth (0-24 years)	Population density (0-24 years) in sq.Km
0	Yorkdale-Glen Park (31)	2451	6.04	1960	1870	3830	634
1	York University Heights (27)	2086	13.23	4045	4750	8795	665
2	Yonge-St.Clair (97)	10708	1.17	1210	920	2130	1821
3	Yonge-Eglinton (100)	7162	1.65	1800	1225	3025	1833
4	Wychwood (94)	8541	1.68	1860	1320	3180	1893

Neighbourhoods mapped with circle markers
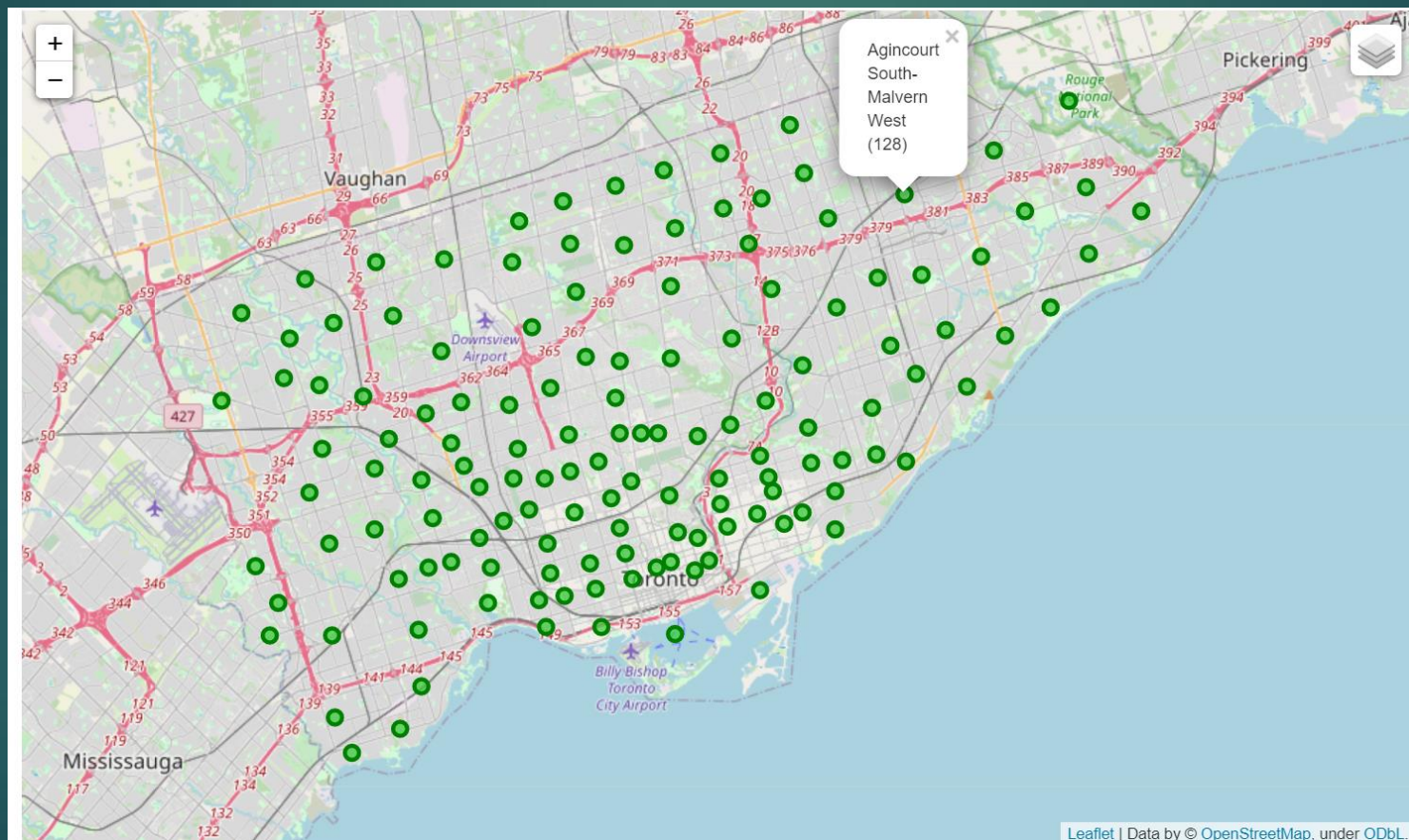
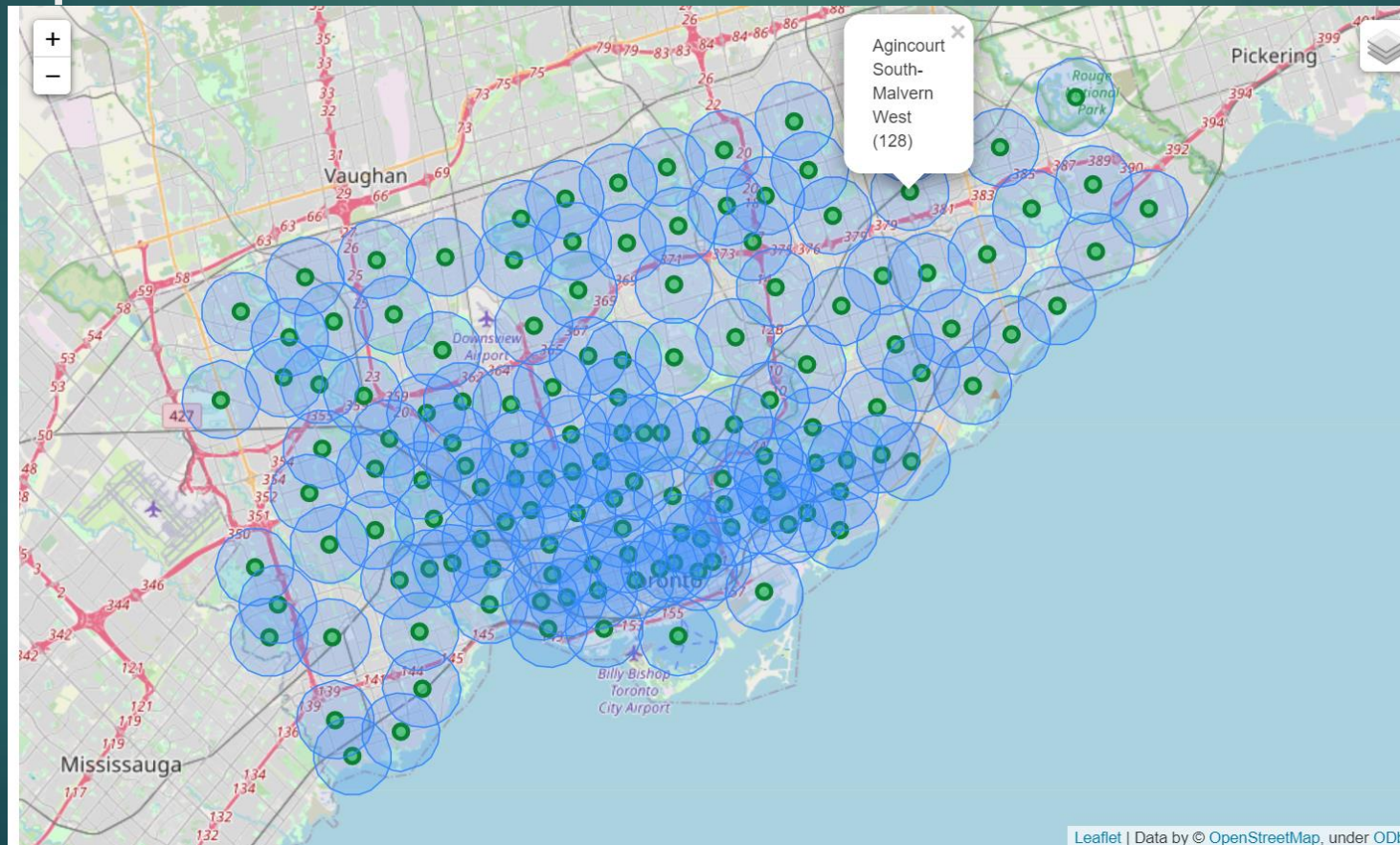# Neighbourhood radial zone of 1.5 Km explored for venues using Foursquares API

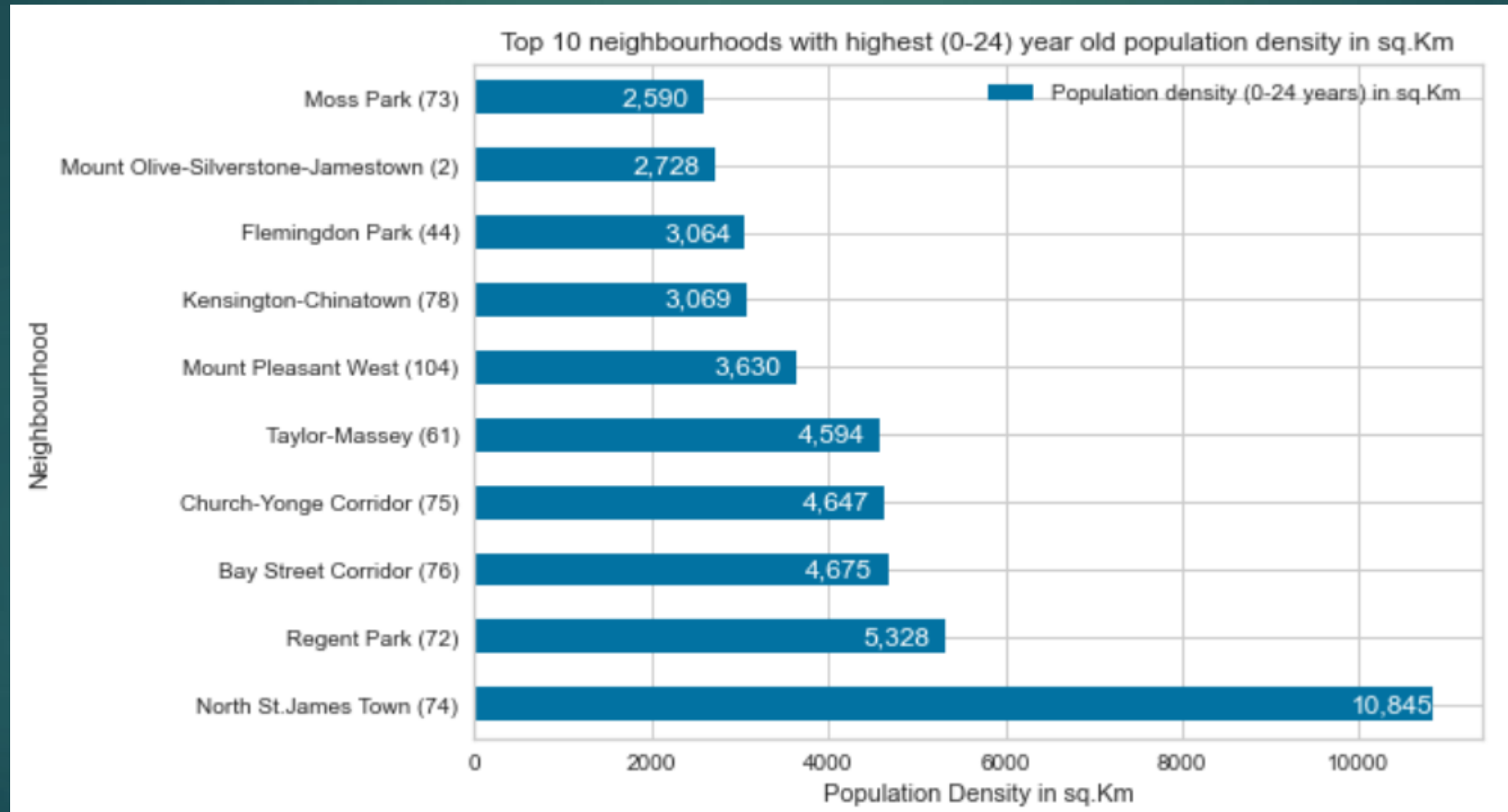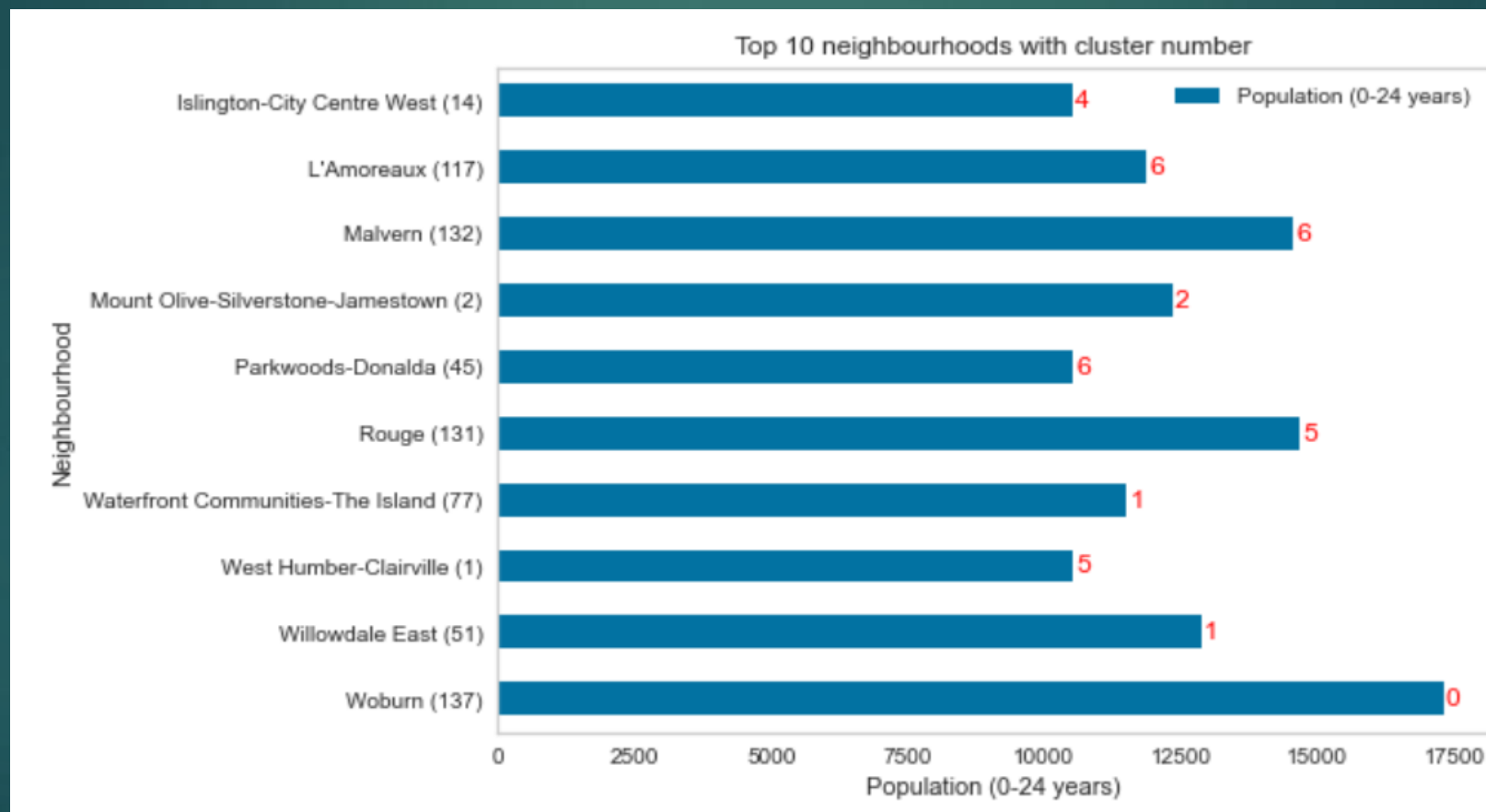# Chart of Top 10 neighbourhood with high population density

Top 10 neighbourhoods with highest (0-24) year old population density in sq.Km

■ Population density (0-24 years) in sq.Km

Neighbourhood	Population Density in sq.Km
Moss Park (73)	2,590
Mount Olive-Silverstone-Jamestown (2)	2,728
Flemingdon Park (44)	3,064
Kensington-Chinatown (78)	3,069
Mount Pleasant West (104)	3,630
Taylor-Massey (61)	4,594
Church-Yonge Corridor (75)	4,647
Bay Street Corridor (76)	4,675
Regent Park (72)	5,328
North St.James Town (74)	10,845

Chart of Top 10 neighbourhood with high population

Top 10 neighbourhoods with cluster number

Exploration using Foursquares: Nearby venues for each neighbourhood

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Yorkdale-Glen Park (31)	43.714672	-79.457108	Harvey's	43.715337	-79.455396	Restaurant
1	Yorkdale-Glen Park (31)	43.714672	-79.457108	Mary Brown's Famous Chicken	43.718309	-79.455706	Fried Chicken Joint
2	Yorkdale-Glen Park (31)	43.714672	-79.457108	Krystos	43.718516	-79.455855	Greek Restaurant
3	Yorkdale-Glen Park (31)	43.714672	-79.457108	Yuki Japanese Restaurant	43.720610	-79.456119	Sushi Restaurant
4	Yorkdale-Glen Park (31)	43.714672	-79.457108	Caffè Demetre	43.720179	-79.456219	Dessert Shop

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1  nearby_venues.shape
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(9082, 7)

Six new categories created: Venues listed for each category

- ► Sports Amenities like soccer field, volleyball stadium
- ► Entertainment, art and learning like music, theatre, library, photography studio
- ► Fitness and well being like gym, yoga studio
- ► Tourist attractions like museums, theme parks
- ► Kid's Stores like bookstore, game store, toy store
- ► Green spaces like parks, garden etc

Categories curated to match our project objective

New categories added for each venue: unwanted venues removed

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	New Venue Category
0	Yorkdale-Glen Park (31)	43.714672	-79.457108	The Lego Store	43.725146	-79.452974	Toy / Game Store	Kid's Stores
1	Yorkdale-Glen Park (31)	43.714672	-79.457108	BATLgrounds	43.724054	-79.463398	Athletics & Sports	Sport's Amenities
2	Yorkdale-Glen Park (31)	43.714672	-79.457108	Indigo	43.727006	-79.451883	Bookstore	Kid's Stores
3	Yorkdale-Glen Park (31)	43.714672	-79.457108	Cineplex Cinemas	43.727000	-79.451290	Movie Theater	Entertainment, Art and Learning
4	Yorkdale-Glen Park (31)	43.714672	-79.457108	Playtime Bowl	43.717427	-79.458148	Bowling Alley	Sport's Amenities

Created top 6 most common venues for each neighbourhood

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue
0	Agincourt North (129)	Sport's Amenities	Green spaces	Entertainment, Art and Learning	None	None	None
1	Agincourt South-Malvern West (128)	Fitness and Well-being	Sport's Amenities	Kid's Stores	None	None	None
2	Alderwood (20)	Kid's Stores	Fitness and Well-being	None	None	None	None
3	Annex (95)	Green spaces	Tourist attractions	Entertainment, Art and Learning	Fitness and Well-being	Sport's Amenities	Kid's Stores
4	Banbury-Don Mills (42)	Green spaces	Fitness and Well-being	Sport's Amenities	Entertainment, Art and Learning	None	None

K-Mean clustering: to group similar neighbourhoods

Finding optimal K value: Metric evaluation

Continued..

Distortion Score Elbow for KMeans Clustering
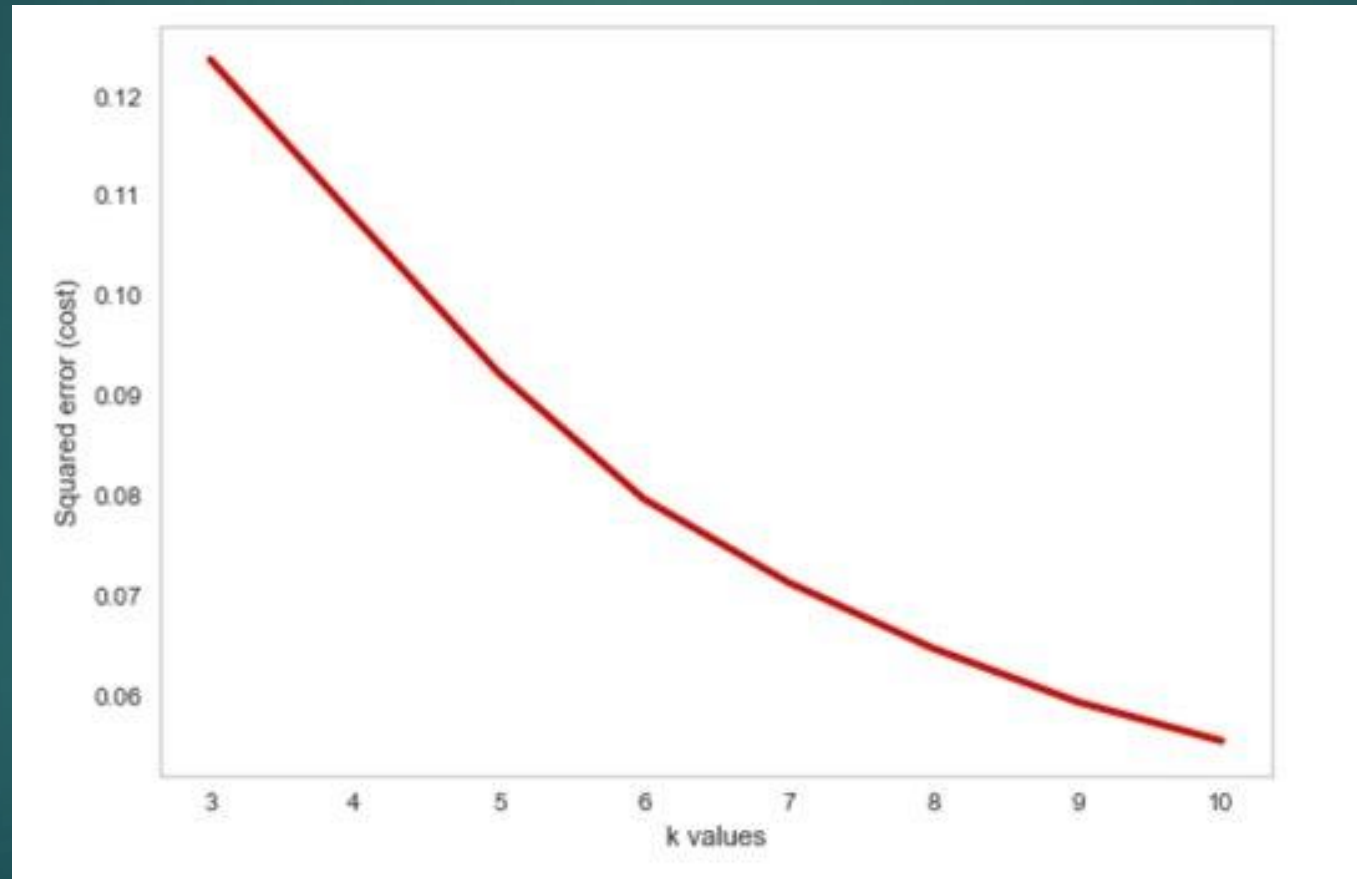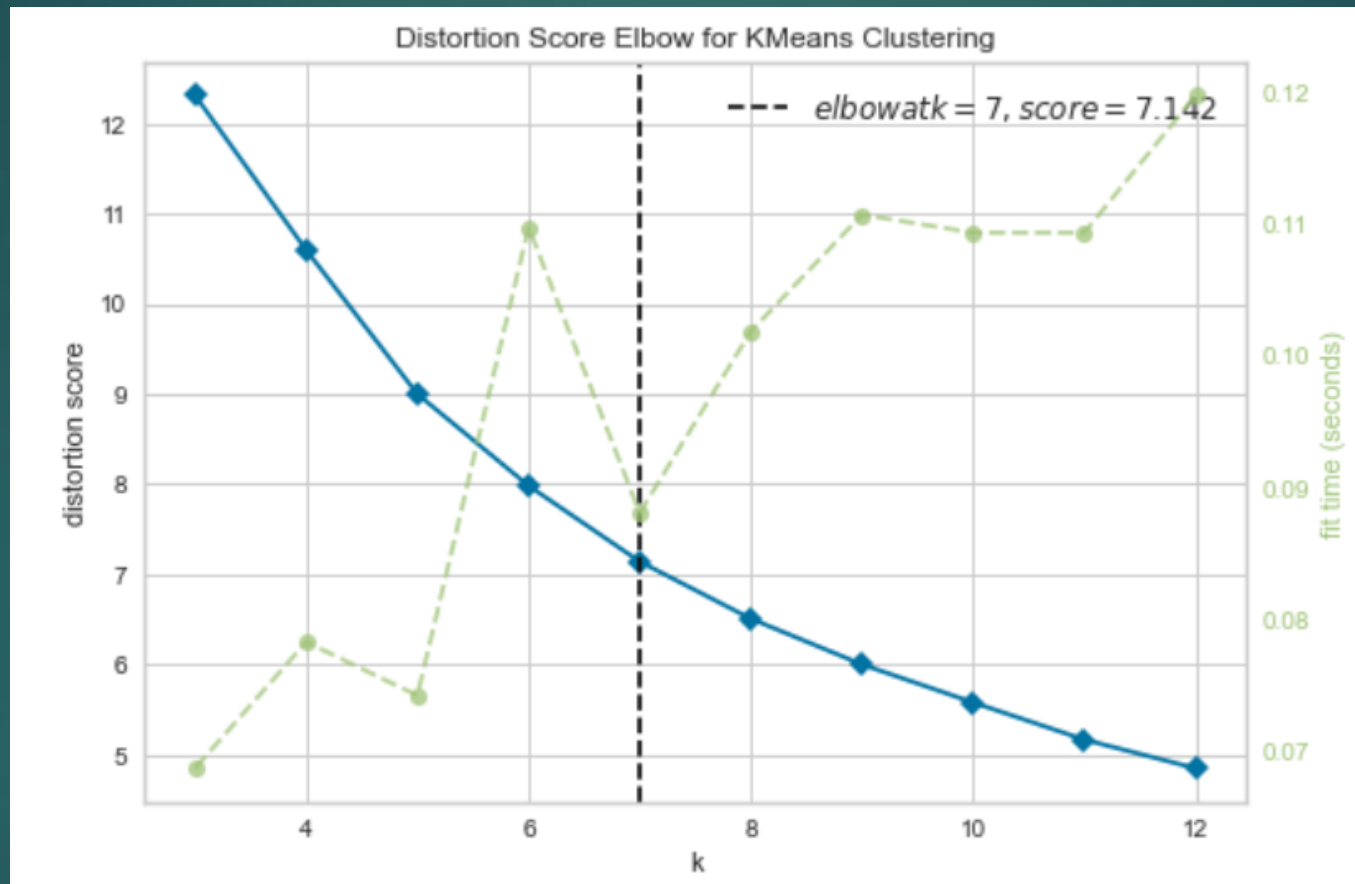
Clusters formed- Neighbourhoods labeled

|	Neighbourhood	Longitude	Latitude	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
0	Yorkdale-Glen Park (31)	-79.457108	43.714672	3.0	Kid's Stores	Sport's Amenities	Entertainment, Art and Learning	Fitness and Well-being	None	None
1	York University Heights (27)	-79.488883	43.765736	6.0	Sport's Amenities	Green spaces	Fitness and Well-being	None	None	None
2	Yonge-St.Clair (97)	-79.397871	43.687859	5.0	Green spaces	Tourist attractions	Fitness and Well-being	Sport's Amenities	None	None
3	Yonge-Eglinton (100)	-79.403590	43.704689	4.0	Fitness and Well-being	Green spaces	Sport's Amenities	Kid's Stores	Entertainment, Art and Learning	None
4	Wychwood (94)	-79.425515	43.676919	5.0	Tourist attractions	Green spaces	Entertainment, Art and Learning	Fitness and Well-being	Sport's Amenities	None

Finding clusters' characteristics:
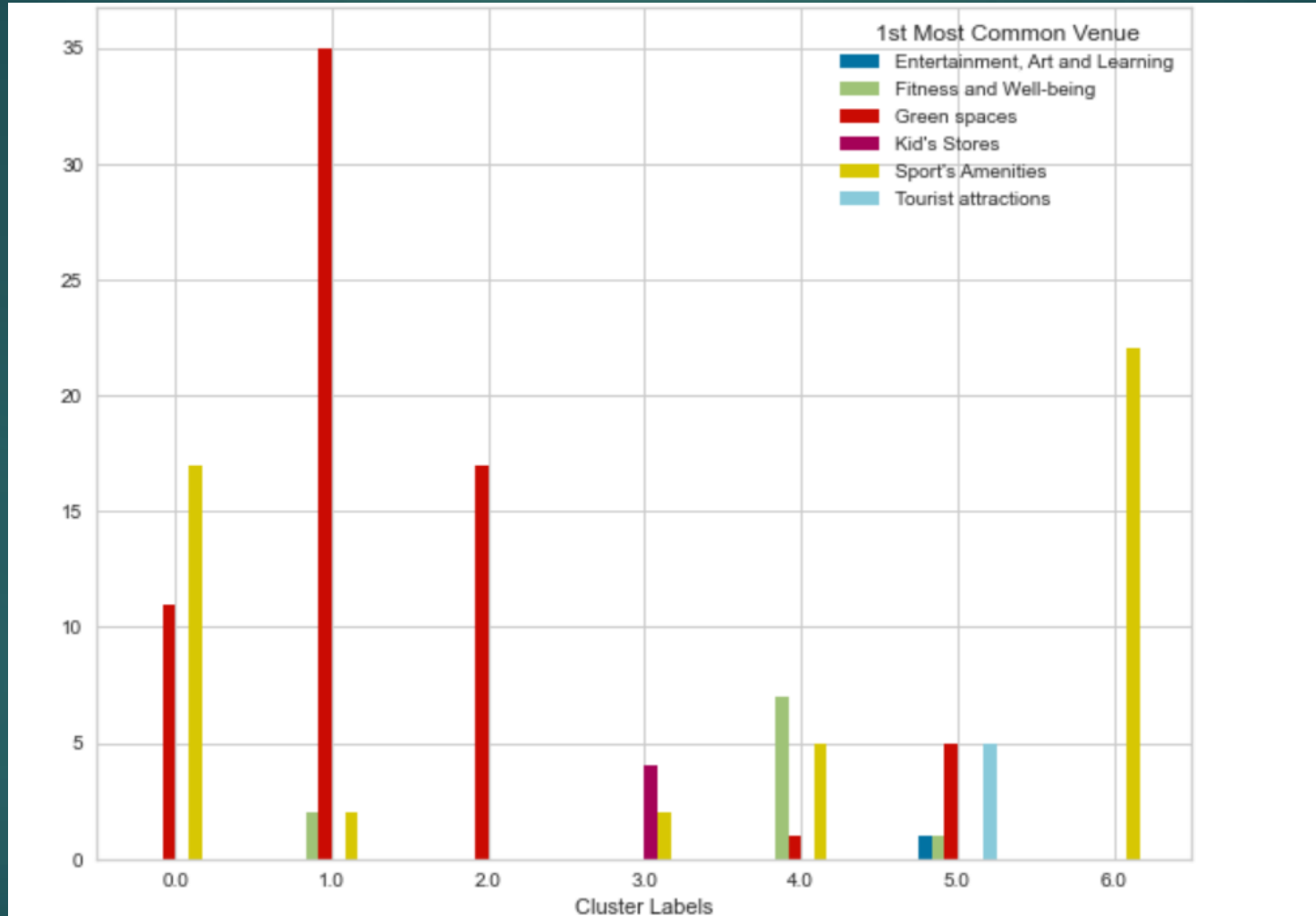
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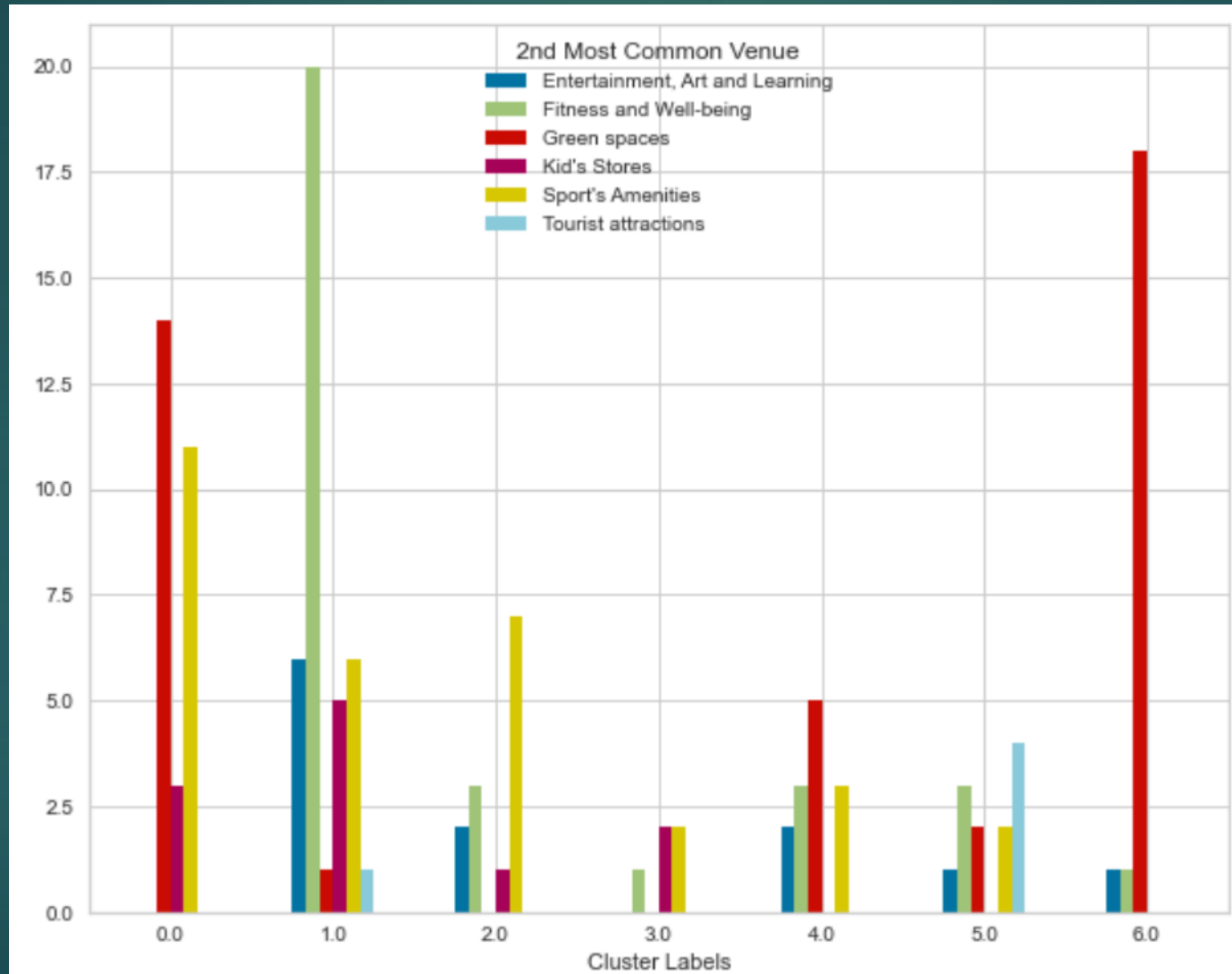
Inferences:

| Clusters	Strengths	Lacks
0	Green spaces and Sports amenities	Entertainment,art and learning,Tourist attractions,Fitness & Wellbeing
1	Green spaces, Fitness & Wellbeing and Sports amenities	--
2	Green spaces	Tourist attractions
3	Kid's stores and Sport's amenities	Green spaces,Tourist attractions, Entertainment,art and learning,
4	Fitness & Well being, Sport's amenities and Green spaces	Tourist attractions, Kid's Stores
5	Tourist attractions, Green spaces, Entertainment, art and learning, Fitness and well-being	Kid's Stores, Sports amenities
6	Sport's amenities and Green spaces	Tourist attractions, Kid's Stores

Neighbourhood clusters
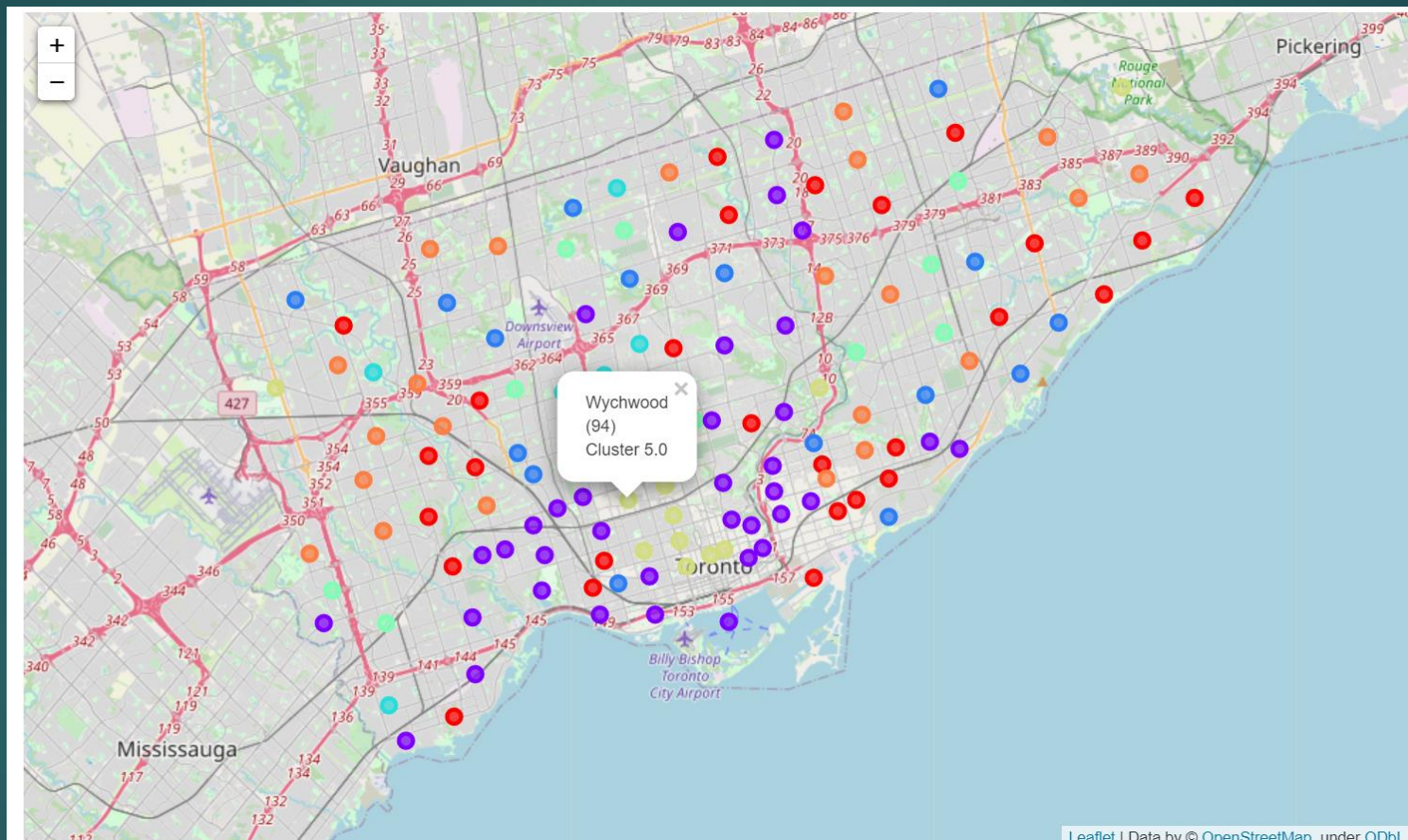
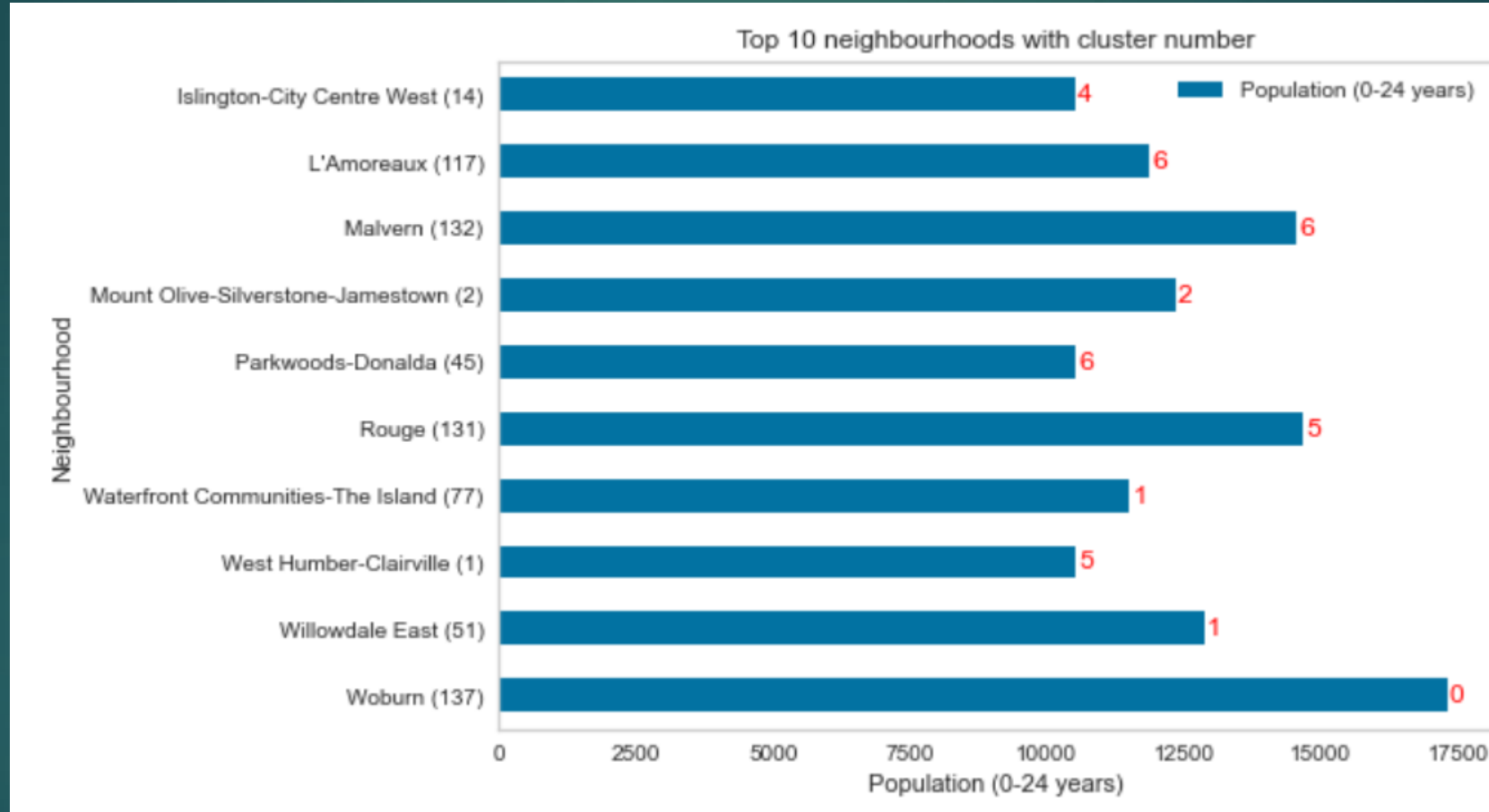# Interactive map: Choropleths +neighbourhood clusters
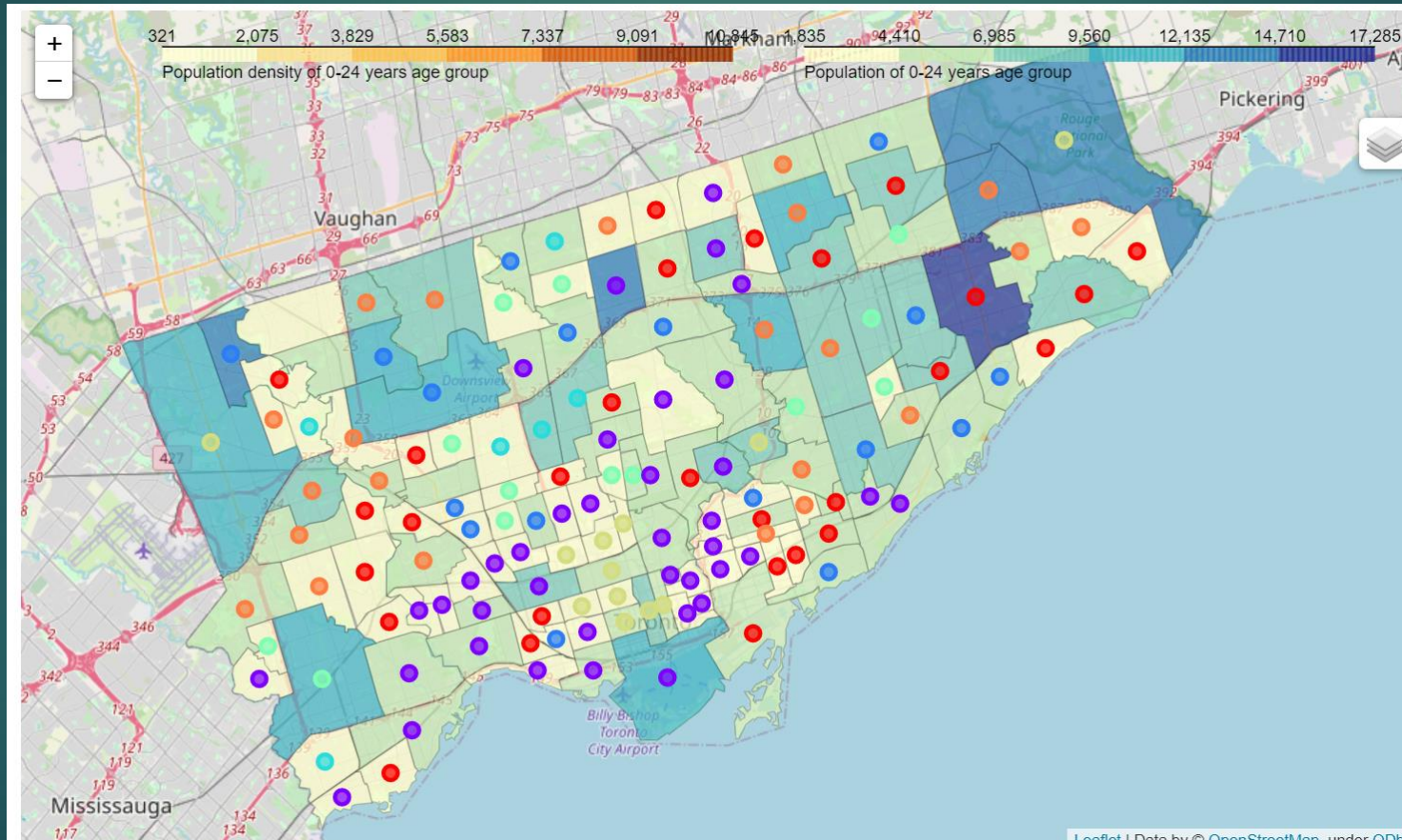
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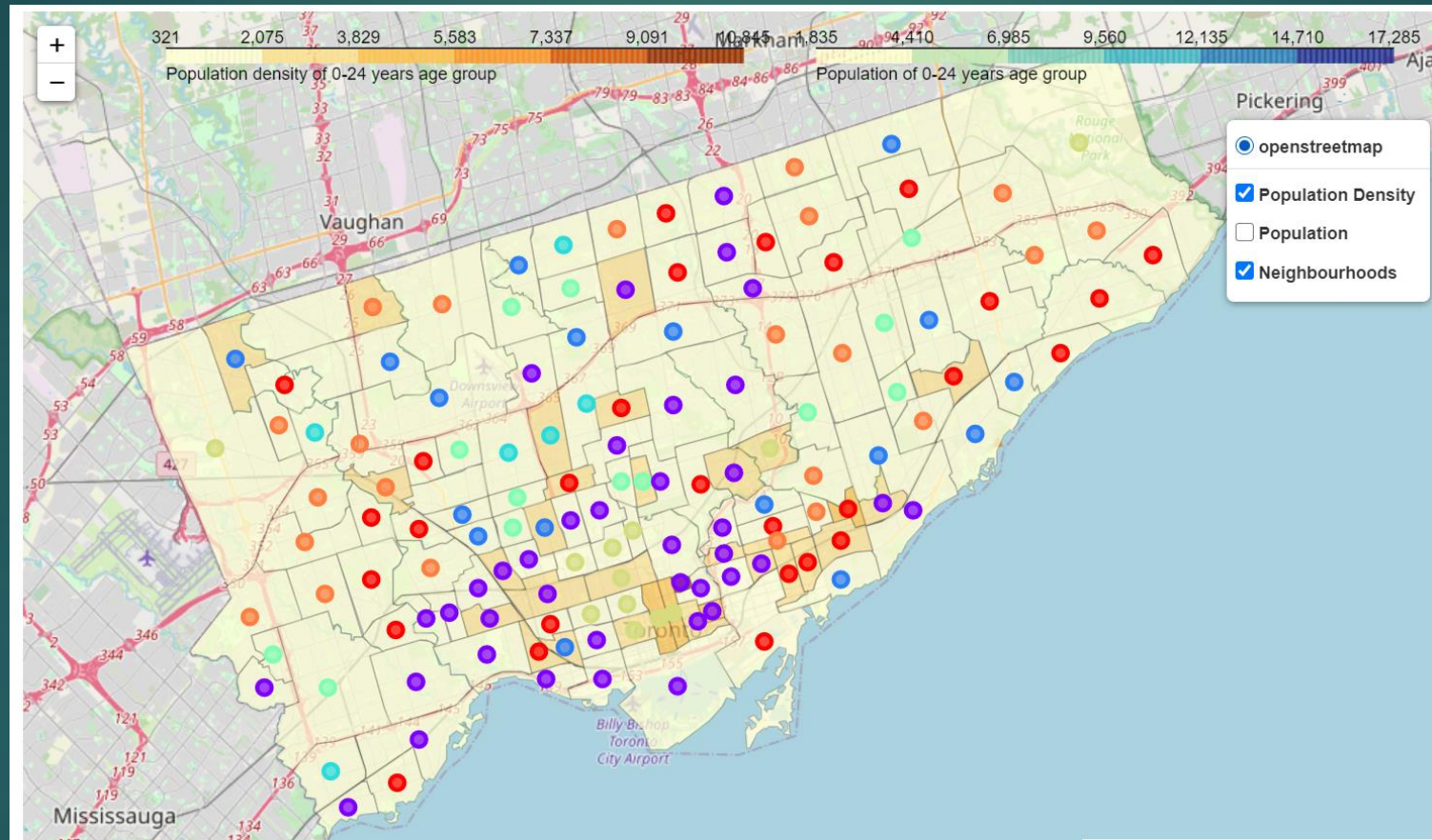
Neighbourhood charts with labels:

Top 10 neighbourhoods with cluster number
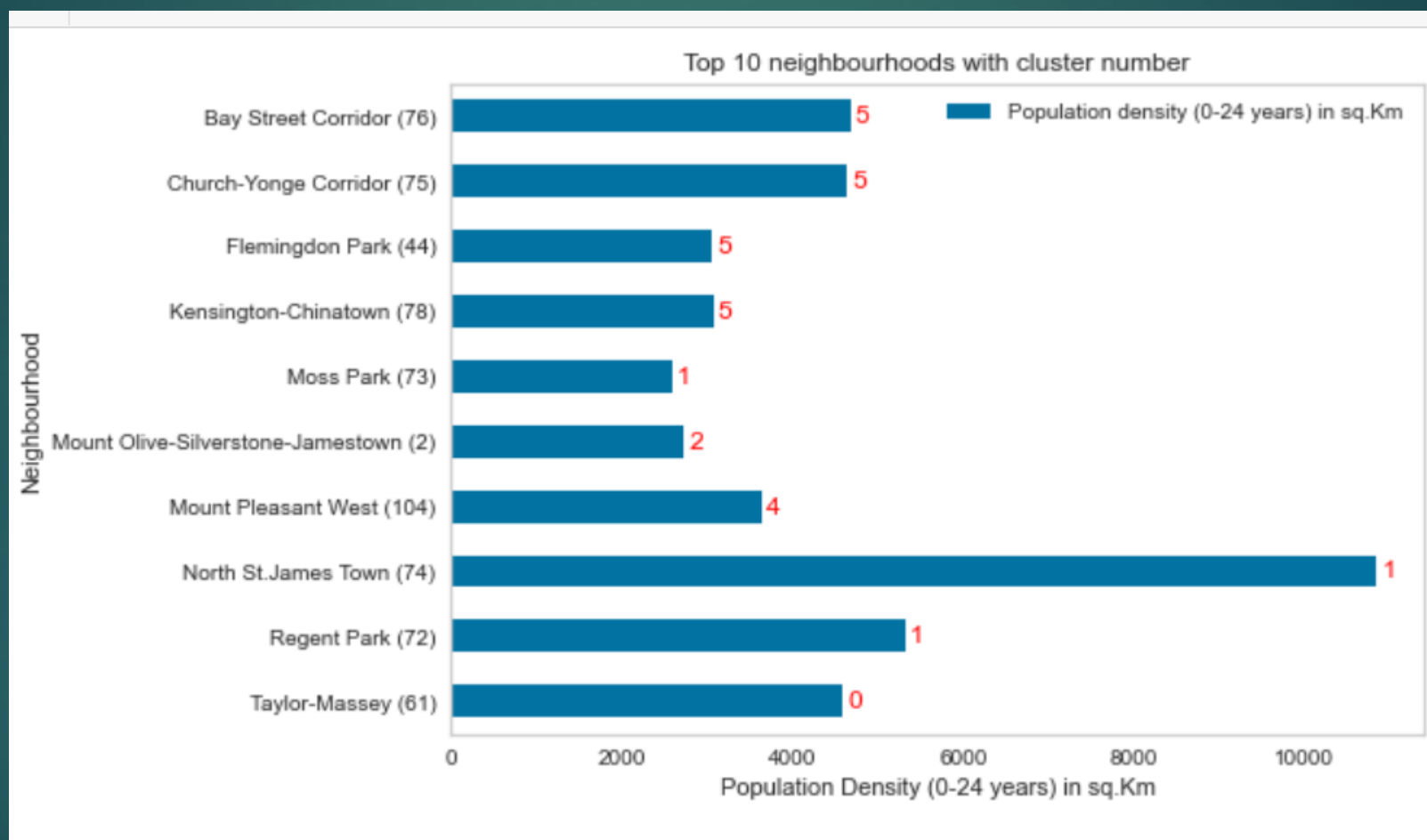
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Results and conclusion:

- Based on our analysis, reccommendations are made to concerned stakeholders
- Problem questions are resolved
- New insights are gained

Thank you!

Github Notebook:
https://nbviewer.jupyter.org/github/PriyankaSagwekar/Coursera_Capstone/blob/main/IBM-Capstone%20project%20notebook.ipynb#3