Smart recommendation system based on personal preferences profile and data about venues

Coursera Capstone Project

Ilja Pavlovs - 12 September 2019

Introduction

In my project I consider such case: Policeman wants to choose Police department where he will work considering his hierarchical profile of preferences. This problem can be scaled and used as worker distribution system for different professions. System will separate them into different offices or into their work departments in town. It is important optimisation problem which will result in higher level of worker satisfaction and as a result higher work efficiency.

Data

- Data Source: https://open.toronto.ca/dataset/police-facility-locations/ (Toronto first Open Data Portal launched in 2009). Data contains such features: id, Facility Name, Adress, Provider, Postal Code and geometry (containing coordinates). For recommendation system I use only Facility Name and coordinates. Then I process data so it separates coordinates into latitude and longitude. This data later is used for requesting information about venues via Foursquare API.
- Foursquare API (I used Foursquare API to get venue categories near police departments). I requested most popular venues nearby for each Police Division. Data contained such features as name (name of venue), categories, lat (lattitude) and long (longitude)

Methodology

Firstly police facility location database is downloaded and processed. Only Police Departments containing “Division” are used.

Subsequently locations of the venues near the Police Divisions are requested via Foursquare API. Then top 10 venues are generated for each Police Division.
After that user preferences are determined by asking user to input top five important for him venues that should be located near Police Division. Then algorithm counts weighted sum of venues which present near the Police Division for every Police Division. Then Police Division with higher score are recommended to user. If there are more than one Police Divisions with same score they both are recommended. Recommended Police Divisions are visualised on the map.

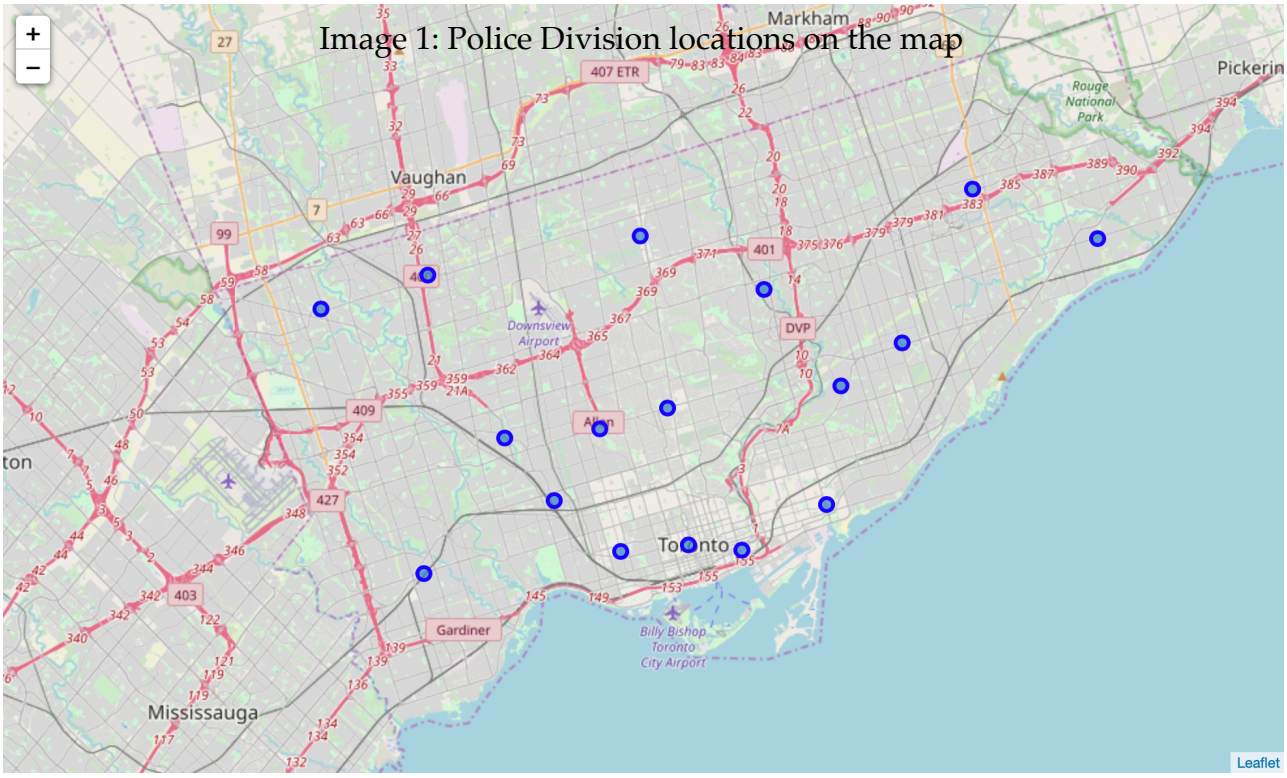

Image 1: Police Division locations on the map

Results

Recommendation system performed well and recommended Police Division near the venues which was first in my preference list.

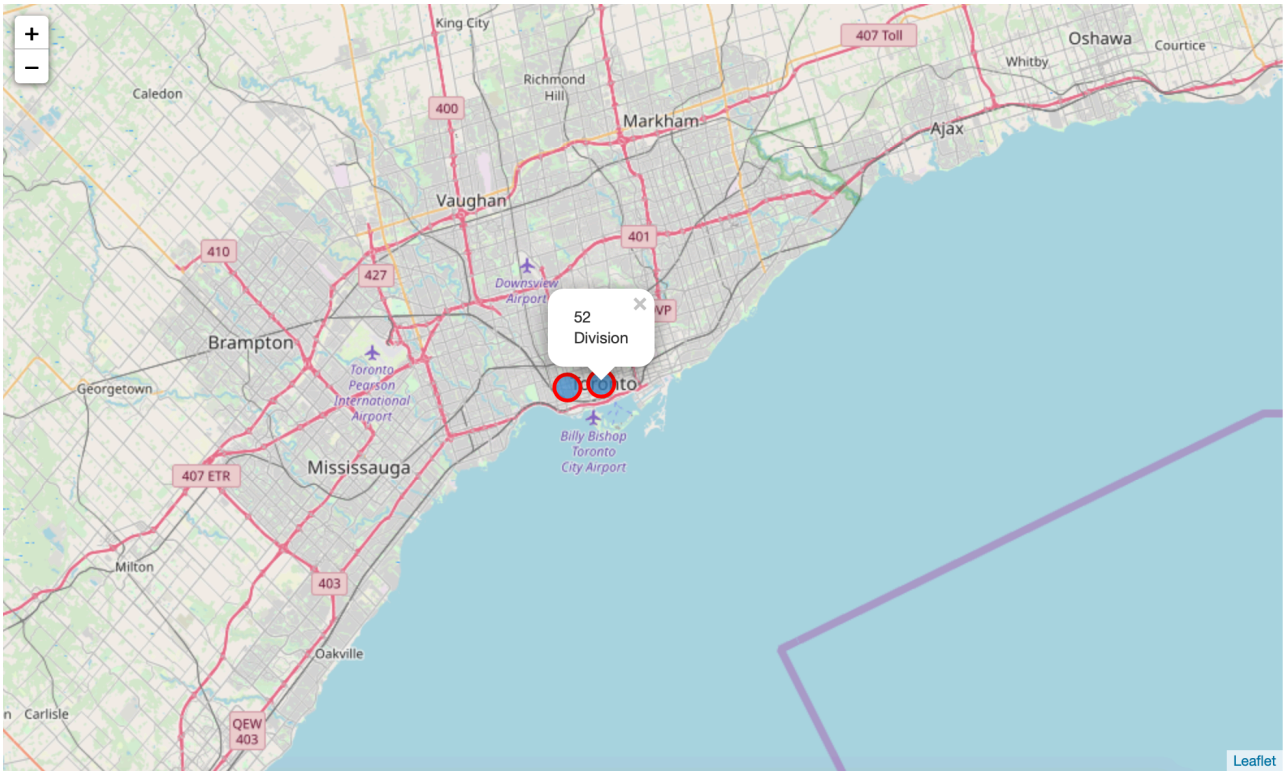

Image 2. Output example.

Improvements

Program can take into account worker home location, because it's important feature. Also user preference profile could be generated in more complex way. Also its possible to build categories on top of venue categories and use them for analysis and preference profile building. It will make reduce system sensitivity and make outcome easier to interpret.

Conclusion

During this project recommendation system was built. It performed well in taking user preferences and generating recommended place of work, but it still need to have some improvements. This model can be scaled to fit similar kinds of problems for workers in other spheres.