How Child-Friendly is Toronto?

Cap Stone Project Presentation

Business Problem

- Happy children make happy parent!
- Happy parent make happy cities (so they say)
- City budgets are always tight
- Where is the biggest bang for the buck if we try to improve children's life?
- Are there city areas with similar challenges when it comes to education and leisure for children?

The Data

- Foursquare data
  - Use their category system to search for venues related to children (0-14yrs)
    - Daycare, preschools, elementary schools, etc.
    - Playgrounds, Candy Stores, Parks, etc.
  - Extensive API to retrieve such data in the vicinity of a coordinate
- Open Data of the City of Toronto
  - Basic geographic information like location and borders of neighbourhoods
  - Census data containing demographical data from 2016

The Data (after cleaning)

	LATITUDE	LONGITUDE	Code	Fun	Education	Population	Land Area	Children	Income Avg	Not Suitable	Affordable	Inadequate	Education per Child	Fun per sqkm
West Humber-Clairville	43.71	-79.60	1	4	0	33312	29.81	0.151897	33288.897353	0.174356	0.318403	0.047	0.000000	0.134183
Mount Olive-Silverstone-Jamestown	43.74	-79.59	2	3	4	32954	4.52	0.215148	29566.037736	0.309367	0.376584	0.100	0.000564	0.663717
Thistletown-Beaumond Heights	43.74	-79.56	3	4	0	10360	3.31	0.166988	33942.065491	0.158295	0.325191	0.063	0.000000	1.208459
Rexdale-Kipling	43.72	-79.57	4	2	1	10529	2.49	0.155760	35517.241379	0.140625	0.308594	0.069	0.000610	0.803213
Elms-Old Rexdale	43.72	-79.55	5	2	5	9456	2.86	0.190884	33545.010468	0.177294	0.335404	0.109	0.002770	0.699301
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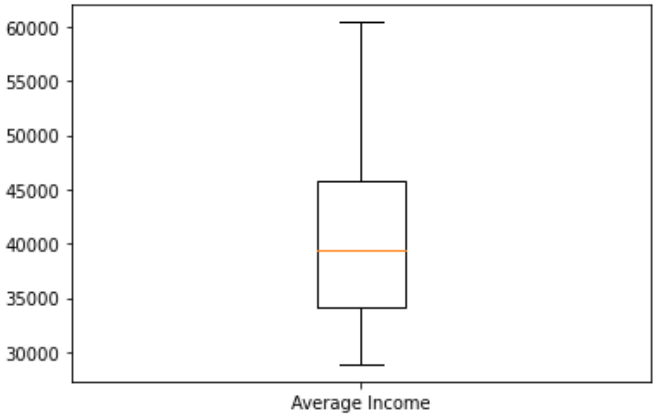
West Hill	43.80	-79.13	136	4	2	27392	9.59	0.169210	34025.172168	0.122244	0.323972	0.116	0.000431	0.417101
Woburn	43.77	-79.23	137	4	3	53485	12.31	0.179957	32428.975526	0.191807	0.358286	0.078	0.000312	0.324939
Eglinton East	43.74	-79.24	138	7	2	22776	3.23	0.183527	32209.439528	0.228824	0.358001	0.108	0.000478	2.167183
Scarborough Village	43.74	-79.21	139	7	1	16724	3.10	0.201208	32654.649734	0.222785	0.415190	0.128	0.000297	2.258065
Guildwood	43.75	-79.19	140	3	3	9917	3.71	0.130584	46377.805486	0.037594	0.240602	0.038	0.002317	0.808625

- Neighbourhood name, neighbourhood code, and geographical coordinates
- Population and land area
- Relative number of children in the overall population
- Average income
- Relative number of not-suitable housing, defined as housing with less than one room per person
- Relative number of affordable housing, defined as housing for which less than 30% of the income is used for
- Relative number of inadequate housing, defined as housing required major repairs.

Explorative analysis



Boxplots to find outliers

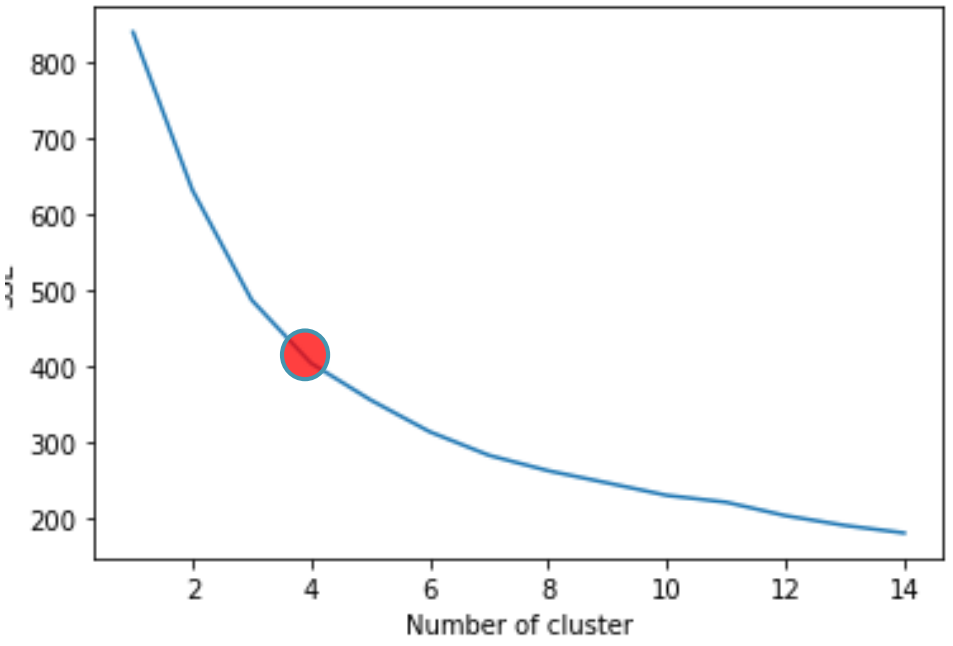
Correlation analysis to find cofounding variables

	Children	Income Avg	Not Suitable	Affordable	Inadequate	Education per Child	Fun per sqkm
Children	1.000000	-0.169958	0.427070	-0.368875	0.380837	-0.442970	-0.373334
Income Avg	-0.169958	1.000000	-0.797390	0.482503	-0.384911	0.236543	0.105097
Not Suitable	0.427070	-0.797390	1.000000	0.496503	0.458113	-0.366141	-0.115740
Affordable	-0.368875	-0.482503	0.496503	1.000000	0.179050	0.115498	0.272072
Inadequate	0.380837	-0.384911	0.458113	0.179050	1.000000	0.104250	0.178588
Education per Child	-0.442970	0.236543	-0.366141	0.115498	0.104250	1.000000	0.592106
Fun per sqkm	-0.373334	0.105097	-0.115740	0.272072	0.178588	0.592106	1.000000

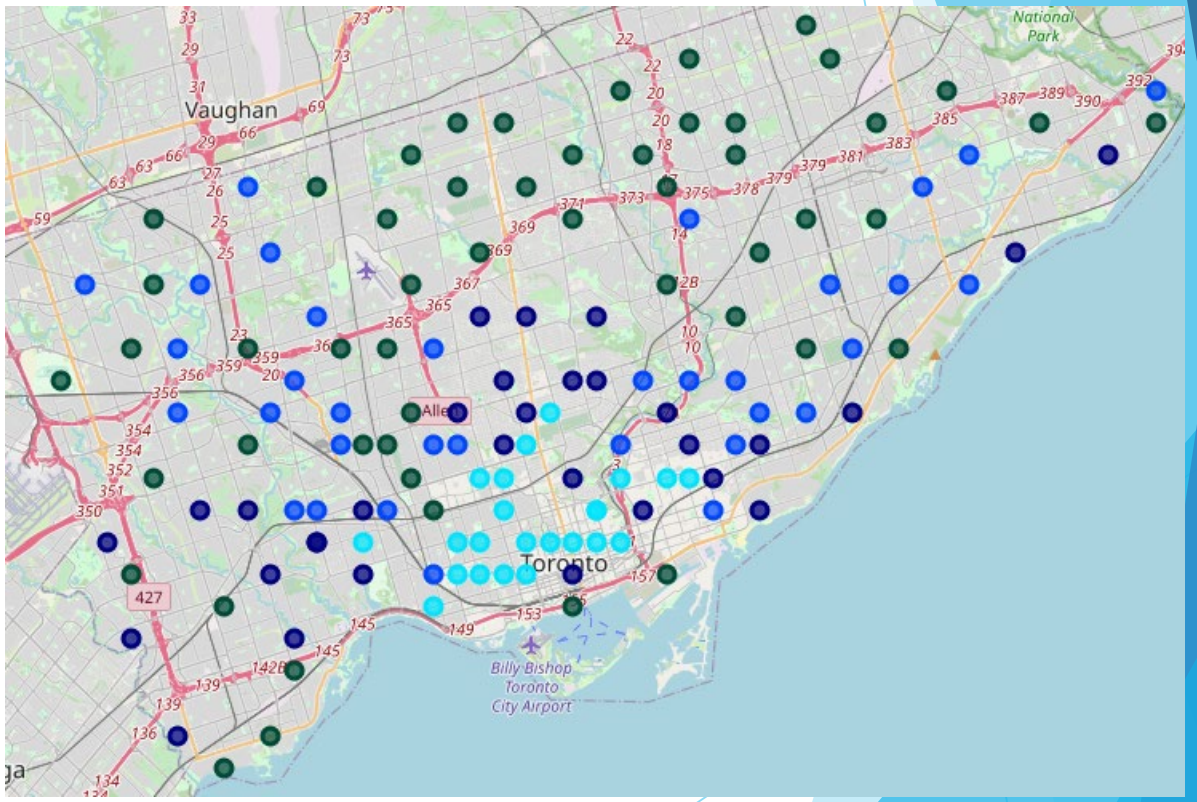
Removed “Not Suitable” for clustering

Clustering

- K-Means cluster with k = 4

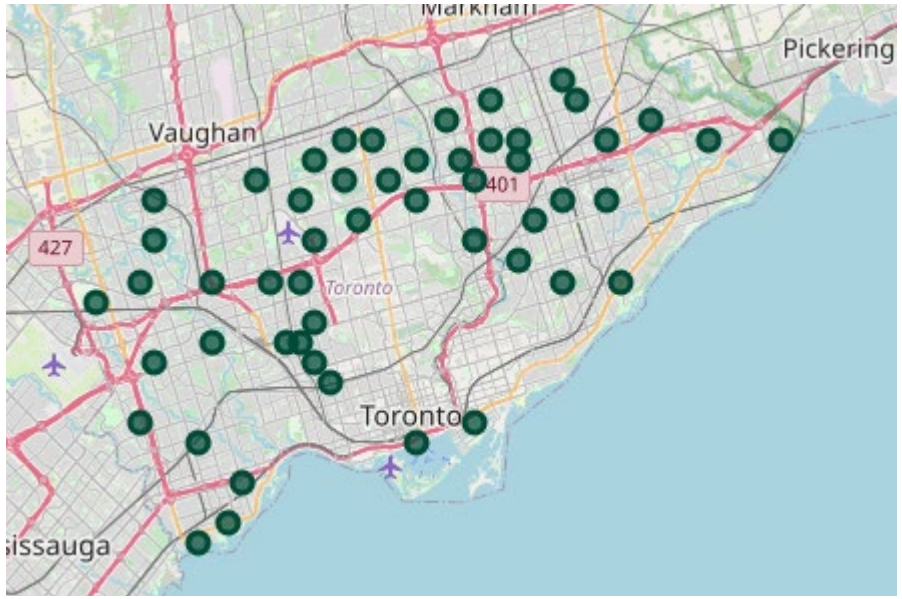


Elbow is not very pronounced



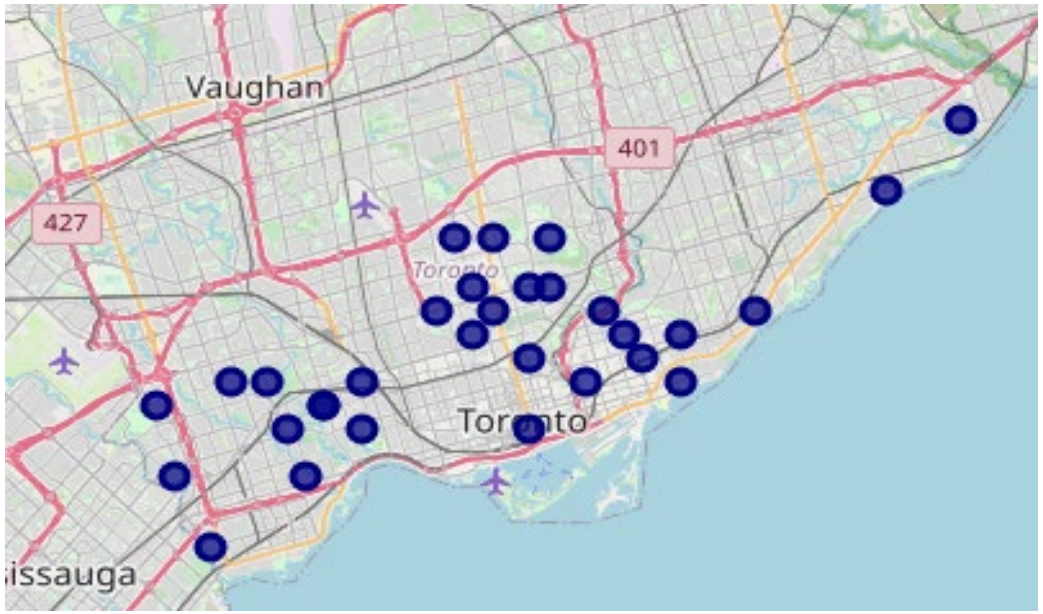
Resulting clusters

Cluster 1 + 2: Limited access to “Education and Fun”



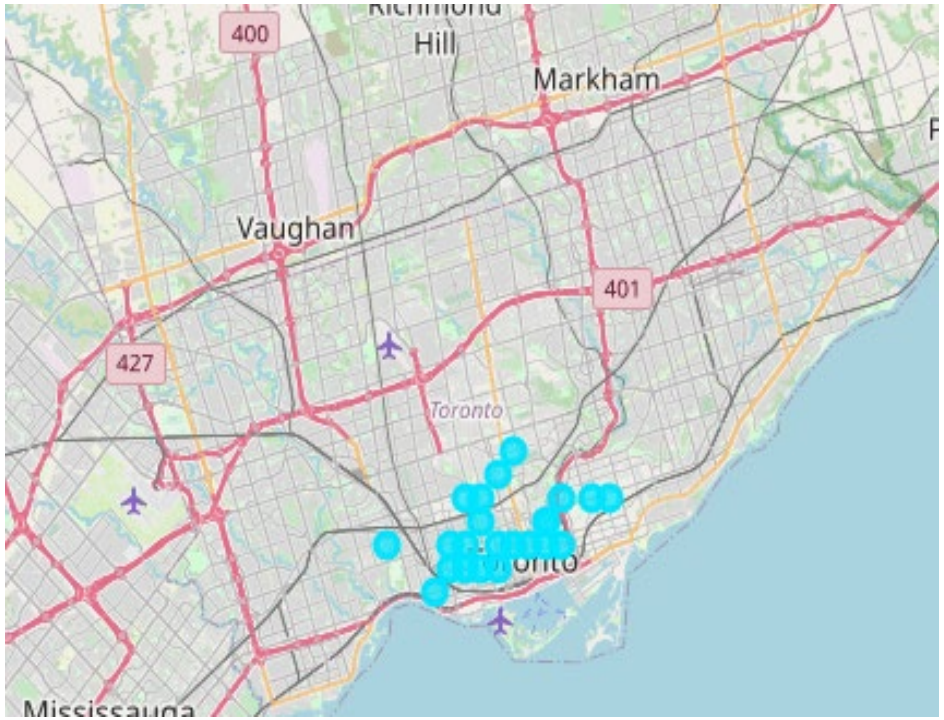
- Lowest average incomes (ca. 70% of highest)
  - Smallest “fun factor” (ca. 60% of next)
- Least closest access to education (< 60% of next)

Cluster 0: The “richer” parts



- Highest income, best but most expensive housing
- Best access to fun and education except downtown

Cluster 3: Downtown



- Highest education and fun scores (density of population?)
  - Smallest relative population of children

Findings

- City might want to prioritize resources regarding new schools, daycare, playgrounds etc. towards Cluster 1 + 2
- Can the city centre be made more attractive for families with children?
- Given the education-dense city centre: how long are childrens ways to school? Health, economic, and ecological effects?

Conclusion

- More aspects to be studied for complete picture regarding the question
- Connection between income and closeness to facilities related to leisure and education of children interesting