Location recommendation of venues based on data from Foursquare

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Introduction

- ▶ Location-Based Social Networks (LBSN), as one of the characteristics of social networks, is also accompanied by the development of these software.

- ▶ Therefore, it is important for social networks to make personalized recommendations about what they are about to do.

- ▶ The main purpose is not only to make the user more convenient, but also to produce a series of commercial value.

- ▶ This report mainly focuses on when the user does not know where to make a new venue and which kind of venue is the best choice, he needs to make specialised recommendations based on the previous queries.

Data acquisition and cleaning

▶ This article uses the POI data set of the user's check-in records in Toronto on Foursquare. Each data records the location category, latitude, longitude and venue.

▶ After data cleaning, 2,223 of 3,000 queries are used for model contributing, which can be classified into 270 categories.


```
In [58]: tor_venues
```

2210	Kingsview Village, Martin Grove Gardens, Richv...	43.688905	-79.554724	Ital Pizza	43.690136	-79.559979	Pizza Place
2211	Kingsview Village, Martin Grove Gardens, Richv...	43.688905	-79.554724	Rogers	43.692620	-79.557402	Mobile Phone Shop
2212	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	Subway	43.742421	-79.589471	Sandwich Place
2213	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	Shoppers Drug Mart	43.741685	-79.584487	Pharmacy
2214	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	Popeyes Louisiana Kitchen	43.741202	-79.584545	Fried Chicken Joint
2215	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	Sheriff's No Frills	43.741696	-79.584379	Grocery Store
2216	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	The Beer Store	43.741694	-79.584373	Beer Store
2217	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	Pizza Pizza	43.741509	-79.584489	Pizza Place
2218	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	McDonald's	43.741757	-79.584230	Fast Food Restaurant
2219	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	Sunny Foodmart	43.741840	-79.590561	Grocery Store
2220	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437	LCBO	43.741508	-79.584501	Liquor Store
2221	Northwest	43.706748	-79.594054	Economy Rent A Car	43.706471	-79.589943	Rental Car Location
2222	Northwest	43.706748	-79.594054	Saand Rexdale	43.705072	-79.590725	Drugstore

```
: print('There are {} uniques categories.'.format(len(tor_venues['Venue Category'].unique())))

There are 270 uniques categories.
```
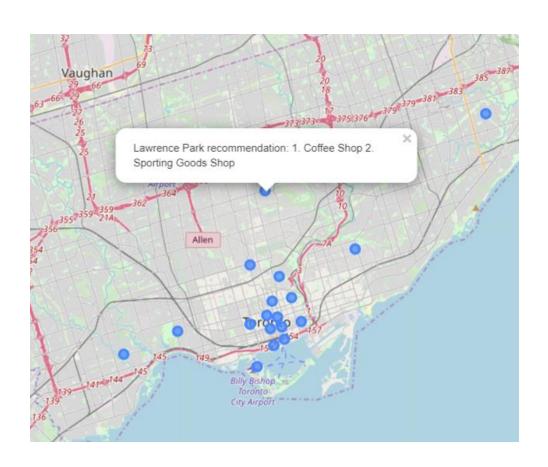
Exploratory data analysis

▶ After making these queries by one-hot method, we can get the frequency of these venues in each areas, and the higher the frequency gets, the more common this venue be in this area.

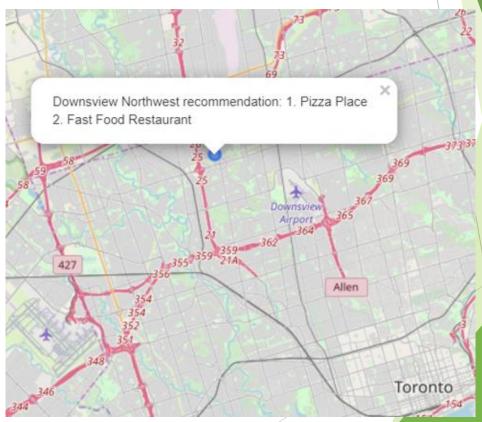▶ Based on that, we can get the recommendation model.

```
----Adelaide, King, Richmond----
                venue  freq
0          Coffee Shop  0.08
1                 Café  0.05
2            Steakhouse  0.04
3                  Bar  0.04
4      Thai Restaurant  0.03
5     Asian Restaurant  0.03
6         Burger Joint  0.03
7            Restaurant  0.03
8      Sushi Restaurant  0.03
9           Salad Place  0.03
```

PostalCode	Borough	Neighborhood	Latitude	Longitude	RecommendedOne	RecommendedTwo
M1B	Scarborough	Rouge, Malvern	43.806686	-79.194353	Fast Food Restaurant	Women's Store
M1C	Scarborough	Highland Creek, Rouge Hill, Port Union	43.784535	-79.160497	Bar	Women's Store
M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711	Rental Car Location	Pizza Place
M1G	Scarborough	Woburn	43.770992	-79.216917	Coffee Shop	Korean Restaurant
M1H	Scarborough	Cedarbrae	43.773136	-79.239476	Fried Chicken Joint	Thai Restaurant
M1J	Scarborough	Scarborough Village	43.744734	-79.239476	Spa	Playground
M1K	Scarborough	East Birchmount Park, Ionview, Kennedy Park	43.727929	-79.262029	Discount Store	Chinese Restaurant
M1L	Scarborough	Clairlea, Golden Mile, Oakridge	43.711112	-79.284577	Bakery	Bus Line
M1M	Scarborough	Cliffcrest, Cliffside, Scarborough Village West	43.716316	-79.239476	Motel	American Restaurant
M1N	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848	Café	College Stadium
M1P	Scarborough	Dorset Park, Scarborough Town Centre, Wexford ...	43.757410	-79.273304	Indian Restaurant	Pet Store
M1R	Scarborough	Maryvale, Wexford	43.750072	-79.295849	Middle Eastern Restaurant	Auto Garage

Results

From the model, we can get:

- Position recommendation of one given venue

- Venue recommendation of one given area

Lawrence Park recommendation: 1. Coffee Shop 2. Sporting Goods Shop

Downsview Northwest recommendation: 1. Pizza Place 2. Fast Food Restaurant

Discussion

There are still some problems:

▶ The framework constructed in this paper is general and can be further expanded in many aspects according to the needs of actual data.

▶ We can further improve the steps and logic of the algorithm.

▶ The calculated results cannot be directly applied to three-dimensional buildings such as department stores.

Thanks !!