

Applied Data Science Capstone

SELECTING A LOCATION NEAR A UNIVERSITY TO OPEN A STUDENT COFFEE SHOP

Coursera

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October, 2019

Background and Business Question

- According to research, studying at a coffee shop can boost creativity!
- Students rely on coffee as a main source of caffeine.
- Therefore, starting a student coffee shop has the potential of being a successful business.

The question is: Near which university in Ontario, Canada, should an investor open a student coffee shop?

Both investors and real estate agencies would be interested in answering this question.

Data Sources

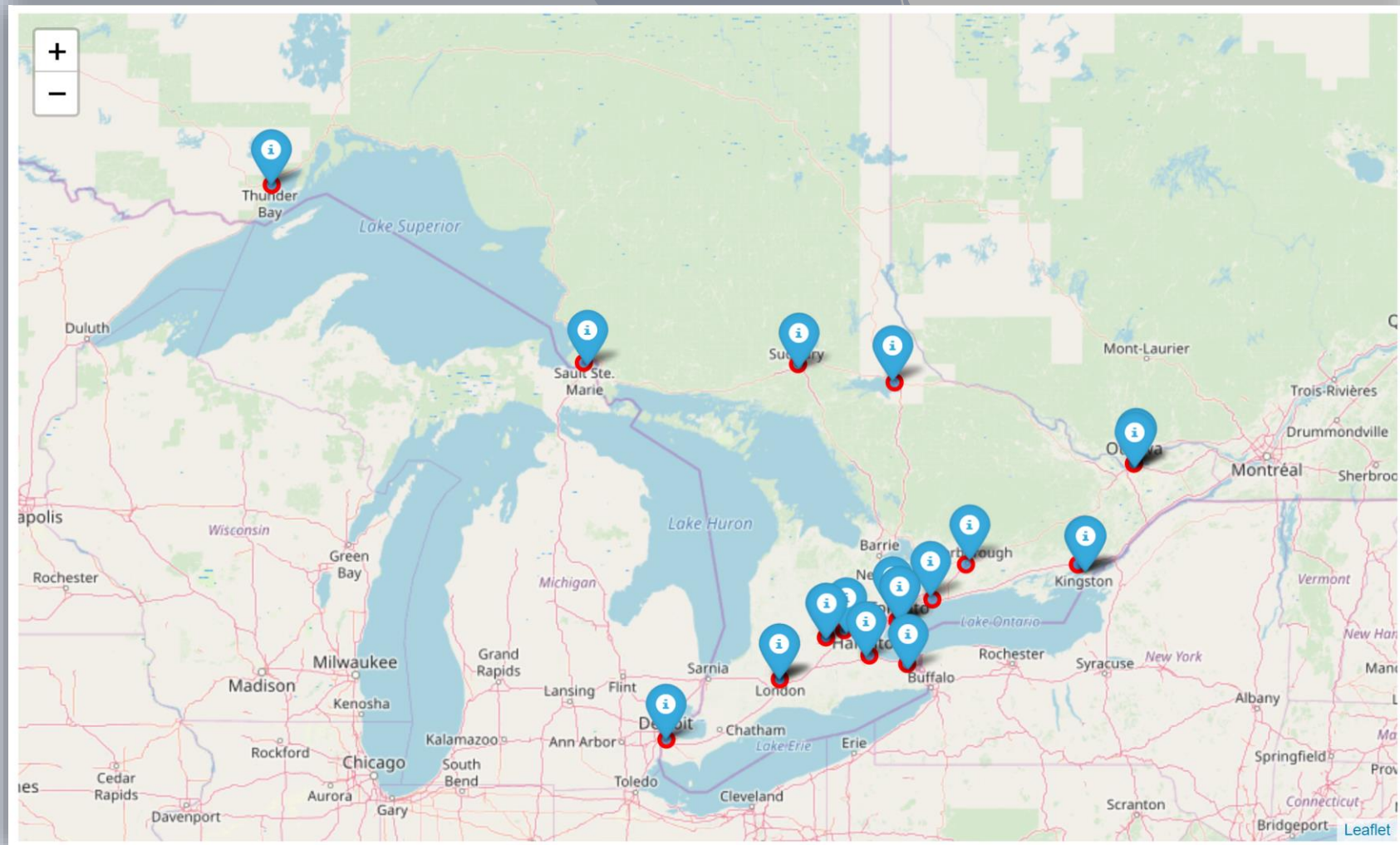
In order to answer our question, we will need the following data:

- List of universities in Ontario, Canada. (https://en.wikipedia.org/wiki/List_of_universities_in_Canada)
- Most updated enrollment data from Universities Canada website: (<https://www.univcan.ca/universities/facts-and-stats/enrolment-by-university>)
- Most updates tuition fees data from Universities Canada website: (<https://www.univcan.ca/universities/facts-and-stats/tuition-fees-by-university/>)
- The population of the cities in which the universities are located will be added for an overview of overall population in the city of the university. This data will be taken from the World Population Review website: (<http://worldpopulationreview.com/countries/canada-population/cities/>).
- **Foursquare API** will be used to obtain data on coffee shops around target universities.

Gathered Data

	University	Main Campus City	Total Students	Average Tuition	City Population	City_Latitude	City_Longitude	Uni_Latitude	Uni_Longitude
0	Algoma University	Sault Ste. Marie	1300	11884.50	74948	46.513600	-84.335800	46.5015	-84.2879
1	Brock University	St. Catharines	19150	15981.50	131989	43.159400	-79.246900	43.1176	-79.2477
2	Carleton University	Ottawa	31500	15848.25	812129	45.416667	-75.700000	45.3876	-75.6960
3	Lakehead University	Thunder Bay	8620	14462.25	99334	48.400000	-89.233333	48.4215	-89.2619
4	Laurentian University	Sudbury	9020	15043.25	157857	46.500000	-80.966667	46.4668	-80.9742
5	McMaster University	Hamilton	33960	15529.25	519949	43.256101	-79.857484	43.2609	-79.9192
6	Nipissing University	North Bay	5100	12874.00	50170	46.300000	-79.450000	46.3373	-79.4887
7	Ontario College of Art and Design University	Toronto	4510	14486.25	2600000	43.666667	-79.416667	43.6530	-79.3912

Visualization of the universities' locations on Ontario map



Venues Data by Foursquare API

	Location	LocationLatitude	LocationLongitude	Venue	VenueLatitude	VenueLongitude	Venue Category
0	Algoma University	46.5015	-84.2879	Tim Hortons	46.501103	-84.287194	Coffee Shop
1	Brock University	43.1176	-79.2477	Tim Hortons	43.119688	-79.248627	Coffee Shop
2	Brock University	43.1176	-79.2477	Tim Hortons	43.118233	-79.241331	Coffee Shop
3	Carleton University	45.3876	-75.6960	Rooster's Coffeehouse	45.383025	-75.698155	Coffee Shop
4	Carleton University	45.3876	-75.6960	Tim Hortons	45.386054	-75.693545	Coffee Shop

Basic Statistics of Our Data

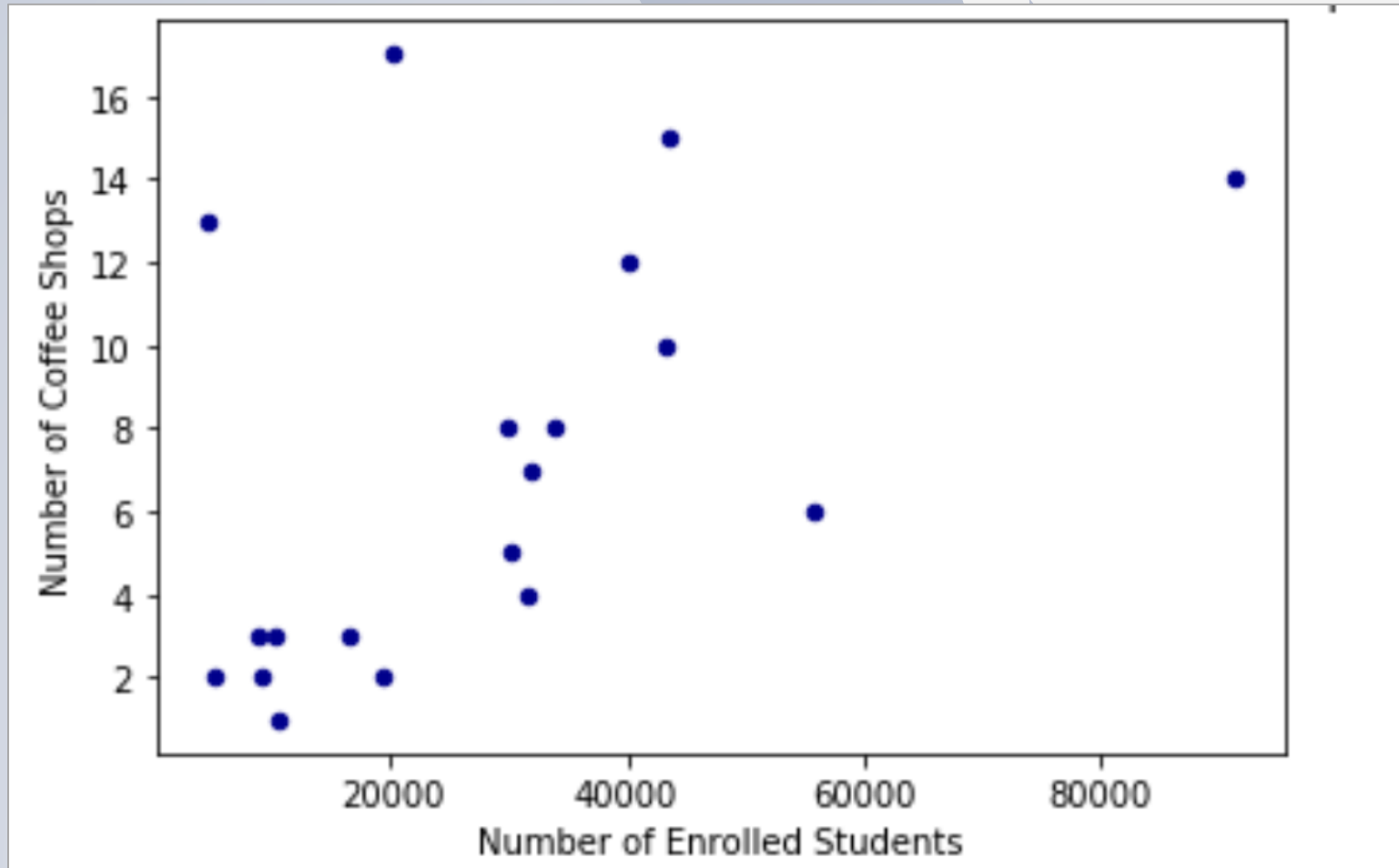
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all_data.describe()
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	Total Students	Average Tuition	City Population	City_Latitude	City_Longitude	Uni_Latitude	Uni_Longitude
count	23.000000	23.000000	2.300000e+01	23.000000	23.000000	23.000000	23.000000
mean	23422.173913	15194.413043	6.828323e+05	44.373369	-79.783040	44.375348	-79.781143
std	21957.898549	4063.501868	9.310037e+05	1.473245	3.031486	1.471303	3.047042
min	520.000000	5720.000000	5.017000e+04	42.301649	-89.233333	42.304300	-89.261900
25%	6860.000000	13252.250000	1.067645e+05	43.464300	-80.743533	43.472350	-80.759550
50%	19150.000000	15075.500000	2.479890e+05	43.666667	-79.416667	43.773500	-79.488700
75%	32915.000000	16555.625000	8.121290e+05	45.416667	-78.600000	45.397750	-78.593050
max	91300.000000	26630.000000	2.600000e+06	48.400000	-75.700000	48.421500	-75.676500

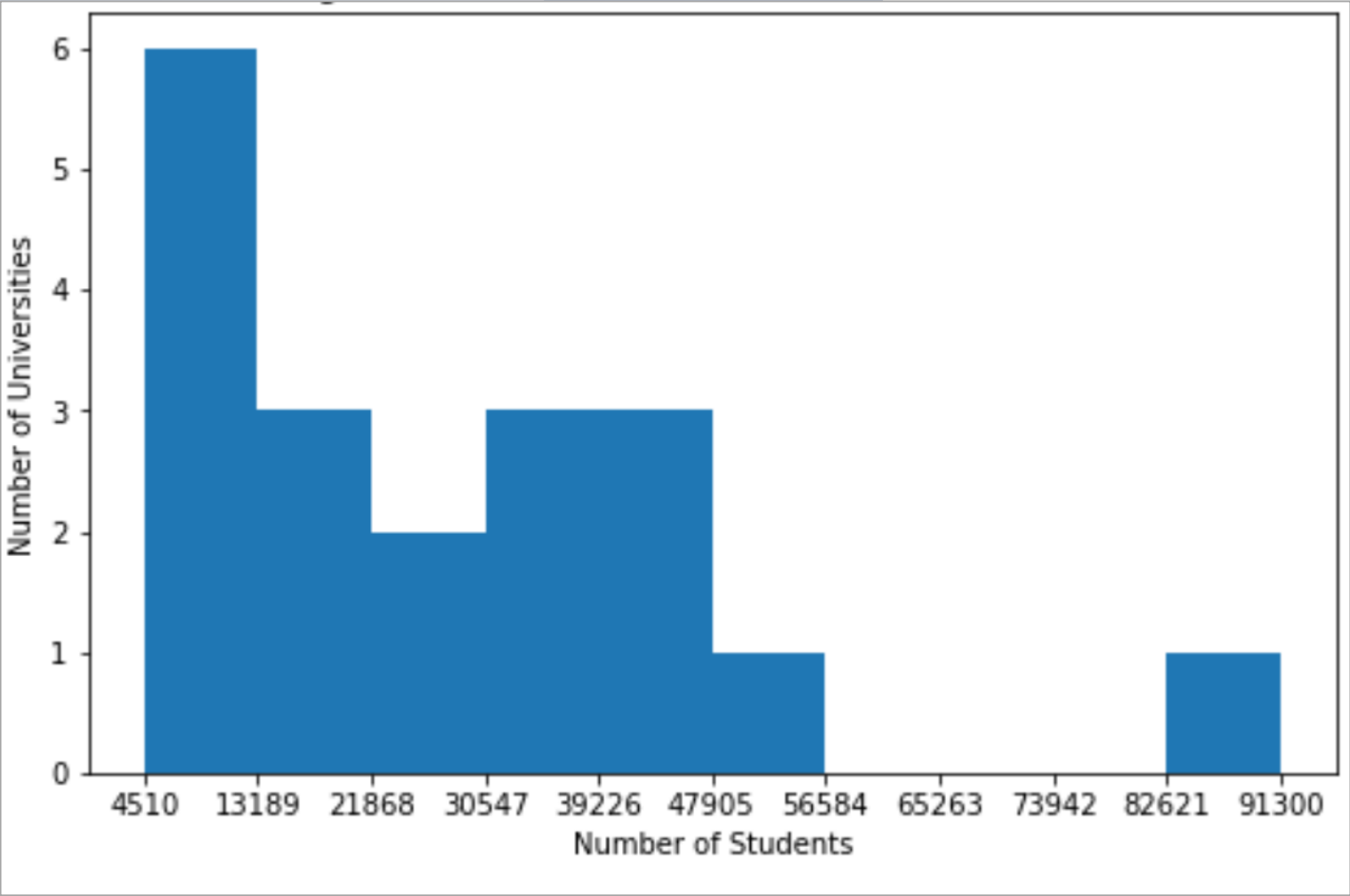
Combining Venues Data to All Data

	University	Main Campus City	Total Students	Average Tuition	City Population	City_Latitude	City_Longitude	Uni_Latitude	Uni_Longitude	NumberOfUniCafes	NumberOfCityCafes	DistanceToUni
0	Brock University	St. Catharines	19150	15981.50	131989	43.159400	-79.246900	43.1176	-79.2477	2	3.0	0.456648
1	Carleton University	Ottawa	31500	15848.25	812129	45.416667	-75.700000	45.3876	-75.6960	4	51.0	0.487904
2	Lakehead University	Thunder Bay	8620	14462.25	99334	48.400000	-89.233333	48.4215	-89.2619	3	2.0	0.261785
3	Laurentian University	Sudbury	9020	15043.25	157857	46.500000	-80.966667	46.4668	-80.9742	2	1.0	0.336817
4	McMaster University	Hamilton	33960	15529.25	519949	43.256101	-79.857484	43.2609	-79.9192	8	14.0	0.660482
5	Nipissing University	North Bay	5100	12874.00	50170	46.300000	-79.450000	46.3373	-79.4887	2	1.0	0.374839
6	Ontario College of Art and Design University	Toronto	4510	14486.25	2600000	43.666667	-79.416667	43.6530	-79.3912	13	52.0	0.689551
7	Queen's University	Kingston	29880	20992.00	114195	44.300000	-76.566667	44.2253	-76.4951	8	0.0	0.673909
8	Ryerson University	Toronto	43160	15606.75	2600000	43.666667	-79.416667	43.6577	-79.3788	10	52.0	0.728134
9	Trent University	Peterborough	10350	13280.50	75877	44.300000	-78.333333	44.3564	-78.2902	1	1.0	0.797926
10	University of Guelph	Guelph	30120	11284.00	115760	43.544800	-80.248200	43.5327	-80.2262	5	9.0	0.359826
11	University of Ontario Institute of Technology	Oshawa	10120	13224.00	247989	43.900000	-78.866667	43.9458	-78.8959	3	5.0	0.472030
12	University of Ottawa	Ottawa	43400	19104.50	812129	45.416667	-75.700000	45.4231	-75.6831	15	51.0	0.600505

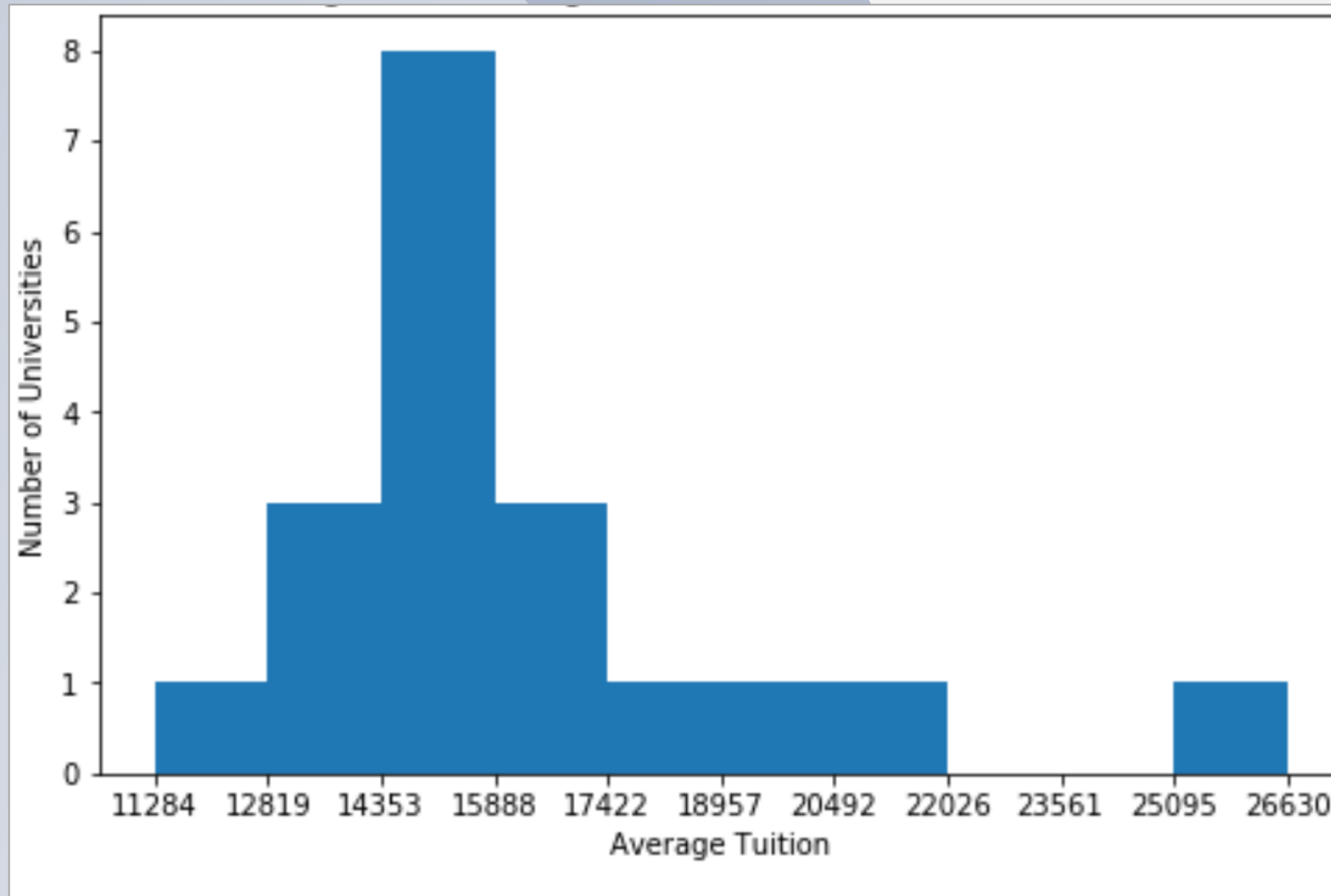
Relation Between Enrolled Students and Number of Coffee Shops Around the University



Histogram of Students' Enrollment in Ontario Universities



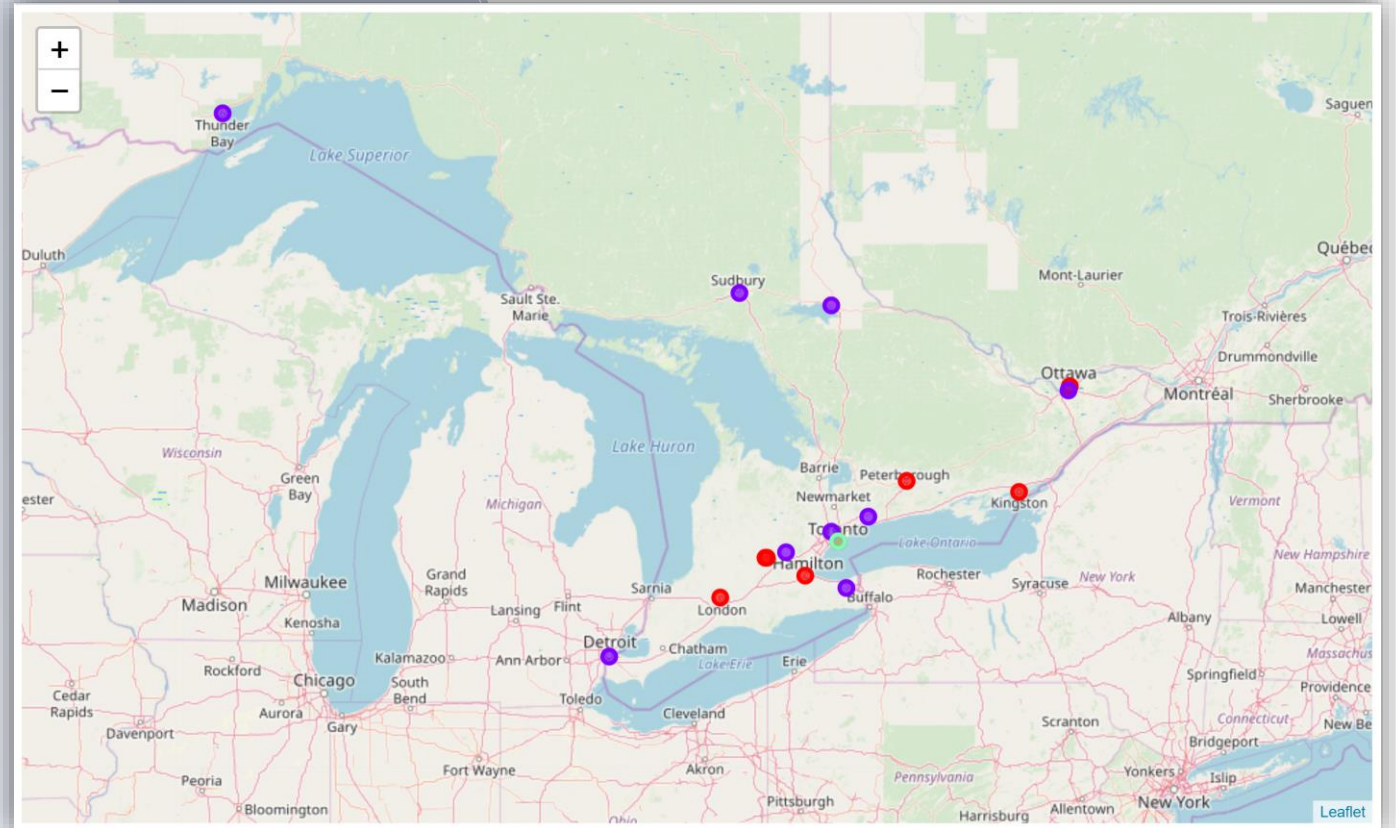
Histogram of Average Tuition Fees in Ontario Universities



Clustering

K-Means was used to cluster universities areas to 3 clusters.

This map shows the visualization of the clusters.



Mean of Clusters

	Total Students	Average Tuition	City Population	City_Latitude	City_Longitude	Uni_Latitude	Uni_Longitude	NumberOfUniCafes	NumberOfCityCafes	DistanceToUni
Labels										
0	28581.111111	16596.833333	8.070961e+05	43.835337	-79.064624	43.836744	-79.055833	10.111111	26.888889	0.659525
1	20660.000000	14402.972222	4.992490e+05	44.798798	-80.684353	44.809678	-80.706500	3.333333	13.777778	0.382898
2	91300.000000	26630.000000	2.600000e+06	43.666667	-79.416667	43.662900	-79.395700	14.000000	52.000000	0.596968

- The investor is recommended to look further around University of Toronto. It has high number of students, indicating large market and high tuition fees.
- Probably more features could serve in better clustering for the universities in this study, especially for universities in clusters 1 and 0.
- It would be beneficial to investigate the availability of cafeterias within campuses and how do students feed about them, and to study locations on campuses.

Recommendations



- The analysis resulted in recommending University of Toronto and probably deeper research for the other clusters and the potential market.
- Investors are recommended to thoroughly study locations within the streets around the selected campus.

The analysis should take into consideration the success rates of existing businesses around the area as **successful businesses usually attract other successful businesses.**

Conclusion





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