Recommend a venue in Chicago based on a user's taste

Capstone Project of IBM Data Science Certificate

Introduction/Business Problem

- Point of interest (POI) recommendation helps people find useful and interesting places, and location-based social networks (LBSNs), for example, Foursquare

- Foursquare provides the check-in, like, tip, and other functions for users, which makes it possible to construct a list of users' like and even the preference of each user. Therefore, an accurate personalized POI recommendation can be made according to users' tastes

- The recommendation system not only lifts the burden of users in searching location information but also provides values for third-party companies to advertise and to forecast service demand

Data

- The venue information is acquired from the Foursquare API

- Due to the restriction of free account in the Foursquare, one user with a profound profile is selected, and the taste of the user is analyzed by a user-created like-list

- The geographical influence is simplified by dividing Chicago into 246 neighborhoods, and hence a nearby location can be selected

Methodology

- A list of neighborhoods in Chicago on Wikipedia is scraped by the library BeautifulSoup, and a dataframe of 246 neighborhoods is constructed

- The latitude and the longitude information are searched by the library geopy.geocoders

- The Foursquare API explores the venues information as JSON format within the limit of each neighborhood

Methodology-cont.

- The coffee shop with the highest score is then explored into the tips. The tip with the highest agree count is filtered, and the user who left the tip is selected as the target user

- The user is then explored, and a like-list is used to find his/her taste. The items in the list are categorized, and the user's favorite categories are found

- The venues in Chicago are sorted based on the favorite categories and the rating. The top venues are then recommended to the user.

Results and discussion

- The top 5 venues for each neighborhood

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Albany Park	Bus Station	Convenience Store	Asian Restaurant	Food Truck	Gym Pool
1	Altgeld Gardens	Park	Fast Food Restaurant	Women's Store	Factory	Eastern European Restaurant
2	Andersonville	Italian Restaurant	Coffee Shop	Pet Store	Lounge	Sandwich Place
3	Archer Heights	Mexican Restaurant	Bakery	Gas Station	Grocery Store	Pharmacy
4	Armour Square	Chinese Restaurant	Sandwich Place	Cosmetics Shop	Breakfast Spot	Grocery Store
5	Ashburn	Clothing Store	Mexican Restaurant	Locksmith	Fried Chicken Joint	Park
6	Avalon Park	Business Service	Burger Joint	Fast Food Restaurant	Food	Grocery Store
7	Avondale	Bakery	Mexican Restaurant	Bar	Donut Shop	Park
8	Back of the Yards	Mexican Restaurant	Pizza Place	Bank	Grocery Store	Clothing Store
9	Belmont Gardens	Fast Food Restaurant	Discount Store	Food	Entertainment Service	Flea Market
10	Belmont Terrace	Liquor Store	Salon / Barbershop	Home Service	Automotive Shop	Bank

Top coffee shops in the neighborhoods of Chicago

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Venue ID	Rating
1684	Logan Square	41.928400	-87.706764	Sip of Hope	41.924656	-87.703974	Coffee Shop	5ac6e19d78782c6401c32429	9.0
622	Dearborn Park	41.866553	-87.628954	Stan's Donuts & Coffee	41.867516	-87.626402	Coffee Shop	569a2c27498e9defd6054348	9.0
839	Edgewater	41.983369	-87.663952	The Coffee Studio	41.984374	-87.669105	Coffee Shop	4a54e2b2f964a52062b31fe3	8.8
895	Edgewater Beach	41.983369	-87.663952	The Coffee Studio	41.984374	-87.669105	Coffee Shop	4a54e2b2f964a52062b31fe3	8.8
538	Clarendon Park	41.963275	-87.648840	Everybody's Coffee	41.965519	-87.653944	Coffee Shop	534d3962498e0eb23f7dfa5b	8.8

A list of venuelikes that the user created

```
results['response']['lists']['groups'][0]['items'][1]
```

```
{'id': '169953/venuelikes',
 'name': 'ben's Liked Places',
 'description': '',
 'placesSummary': "Joe's Pizza, Lucky Dorr Patio & Tap, Otto's Place, Au Pied de Cochon",
 'type': 'liked',
 'user': {'id': '169953',
```

Items in the list of venuelikes

```python
ben_likes_list = []
ben_likes_list.append([(
    place['venue']['id'],
    place['venue']['name'],
    #place['venue']['location']['city'],
    place['venue']['categories'][0]['name']) for place in ben_likes])
ben_likes_list
```

[[('3fd66200f964a520dbea1ee3', 'The Blind Tiger', 'Beer Bar'),
  ('45ebc982f964a52091431fe3', "Joe's Pizza", 'Pizza Place'),
  ('59653657018cbb46a640bd78', 'Lucky Dorr Patio & Tap', 'Beer Bar'),
  ('4bdc54552a3a0f477c54b2b6', 'Flying Saucer', 'Breakfast Spot'),
  ('40b28c80f964a52029fc1ee3', "Delilah's", 'Whisky Bar'),
  ('4bc9e445937ca593cc86a692', 'Tiztal Cafe', 'Breakfast Spot'),
  ('4df4e6b763659543662d05a7', "Otto's Place", 'American Restaurant'),
  ('4adb95ebf964a5202d2921e3', 'Le Garde-Manger', 'Seafood Restaurant'),
  ('4b84801af964a520fd3831e3', 'Joe Beef', 'Steakhouse'),
  ('4ad4c06bf964a52046f920e3', 'Au Pied de Cochon', 'French Restaurant'),
  ('49ea7b74f964a5206e661fe3',
   "Pappy & Harriet's Pioneertown Palace",
   'BBQ Joint'),
  ('4b4e9dc9f964a520b2f226e3', 'Carnevor Steakhouse Moderne', 'Steakhouse'),
  ('5c09d27867af3a002cb81bbc', 'The Swill Inn', 'Pub'),
  ('4c1f8dd3b306c928029768b7', 'Girl & the Goat', 'New American Restaurant'),
  ('4b05865cf964a520d05e22e3', 'Proof on Main', 'Bar'),
  ('4e39e96588772c3bf11d150a', "Jimmy's Pizza Cafe", 'Pizza Place'),
  ('5a76331e0336935b3dcf3eab', 'SGD DUBU - @h mart', 'Korean Restaurant'),
  ('49e4e821f964a52067631fe3', 'Spacca Napoli Pizzeria', 'Pizza Place'),
  ('4b16cd4ff964a520b0bd23e3', "Kaufman's Bagel & Delicatessen", 'Bagel Shop'),
  ('4a2c3405f964a5202f971fe3', "Weegee's Lounge", 'Cocktail Bar'),
  ('5bd388af9ef8ef003953e234', 'Beermiscuous', 'Beer Bar'),
  ('4b69c83bf964a520e0b32be3', 'The Ivy Club', 'Lounge'),
  ('4db4670d316a3bec525cc66a', 'Scafuri Bakery', 'Bakery'),
  ('529918be498e59fe18712653', 'chair 9', 'Cocktail Bar'),
  ('55f43027498efda6b370df8c', 'Esphahan', 'Indian Restaurant'),
  ('4dfe2580d22d056d59a6cefb', 'Upre', 'Food'),
  ('515d96d2e4b07a8438b3936a', 'Sheesh Mahal At Leela', 'Indian Restaurant'),
  ('4bab1b3ef964a52051953ae3', 'Bukhara', 'North Indian Restaurant'),
  ('4ad8ac03f964a520921321e3',
   "Bombacigno's J & C Restaurant",
   'Italian Restaurant'),
  ('5ab54763b25fee59a956539f', 'Din Tai Fung', 'Chinese Restaurant')]]

Venues the user likes

```python
df_ben_likes = pd.DataFrame([item for venue_list in ben_likes_list for item in venue_list])
df_ben_likes.columns = ['ID', 'Name', 'Category']
df_ben_likes
```

	ID	Name	Category
0	3fd66200f964a520dbea1ee3	The Blind Tiger	Beer Bar
1	45ebc982f964a52091431fe3	Joe's Pizza	Pizza Place
2	59653657018cbb46a640bd78	Lucky Dorr Patio & Tap	Beer Bar
3	4bdc54552a3a0f477c54b2b6	Flying Saucer	Breakfast Spot
4	40b28c80f964a52029fc1ee3	Delilah's	Whisky Bar
5	4bc9e445937ca593cc86a692	Tiztal Cafe	Breakfast Spot

The number of each category in the list

```
df_ben_likes.Category.value_counts()
```

```
Beer Bar                  3
Pizza Place               3
Indian Restaurant         2
Steakhouse                2
Breakfast Spot            2
Cocktail Bar              2
New American Restaurant   1
North Indian Restaurant   1
Bagel Shop                1
French Restaurant         1
Korean Restaurant         1
Seafood Restaurant        1
Food                      1
BBQ Joint                 1
Italian Restaurant        1
Lounge                    1
Bar                       1
Pub                       1
Whisky Bar                1
Chinese Restaurant        1
American Restaurant       1
Bakery                    1
Name: Category, dtype: int64
```

Recommended beer bar in Chicago

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Venue ID	Rating
11	Andersonville	41.977139	-87.669273	Hopleaf Bar	41.975813	-87.668509	Beer Bar	412a8500f964a520770c1fe3	9.1
2209	Near North Side	41.900033	-87.634497	Centennial Crafted Beer & Eatery	41.895807	-87.632539	Beer Bar	58c1b0879b7eac37c66519f5	9.1
3491	Wrigleyville	41.947022	-87.656477	Lucky Dorr Patio & Tap	41.948660	-87.656829	Beer Bar	59653657018cbb46a640bd78	8.8
77	Andersonville	41.977139	-87.669273	Meeting House Tavern	41.973295	-87.667916	Beer Bar	5b16e138db3aef0024361aac	7.4
2450	O'Hare	41.977928	-87.902955	Goose Island Beer Co.	41.977056	-87.907214	Beer Bar	581e34531338633a85a462a3	7.4

Recommended pizza place in Chicago

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Venue ID	Rating
1132	Goose Island	41.910048	-87.655765	Pizzeria Bebu	41.909237	-87.651089	Pizza Place	58962beb375c4a79fe9ecdb0	9.1
325	Boystown	41.943883	-87.649267	Dimo's Pizza	41.945113	-87.654730	Pizza Place	4a3b2be5f964a52098a01fe3	8.8
625	Dearborn Park	41.866553	-87.628954	Flo & Santos	41.865398	-87.626123	Pizza Place	4bc7b41e92b376b08c4e503a	8.7
639	Dearborn Park	41.866553	-87.628954	Giordano's	41.864562	-87.624400	Pizza Place	5284eb42498e7b97a8388083	8.5
411	Buena Park	41.957810	-87.652833	Michael's Original Pizzeria & Tavern	41.956879	-87.651865	Pizza Place	4b0b3045f964a520552e23e3	8.4

Remarks

- The more specific recommended venues can be recommended if the current location of the user is known since the venue latitude and longitude can be used to calculate the distance between the user and the target

- If quota permitted, all the list of the user can be explored. Then, the number of each category will be more representative. Also, more investigations can be performed on the other users and their like lists. Based on these lists, the users who have similar like venues can be retrieved. Then, the collaborative filtering can be used to recommend potential venues.

Conclusion

- In this study, a simple recommendation system for places in Chicago is investigated

- The Foursquare API is used to provide location information, the user information, and the rating list of each category of places

- More than 150 neighborhoods in Chicago are explored, and the venues in these neighborhoods are obtained with the location, category, and rating

- The taste of a user is determined based on the user-creating like list. Then, a list of beer bar and pizza place which the user preferred are recommended with the ratings

- The recommendation system not only lifts the burden of users in searching location information but also provides values for third-party companies to advertise and to forecast service demand.