

Applied Data Science Capstone - Coursera course

Report - final project

Introduction / Problem

The idea of the project is to determine the optimal neighborhood to pick a hotel in, or similar, for a family trip to one of Canada's 5 largest cities. The cities and their corresponding neighborhoods are Toronto, Montreal, Vancouver, Calgary and Edmonton. The important underlying assumption are, that the family has planned trips to site seeing spots during the day, but in the evenings and mornings, everyone wants to pursue their individual interests. Further, the family is indifferent between the cities.

Therefore, the goal is to find the neighborhood that best meets the interests and demands of the made-up, stereotypical family, consisting of the parents, a son and a daughter. The evaluation of the neighborhoods is based on a scoring system, in which, to allow the parents an as much as possible stress-free trip, the kids' priorities have higher weights.

It is assumed that each family member has a list of 5 venues that they would like to visit with the least time spent travelling from one neighborhood to another, in order to better be able to visit more venues. Thus, the ideal neighborhood includes as many of the preferred venues as possible. The venues have been chosen from the list of available ones in the neighborhoods of the five cities.

Parents	Mom	Dad	Kids	Son	Daughter
40 pts	Yoga Studio	Golf Course	50 pts	Hockey Arena	Recreation Center
30	Café	Bagel Shop	40	Nightclub	Accessories Store
20	Museum	Karaoke Bar	30	Bar	Movie Theater
10	Jewelry Store	Wine Bar	20	Comedy Club	Shopping Mall
5	Shoe Store	Steakhouse	10	Pizza Place	Gym

The code resulting from this project will produce two major results. First, it will recommend the neighborhood and city to which a trip will lead to the most overall points, thus the greatest common benefit. Second, it will recommend a second option that maximizes the outcome of the most dissatisfied family member. Hence, the second option maximizes the minimum points of the individual family members, whereas the first option maximizes the overall sum.

Data used for the project

The data for the project is obtained from three sources. First, the postal codes and names of the neighborhoods in the five cities are scraped from Wikipedia. These codes are then matched, by postal code, with the latitude and longitude geospatial data obtained from geonames.org. Lastly, the venue data is accessed through the foursquare API.

Combining the information included in the data, it is possible to rank the neighborhoods according to the order in which they meet the preferences outlined above.

Methodology

Using the foursquare API, the top 100 venues within 700 meters of the geospatial data-based neighborhood location is used to collect the information on which venues are easily accessible from each neighborhood.

Here, neighborhoods that do not include a hotel / hostel / inn, thus a place to stay during a vacation, are excluded from the neighborhood sample.

Each remaining neighborhood then receives points on how well it meets the family members' preferences, individually scored per family member, based on one-hot-coding. Neighborhoods do not receive points for containing additional venues of the same type after the first. Thus, a neighborhood with 2 Yoga Studios will receive just as many "Mom points" as a neighborhood with 1 or 5 such venues.

The overall family score as the sum of the individual scores and the minimum preference score as the minimum of the individual scores are subsequently calculated.

Finally, the neighborhoods are ranked based on their score.

Results

The results show that the optimal neighborhood, using the highest family level score, for a family trip and the chosen preferences, is North Downtown in the Edmonton. On the other hand, the optimal neighborhood with the highest level of minimal "happiness" as the maximum of the minimums of individual scores by neighborhood, is SW Downtown in Vancouver.

Furthermore, if the family were to randomly pick a neighborhood but decide on a city to travel to, the best chance for high satisfaction is to travel to Montreal, since there the median family score of all neighborhoods is the highest.

Discussion and Conclusion

The project shows that if preferences can be quantified and a lower distance to sought after venues is a necessary condition for preferences to be fulfilled, using geospatial data to pick a hotel within a specific neighborhood is beneficial to obtaining a desired outcome.

With the caveat being the outlined assumptions, the results prove that not every neighborhood is suitable for a hotel or similar to attract every kind of customer.

A trip advisor who considers the needs and interest of their clientele, which at least some probably already do, to first determine the appropriate neighborhoods and then hotels, potentially even the destination city last, when recommending trips, may be better at meeting their needs and satisfying them. This in turn may lead a higher customer retention and attraction rate.