Is there a correlation between a restaurants Foursquare rating and the income levels of a neighborhood ?

James Mbuthia

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1. Introduction

1.1 Background

One of the most interesting questions that data science can hopefully answer is, is the service better in restaurants in higher income areas than in lower income areas? Is there a correlation between income levels and restaurant ratings? This is an interesting question because conventional opinion would say that restaurants in higher income areas have better service which leads to better ratings because the restaurant's patrons will demand better service or the restaurant will offer better service when in a high income neighborhood. But can the data prove that or are people biased to think that?

My study will look at the data and see whether we can confirm that restaurant service does differ depending on the income levels of the neighborhood. If the study shows there is a link between poor Foursquare ratings and income levels, this would be of major interest to business owners, to restaurant patrons and to the city's management team. For business owners running a restaurant, they might spot an opportunity to gain customers by improving their customer service. Patrons living in low income neighborhoods would have the ammunition to demand better customer service in the restaurants they frequent. City hall officials might also see this as a form of income segregation and work harder to ensure restaurants in low income areas have the same amenities as those in middle or high income areas.

The city I have chosen for this study is Toronto, Canada. It's a relatively wealthy city with a population of approximately 6.5 million people (2016 census). It is also one of the most diverse, multicultural and multiracial cities in the world, 51% of the population is made up of visible minorities according

to the 2016 census. The big and varied population has resulted in a large number of restaurants and fast food places offering all types of cuisine from Indian to Chinese to South Korean to Ethiopian. This is good for our study as it means we can get a diverse number of restaurants to sample.

According to the 2016 Canada census, the median total household income in Toronto was $65,829. Low income households have an average income of $32,000 per year. Middle income neighborhoods have an average income of $49,000 per year and high income households have an average income of $102,000 per year. We will use these income levels as a guide in our study.

2. Data acquisition and cleaning
2.1 Data Sources

We need the following sets of data to work on this study:
1) A Toronto neighborhood dataset showing average income per neighborhood in Toronto. We have sourced this dataset from the Open Data website for the City of Toronto,
https://open.toronto.ca/dataset/neighbourhood-profiles/

2) A Toronto neighborhood restaurant dataset with average restaurant ratings. We will source this data from Foursquare by collecting the average ratings of restaurants in each Toronto neighborhood using the Toronto dataset above and the Foursquare API.