Capstone Project - The Battle of the Neighborhoods (Week 2)

Finding Suitable Neighbourhoods For Opening A Grocery Store In Toronto

Introduction: Business Problem

In this project we are going to identify three most suitable neighborhoods in Toronto to open a new grocery store.

We target on selling high quality foods, personal care products and home utility to people who are willing to spend on more premium products. According to the statistics in 2019, the median household income in Toronto is 71,631 dollars. Therefore, It is preferred to choose **neighbourhoods with household income of 70,000 dollars or above and their percentage is greater than that of all households in Toronto**.

Among these neighbourhoods, we want to find out **five of them with the least competition for grocery stores, i.e. the least number of grocery stores per capita around the neighborhoods**.

Safety and security are also concerns for running a stable business. We will further choose the **final three out of the five neighbourhoods with the least crime rates per capita related to Break and Enter, Robbery and Theft**.

Data

Based on the criteria mentioned above to tackle our business problem, the following data sources will be used to help us make the decision:

1. Household income of of neighbourhoods in Toronto
   Source: Neighborhood Profiles from City of Toronto's Open Data Portal
   https://open.toronto.ca/dataset/neighbourhood-profiles/
2. Number of grocery stores per capita in neighbourhoods in Toronto
   Source: Foursquare API
3. Crime rates per capita of neighbourhoods in Toronto
   Source: Neighborhood Crime Rates 2014-2019 from Toronto Police Service
   https://data.torontopolice.on.ca/datasets/neighbourhood-crime-rates-boundary-file-

Household income of of neighbourhoods in Toronto

We had made use of Neighborhood Profiles from City of Toronto's Open Data Portal and extracted the household income data from it. We obtained the number of households with income over $70,000 in each neighbourhood and in the whole city of Toronto. By dividing by the total number of households in each neighbourhood and in the whole city of Toronto, the percentage of households with income over $70,000 in each neighbourhood and in the whole city of Toronto was found out.

	total	70000-79999	80000-89999	90000-99999	over 100000	Total over 70k	Percentage_over_70k
City of Toronto	1112930.0	75120.0	63360.0	51570.0	263465.0	453515.0	0.407496
Agincourt North	9115.0	695.0	640.0	500.0	1920.0	3755.0	0.411958
Agincourt South-Malvern West	8140.0	630.0	500.0	405.0	1500.0	3035.0	0.372850
Alderwood	4620.0	365.0	310.0	265.0	1520.0	2460.0	0.532468
Annex	15940.0	820.0	750.0	620.0	4755.0	6945.0	0.435696

Crime rates per capita of neighbourhoods in Toronto

We had made use of Neighborhood Crime Rates 2014-2019 from Toronto Police Service and extracted the crime data from it. We only use the data of Break and Enter, Robbery and Theft Over in each neighbourhood as these are closely relevant to our business. We sum up the average of these 3 types of crimes from 2014-2019 as a total crime rate. By dividing by the population of each neighbourhood, the total crime rate per capita was found out.

	Neighbourhood	Population	BreakandEnter_AVG	Robbery_AVG	TheftOver_AVG	Total_crime_rate	Total_crime_rate_per_capita
0	Yonge-St.Clair	12528	23.3	5.7	4.3	33.3	0.002658
1	York University Heights	27593	113.2	75.8	36.3	225.3	0.008165
2	Lansing-Westgate	16164	38.8	14.7	7.0	60.5	0.003743
3	Yorkdale-Glen Park	14804	63.3	31.5	22.5	117.3	0.007924
4	Stonegate-Queensway	25051	52.8	20.7	6.0	79.5	0.003174

Number of grocery stores per capita in neighbourhoods in Toronto

We utilized the location data from Foursquare API to find out the number of grocery stores in each neighbourhood. By dividing the population, the number of grocery stores per capita was found out.

	Neighbourhood	Percentage_over_70k	Population	Total_crime_rate	Total_crime_rate_per_capita	Latitude	longitude	Number_of_grocery_stores	grocery_stores_per_capita
0	Agincourt North	0.411958	29113	88.4	0.003036	43.808038	-79.266439	1	0.000034
1	Agincourt South-Malvern West	0.372850	23757	120.4	0.005068	43.785353	-79.278549	1	0.000042
2	Annex	0.435696	30526	217.8	0.007135	43.670338	-79.407117	5	0.000164
3	Bay Street Corridor	0.311214	25797	332.3	0.012881	43.667342	-79.388457	9	0.000349
4	Beechborough-Greenbrook	0.247170	6577	31.1	0.004729	43.695030	-79.471683	1	0.000152

Methodology

In this project we try to find the top three neighbourhoods for opening a grocery store in Toronto. Such neighbourhoods should have a high percentage of households with income over 70,000 dollars, low number of grocery stores per capita and low crime rates per capita.

With the data collected, we will find out the top three neighbourhoods based on the criteria we have mentioned in the introduction section.

Firstly, we will find out all the neighbourhoods where the percentage of households with incomes over 70,000 dollars greater than that of the whole city of Toronto (0.407496). Among these neighbourhoods, we will find out five of them with the lowest number of grocery stores per capita. Finally, we will then select three out of these five neighbourhoods with the least crime rate per capita as our choices.

Results and Discussion

	Neighbourhood	Percentage_over_70k	Population	Total_crime_rate	Total_crime_rate_per_capita	Latitude	longitude	Number_of_grocery_stores	grocery_stores_per_capita
0	Agincourt North	0.411958	29113	88.4	0.003036	43.808038	-79.266439	1	0.000034
26	High Park-Swansea	0.500000	23925	81.5	0.003406	43.653867	-79.466864	1	0.000042
6	Birchcliffe-Cliffside	0.461371	22291	99.5	0.004464	43.711170	-79.248177	1	0.000045
14	Clairlea-Birchmount	0.425866	26984	146.9	0.005444	43.708823	-79.295986	1	0.000037
74	West Humber-Clairville	0.440233	33312	281.8	0.008459	43.735781	-79.625865	1	0.000030

By applying our criteria to analyse the data we collected, the results above have shown that Agincourt North, High Park-Swansea and Birchcliffe-Cliffside are the best three neighbourhoods in Toronto for opening our grocery store. These neighbourhoods have a higher percentage of households with income over 70,000 dollars compared to the average percentage of Toronto, low number of grocery stores and low crime rate per capita.

However, It is worth noting that although we know the household incomes matching with our target customer, we do not have information about the customer's background and their choices on products in these neighbourhoods. This can greatly affect what kind of products we should sell in our store. Also, we still need more research on the locations in which more people go for shopping as this has not been reflected in our project.

Conclusion

The purpose of this project is to find out the top 3 neighbourhoods to open the grocery store matching our criteria and the results have shown that they are Agincourt North, High Park-Swansea and Birchcliffe-Cliffside. Although this helps to narrow down the choices of neighbourhoods, it still needs further research on the customer's choice on products and the exact locations suitable for opening the store within these neighbourhoods.