

The background image shows a close-up perspective of a building's exterior wall. The wall is covered in a grid-like pattern of small, light-colored tiles or panels. The perspective is from a low angle, looking up at the building, which has a curved, slightly upward-sloping profile. The lighting suggests it might be late afternoon or early evening.

RECOMMENDED FOOD VENUES IN N.Y



INTRODUCTION

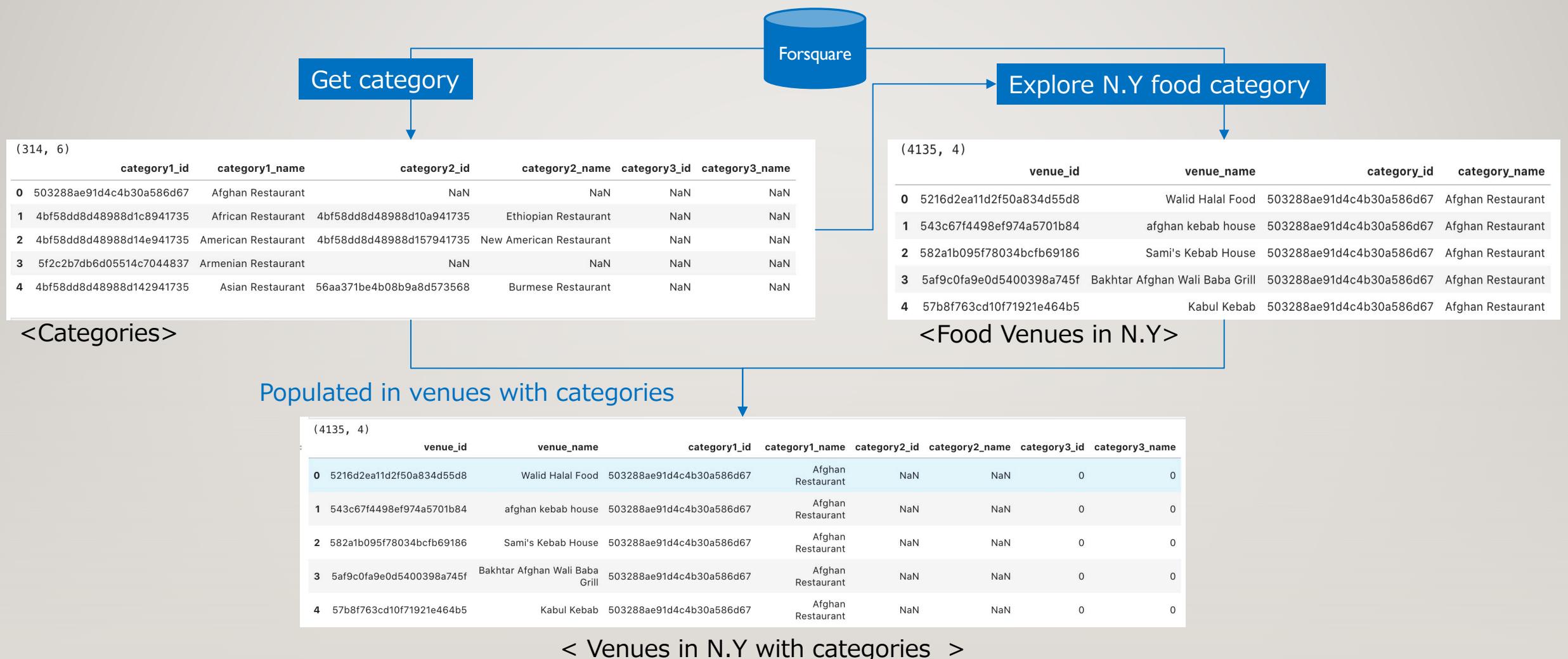
- My client who operates some food venues in New York often mailed to customers who ever visited there in order to drive sales. But his sales volume has not increased more than he expected.
- Now he thinks that any strategy is needed to invite new customer. So, I propose finding prospective new customer on Forsqare users and advertise them by any means.

EXPLORING DATA

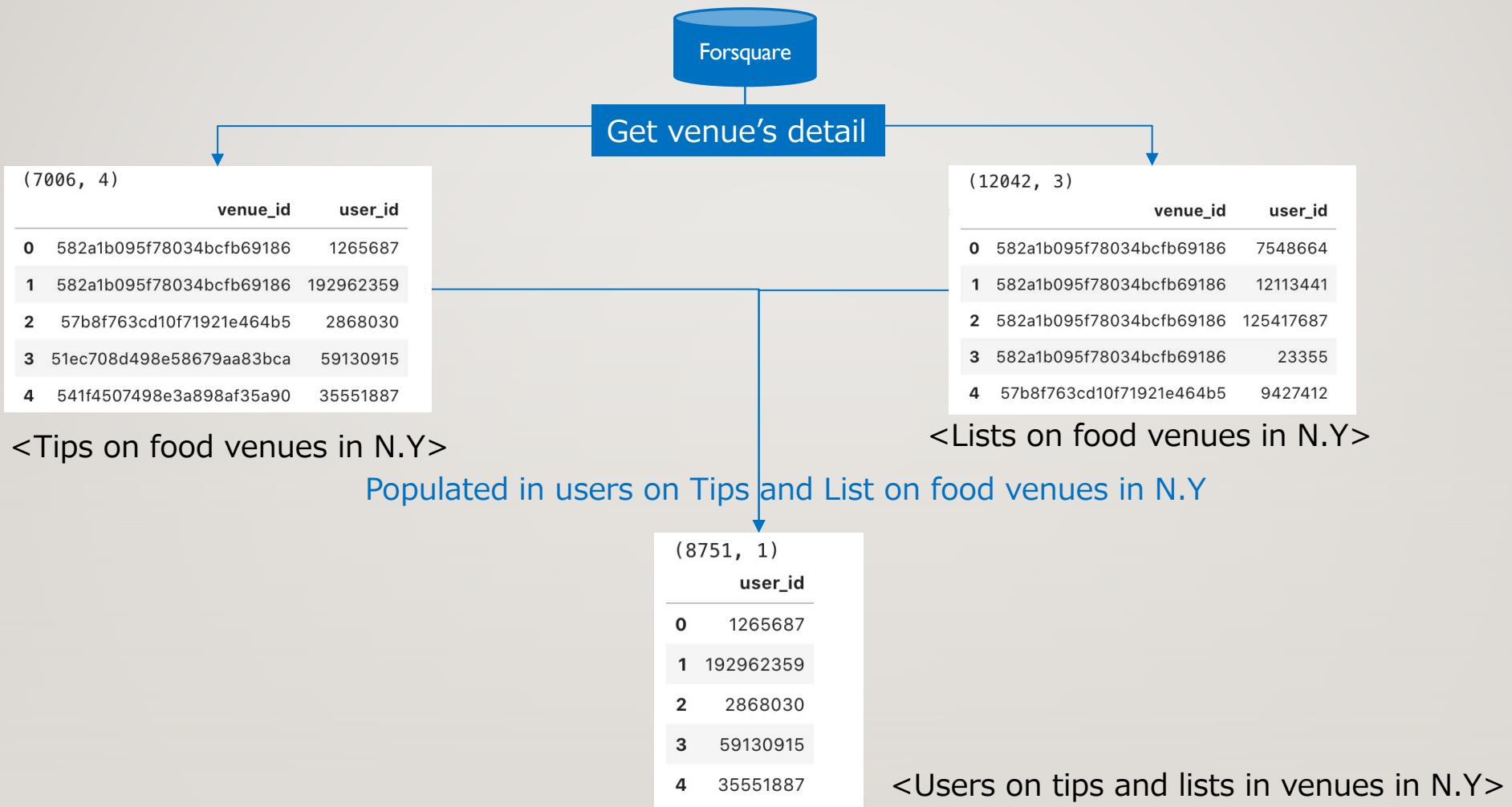
- Foursquare provides **venues** and **users with tips, lists and liked**, so that we can assume what kind of people is interested in what kind of venue in a certain extent. These data can be utilized to recommend food venues which he has not yet visited.

(Unfortunately, venues which has been visited by users actually are not requested by other than themselves.)

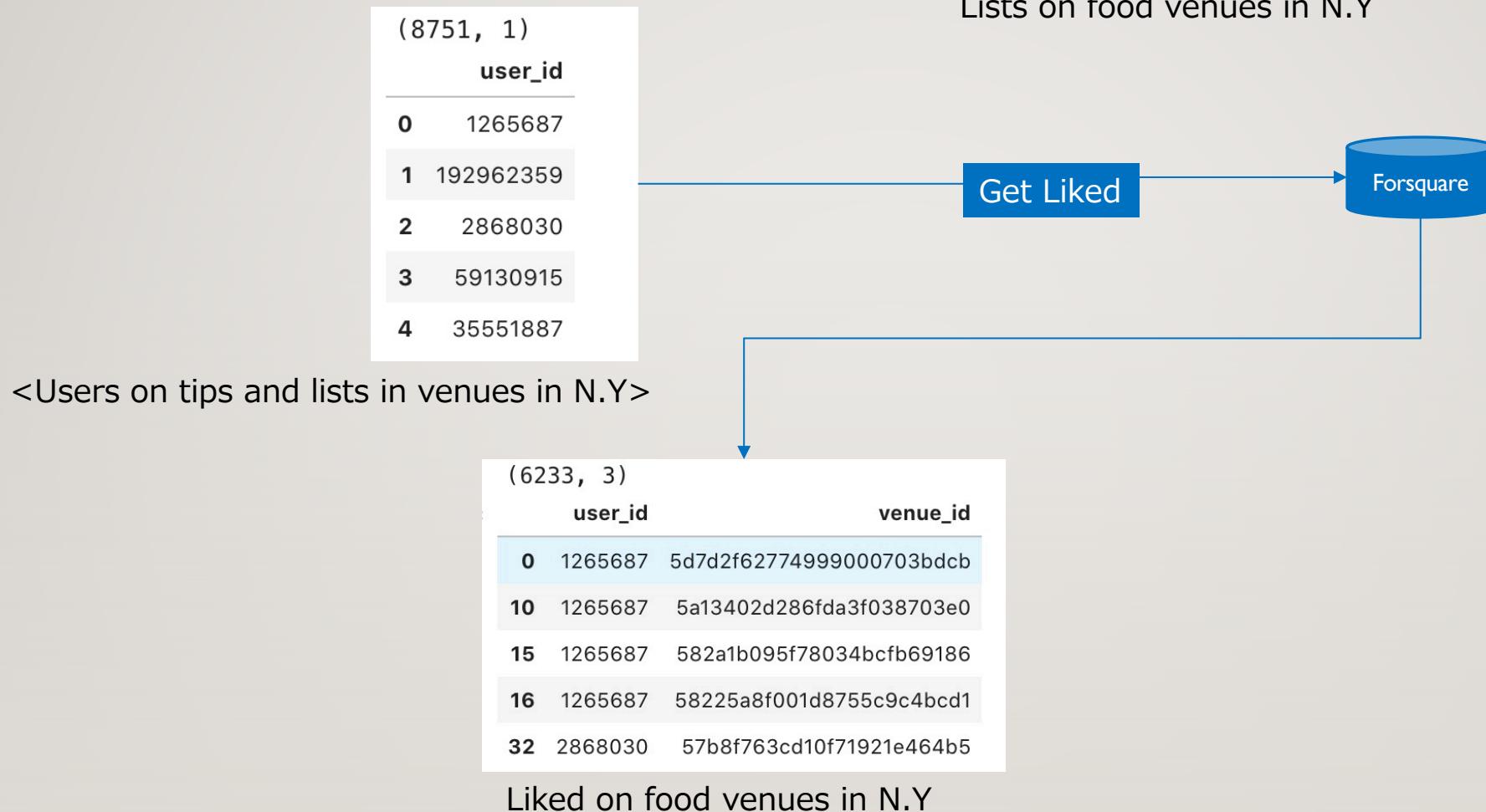
Venues with categories



Tips and lists



Liked



SCORING

- liked venues as 3
- venues on lists as 4 and ones on tips as 5
- venues same category as on lists and tips as 2
- venues same super-category as on lists and tips as 1

Scores (1)

<Tips on food venues in N.Y>

(7006, 4)		
	venue_id	user_id
0	582a1b095f78034bcfb69186	1265687
1	582a1b095f78034bcfb69186	192962359
2	57b8f763cd10f71921e464b5	2868030
3	51ec708d498e58679aa83bca	59130915
4	541f4507498e3a898af35a90	35551887

<Lists on food venues in N.Y>

(12042, 3)		
	venue_id	user_id
0	582a1b095f78034bcfb69186	7548664
1	582a1b095f78034bcfb69186	12113441
2	582a1b095f78034bcfb69186	125417687
3	582a1b095f78034bcfb69186	23355
4	57b8f763cd10f71921e464b5	9427412

Liked on food venues in N.Y

(6233, 3)		
	user_id	venue_id
0	1265687	5d7d2f62774999000703bdcb
10	1265687	5a13402d286fda3f038703e0
15	1265687	582a1b095f78034bcfb69186
16	1265687	58225a8f001d8755c9c4bcd1
32	2868030	57b8f763cd10f71921e464b5

Lists on food venues in N.Y

	user_id	venue_id	score
0	1265687	582a1b095f78034bcfb69186	5
1	192962359	582a1b095f78034bcfb69186	5
2	2868030	57b8f763cd10f71921e464b5	5
3	59130915	51ec708d498e58679aa83bca	5
5	35551887	541f4507498e3a898af35a90	5

Scores on food venues in N.Y

Scores (2)

Scores on food venues in N.Y

user_id	venue_id	score
0 1265687	582a1b095f78034bcfb69186	5
1 192962359	582a1b095f78034bcfb69186	5
2 2868030	57b8f763cd10f71921e464b5	5
3 59130915	51ec708d498e58679aa83bca	5
5 35551887	541f4507498e3a898af35a90	5

<Users on tips and lists in venues in N.Y>

4125, 4	venue_id	venue_name	category1_id	category1_name	category2_id	category2_name	category3_id	category3_name
0 32162a1256a4686	Valle Motel	503336ef04a64203607	Alpin	Restaurant	N/A	N/A	1	C
1 503336ef04a64203607	Afghan Motel Hotel	503336ef04a64203607	Alpin	Restaurant	N/A	N/A	1	C
2 503336ef04a64203607	Sant's Motel Hotel	503336ef04a64203607	Alpin	Restaurant	N/A	N/A	1	C
3 503336ef04a64203607	Delhi Motel Hotel	503336ef04a64203607	Alpin	Restaurant	N/A	N/A	1	C
4 503336ef04a64203607	Valle Motel	503336ef04a64203607	Alpin	Restaurant	N/A	N/A	1	C

Extract from
Same category1

Extract from
Same category2

Extract from
Same category3

Concatenate

(13596757, 3)		
user_id	venue_id	score
0 1265687	582a1b095f78034bcfb69186	2
1 1265687	57b8f763cd10f71921e464b5	2
2 1265687	51ec708d498e58679aa83bca	2
3 1265687	541f4507498e3a898af35a90	2
4 1265687	4d1e78d2dd6a236a57532738	2

(7084967, 3)		
user_id	venue_id	score
0 1265687	582a1b095f78034bcfb69186	1
1 1265687	57b8f763cd10f71921e464b5	1
2 1265687	51ec708d498e58679aa83bca	1
3 1265687	541f4507498e3a898af35a90	1
4 1265687	4d1e78d2dd6a236a57532738	1

(15218507, 3)		
user_id	venue_id	score
0 1265687	582a1b095f78034bcfb69186	5
1 192962359	582a1b095f78034bcfb69186	5
2 2868030	57b8f763cd10f71921e464b5	5
3 59130915	51ec708d498e58679aa83bca	5
5 35551887	541f4507498e3a898af35a90	5

< Venues in N.Y with categories >

(2561259, 3)		
user_id	venue_id	score
0 1265687	582a1b095f78034bcfb69186	1
1 1265687	57b8f763cd10f71921e464b5	1
2 1265687	51ec708d498e58679aa83bca	1
3 1265687	541f4507498e3a898af35a90	1
4 1265687	4d1e78d2dd6a236a57532738	1

Scores on food venues in N.Y (Updated)

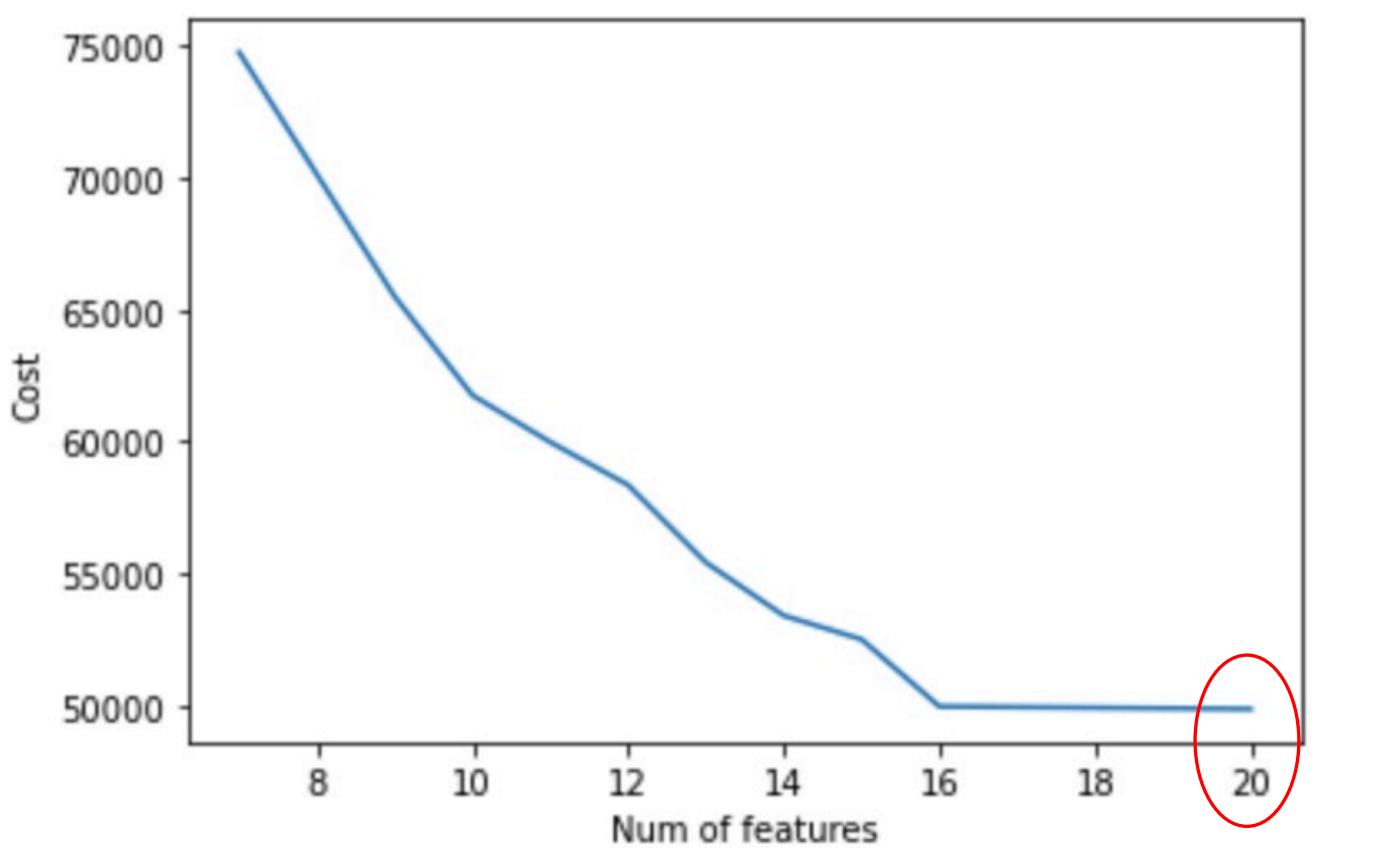
A photograph of a person from behind, wearing headphones and working on a computer. In the background, there are other people, suggesting a collaborative environment.

COLLABORATIVE FILTERING

- Over 15 million scoring data with for about 8 thousand users and 4 thousand venues(food category) has been collected, so I think we can predict scores of unevaluated venues by collaborative filtering.

TRAINING

- Cost for each combination of the number of feature and the amount of bias was as followings. So number of features will be set **20**.



Prediction

User_ID

Venue ID	32	33	37	56	59	61	135	140	144	209	...	580677
5ba682d616ef670039f6d605	2.014082	1.987447	2.024548	2.009573	1.999409	1.989089	2.010838	2.034907	2.026080	1.990084	...	2.033
5c13bf838afbe0002de55061	1.999777	2.009438	2.003895	2.006324	1.996612	2.007620	2.010113	2.024210	2.015391	2.005031	...	2.008
4cb218c7ef1b37041ca24800	2.005399	1.997427	2.002186	2.008171	2.001285	1.998127	2.001735	2.011519	2.026425	2.008373	...	2.023
57fa6c67498e23e3cf1861f4	1.991532	1.997121	1.999090	2.003478	1.999316	1.997626	2.005188	2.018935	2.029585	2.011068	...	2.017
5615a472498ed90cc0623b3c	2.002414	2.006484	2.006006	2.005894	2.005643	2.005005	2.002959	2.022838	2.021965	2.003634	...	2.018
...
5adcbd038173cb433ff5350d	1.380004	0.906656	1.163593	1.013677	1.153813	1.260904	0.658151	0.948888	0.349389	1.262704	...	1.294
52f66aa6498e08f2b069ab80	1.010813	1.001961	0.999621	1.014716	1.026965	1.003386	0.999194	1.000771	0.972044	1.015611	...	1.005
596fb23c31ac6c49a7f6b6c4	1.001377	0.998714	1.005378	1.002443	1.010739	1.001027	1.003945	1.005788	1.000046	1.001039	...	1.012
4cddd9dadb125481c4f22cce	1.115300	0.622533	1.091012	0.939870	1.112741	1.031712	0.704897	0.963842	0.837573	1.217481	...	1.323
590e07a81bc704026f2e9400	1.142625	0.713616	1.119190	0.901105	0.976738	1.053903	0.756639	0.857028	0.765521	1.084026	...	1.264

3428 rows × 7780 columns

Sampling/Verify (1)

To make sure if already high scored venues are predicted high as well, one user' top 5 scored venue and corresponding prediction.

	user_id	venue_id	score	venue_name	category_id	category_name
0	1265687	582a1b095f78034bcfb69186	5	Sami's Kebab House	503288ae91d4c4b30a586d67	Afghan Restaurant
1	1265687	56e064dc498e1ba17ec18b6f	5	Fu Yuan	56aa371be4b08b9a8d57350b	Food Stand
2	1265687	5d7d2f62774999000703bdcb	3	Yin Ji Chang Fen 銀記腸粉店	52af3a7c3cf9994f4e043bed	Cantonese Restaurant
3	1265687	5a13402d286fda3f038703e0	3	Le Privé	4bf58dd8d48988d10c941735	French Restaurant
4	1265687	58225a8f001d8755c9c4bcd1	3	Sweetcatch Poke Bar	5bae9231bedf3950379f89d4	Poke Place

<Top 5 scores of user id '1265687' ordered by score>

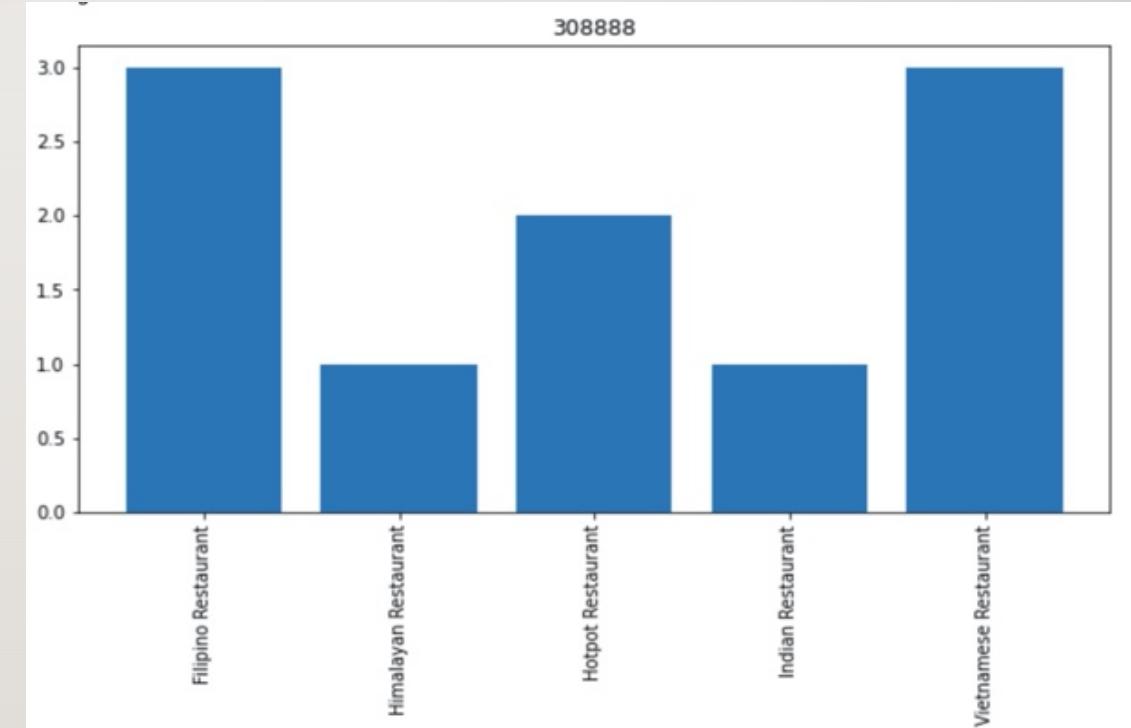
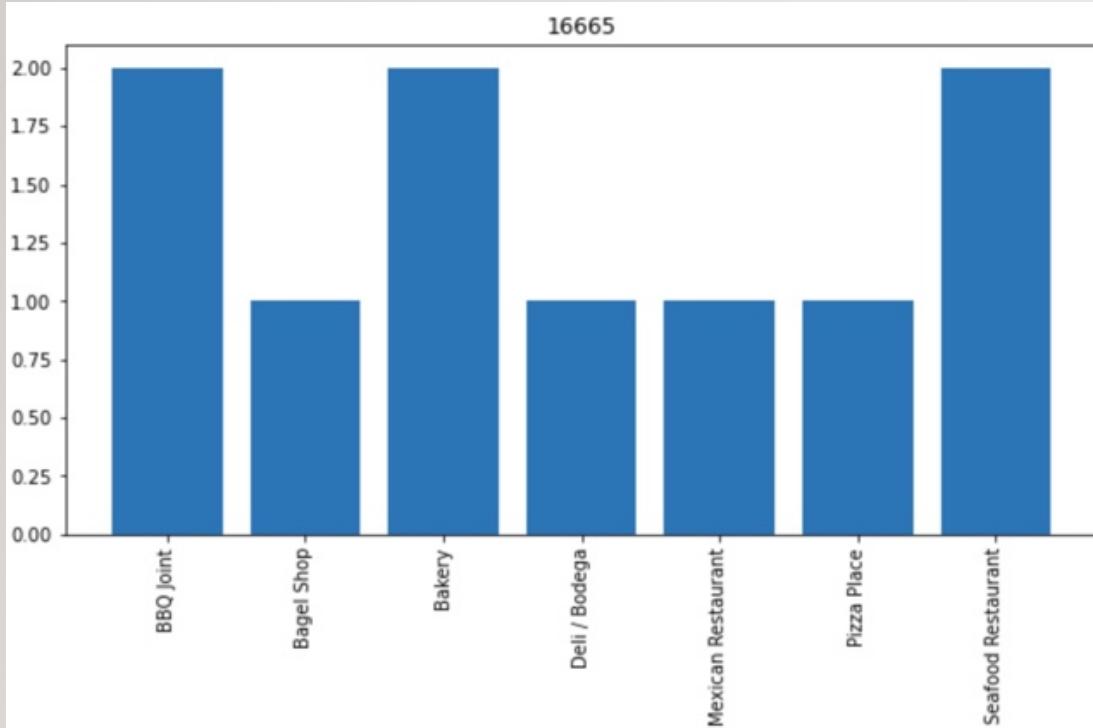
	venue_id	venue_name	category_id	category_name
2	582a1b095f78034bcfb69186	Sami's Kebab House	503288ae91d4c4b30a586d67	Afghan Restaurant
218	5a13402d286fda3f038703e0	Le Privé	4bf58dd8d48988d10c941735	French Restaurant
904	56e064dc498e1ba17ec18b6f	Fu Yuan	56aa371be4b08b9a8d57350b	Food Stand
2993	58225a8f001d8755c9c4bcd1	Sweetcatch Poke Bar	5bae9231bedf3950379f89d4	Poke Place
3558	5d7d2f62774999000703bdcb	Yin Ji Chang Fen 銀記腸粉店	52af3a7c3cf9994f4e043bed	Cantonese Restaurant

<Top 5 predictions of user id '1265687' ordered by score>

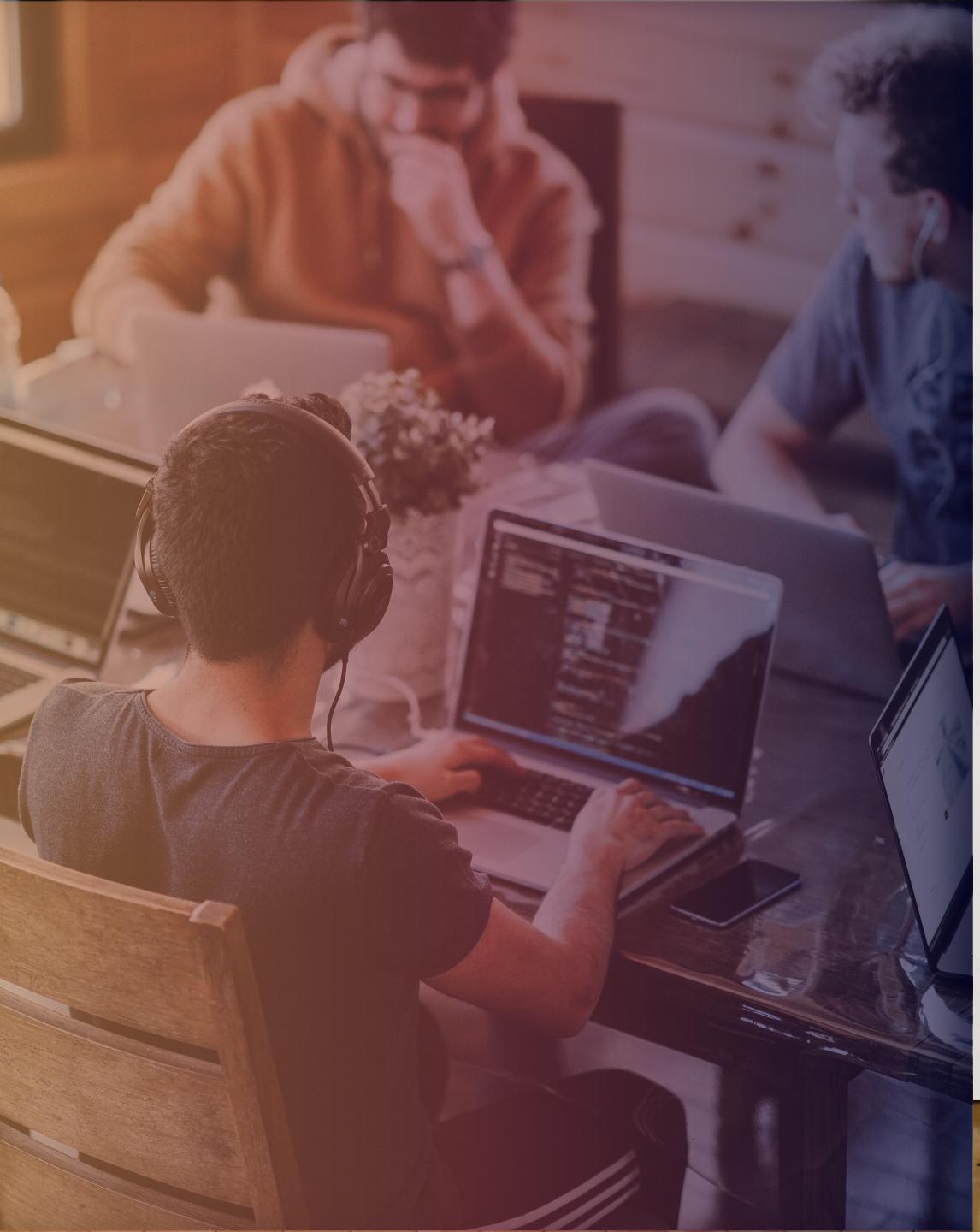
5 scored restaurants were highly ranked on prediction as well.

Sampling/Verify (2)

10 users were randomly picked up and their top 30 venues were ordered by their scores to look up how category of their recommended venues are varied.
(Bellows are 2 users graph)



It is apparent that their recommended restaurants belong to same category, but in some cases they cover a variety of categories.



CONCLUTION

- We could get recommendation somehow. We hope we could propose users to visit their recommendation and they got back to us! For more precise prediction, we need more data as followings
-
- **Much more cross evaluations. (Scoring was done base on "tips", "listed", 'liked' flag and category, however, there were not enough cross evaluations for collaborative filtering to reach success.)**
-
- **Venues they visited. (As for now, API does not support it)**

THANK YOU

Notebook

<https://jupyterlab-20.labs.cognitiveclass.ai/user/dai45ta/lab?redirects=3>



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