Introduction

The purpose of this investigation is to use population statistics to see if trends can be found to suggest where a producer of meat, dairy, or egg substitute products might want to distribute or promote their products. Toronto will be examined for trends using data from the city of Toronto Open Data project and the Canadian Census bureau as well as the foursquare API. According to Vegetarian Resource Group 37% of people in the united states in 2016 avoided eating dishes containing meat, fish, or poultry at least part of the time when dining out[1]. In the UK vegan take out is the fastest growing area of take out meals[2] and the number of vegans in the US increased six times in 2018[3]. In Canada the majority of people committing to vegan or vegetarian lifestyles are under 35[4]. This suggests strongly that restaurants and grocery stores will likely want to carry alternatives to meat in the near future.

Data

The above data suggests that even restaurants that do not cater specifically to vegans and vegetarians might want to consider making some options available. The intention of this project is to look at trends in population density, gender, age, race, and income to determine if there are any significant trends that might indicate where there are more vegetarians or vegans and thus where vegetarian and vegan substitute products are in highest demand both by restaurants and home consumers. It will look for unforeseen trends as well as attempting to verify previous results, such as the larger portion of vegetarians and vegans being young.

Methodology

For this project data on the population statistics of the Greater Toronto Area will be taken from the Canadian census data and then the desired data will be extracted. Afterwards kmeans clustering would be used to divide the neighborhoods into clusters. The relevant data includes the fraction of males in the area, the fractions of females, the fraction people of European descent, the fraction of people of Asian descent, the fraction of people in the top five income deciles, the fraction of people employed, the fraction of people receiving public assistance, and the fraction of the population between fifteen and thirty-five years of age. Subsequently the number of vegan or vegetarian restaurants in close proximity to each neighborhood would be ascertained. The data would then be clustered and the individual clusters examined. The best k values for clustering would be assessed via the elbow test method. After this it would be assessed which neighborhoods in the desired cluster had the highest number of grocery stores in order to see what locations might be best for promotion or distribution.

Results

After the clustering was complete it was found that the greatest density of vegan and vegetarian restaurants was found in the cluster of neighborhoods near center city Toronto. There were four total clusters formed. The number was chosen using the elbow method with results showing cluster efficiency versus number below.

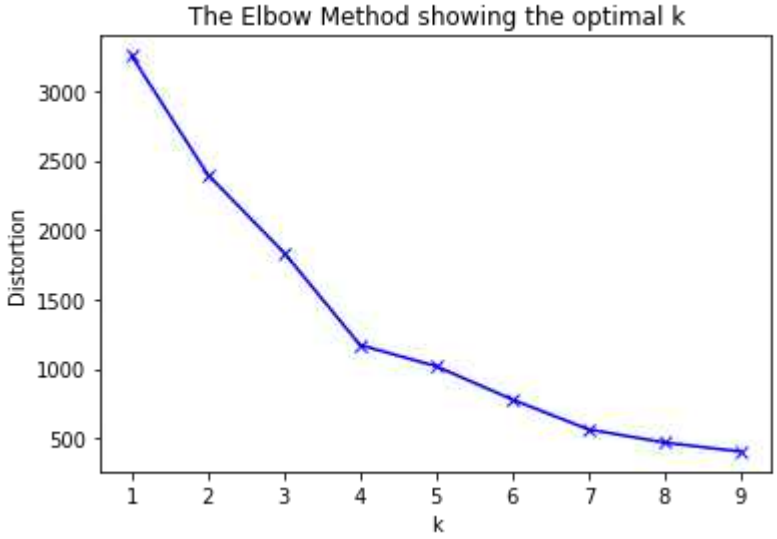

Fig. 1 Data collected versus cluster number.

Results

As expected it was found that these neighborhoods had a large portion of young people living in them compared to the other clusters. This cluster also had a high average population density. It was also found that the neighborhoods in this cluster have an average of nearly half of people in the top five deciles of income. There were a number of people on public assistance but not an extraordinary number. The neighborhood with the most nearby restaurants in the cluster did have the largest number of people considered to be high income. It was found that the neighborhood with the largest number of nearby grocery stores in the cluster was situated around the University of Toronto.

Conclusions

Due to the large number of young persons and the large quantity of nearby grocery stores I would recommend initial promotion and distribution efforts should take place in four neighborhoods. Those neighborhoods are Bay Street Corridor, Little Portugal, Trinity-Bellwoods, and University. In particular it would be best to target the university neighborhood due to a large density of grocery stores. However I would recommend further research to understand the possible correlation between vegetarianism/veganism and the factors measured for in this study as the evidence drawn is mostly inconclusive for most of the categories of data.

Citations

1. Oberst, Lindsay. “Statistics.” *The Vegan Society*, www.vegansociety.com/news/media/statistics.

2.Oberst, Lindsay. “Why the Global Rise in Vegan and Plant-Based Eating Isn't A Fad (600% Increase in U.S. Vegans + Other Astounding Stats).” *Food Revolution Network*, 18 Jan. 2018, foodrevolution.org/blog/vegan-statistics-global/.

3.Oberst, Lindsay. “Canada's Surprising New Proposed Health Guide Favors Plant-Based Foods and Ignores Industry Input.” *Food Revolution Network*, 21 July 2017, foodrevolution.org/blog/canada-plant-based-food-guide/.

4. Thomson, Aly. “Most Vegans, Vegetarians in Canada Are under 35: Survey.” *The Globe and Mail*, 13 Mar. 2018, www.theglobeandmail.com/canada/article-most-vegans-vegetarians-in-canada-are-under-35-survey/.

https://www.toronto.ca/city-government/data-research-maps/open-data/