WHERE IS A RESTAURANT LOCATED
IN HONG KONG?

Background

People go to a restaurant for

Except the service and quality:

◦ Convenience

◦ Combination of eating and other activities

Meaning:

◦ Where to find more restaurants?

◦ Where to set up a restaurant?

Hypothesis:

◦ Certain combinations of nearby facilities exist for a restaurant

◦ The popularity of a restaurant is influenced by the nearby facilities

Data Preparation

Data requirement:

◦ ID, name, category, latitudes and longitudes of all venues in Hong Kong city

Data acquisition and wrangling

◦ Downloaded from foursquare API

◦ Removal of the venues without data

◦ Calculate geodesic distance using Geopy

◦ Count the number of venues of each category within 2000 meters of a restaurant

◦ Count the number of venues of each category within 200 meters of a restaurant

Categories of the venues

Basic Categories	Popular Subcategories
Arts & Entertainment	Art Gallery
Food	Asian Restaurant
	Coffee Shop
	Café
	Bakery
Nightlife Spot	Bar
Outdoors & Recreation	Athletics & Sports
Professional & Other Places	Office
	Medical Center
Residence	Residential Building (Apartment / Condo)
Shop & Service	Spa
	Food & Drink Shop
	Clothing Store
	Jewelry Store
	Bank
	Cosmetics Shop
	Salon / Barbershop
Travel & Transport	Hotel
	Bus Stop
	Bus Station
Event	
College & University	

PCA of the nearby venues within 2000 m of a restaurant
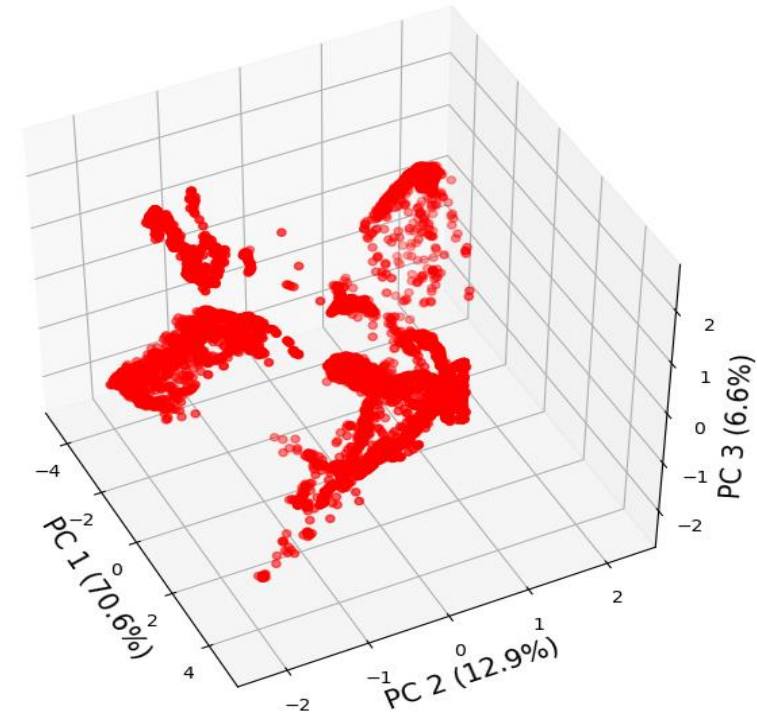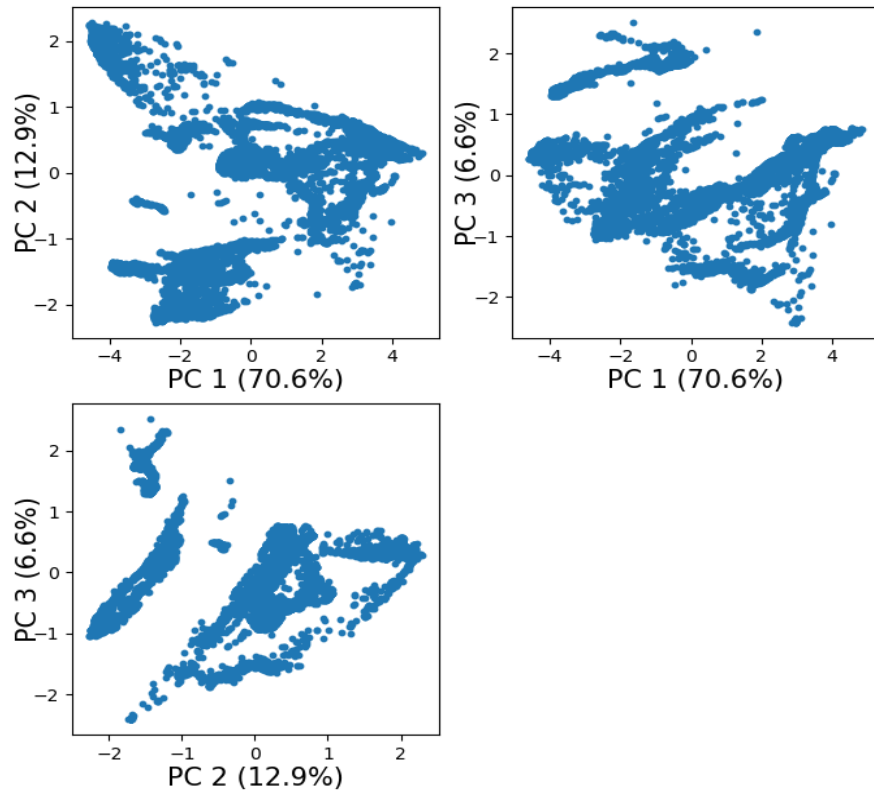
DBSCAN Clustering of venue counts
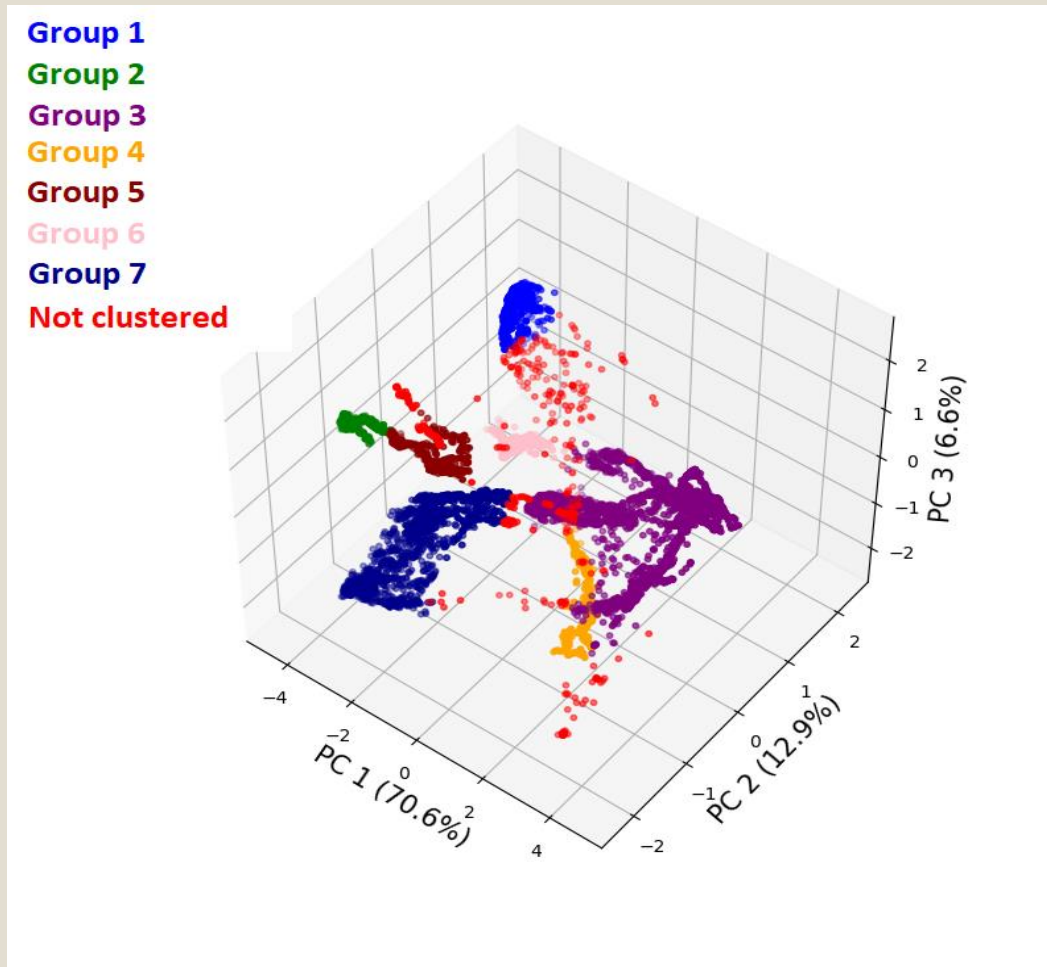
Cluster	Not clustered	1	2	3	4	5	6	7
Arts & Entertainment	164	316	216	72	94	166	175	139
Professional & Other Places	902	1865	1214	340	341	904	1004	787
Nightlife Spot	283	561	445	62	63	267	358	340
Food	1627	2312	2780	1163	912	1682	2444	2519
Shop & Service	1650	2892	2841	828	546	1257	2729	1839
Outdoors & Recreation	145	234	223	74	85	171	197	161
Travel & Transport	161	237	216	113	94	165	203	295
College & University	78	56	77	30	116	58	68	91
Event	0	0	2	0	0	2	0	1
Residence	184	296	211	109	195	159	192	118

Detailed venue distribution of the clusters

Basic Category	Subcategory	Outliers	1	2	3	4	5	6	7
Arts & Entertainment	Art Gallery	72	174	54	15	43	53	38	22
Food	Asian Restaurant	742	901	1463	648	441	817	1300	1307
	Coffee Shop	73	132	95	24	39	77	80	69
	Café	119	176	194	77	69	97	187	141
	Bakery	63	101	101	50	36	68	77	89
Nightlife Spot	Bar	215	412	343	51	49	199	277	286
Outdoors & Recreation	Athletics & Sports	90	152	153	36	37	104	136	93
Professional & Other Places	Office	314	712	425	80	92	347	321	190
	Medical Center	215	500	247	80	62	121	244	227
Residence	Residential Building (Apartment / Condo)	170	279	201	90	176	152	179	109
Shop & Service	Spa	95	182	171	22	11	56	170	102
	Food & Drink Shop	106	184	137	62	81	79	120	96
	Clothing Store	309	552	551	102	30	217	584	401
	Jewelry Store	61	120	109	15	3	32	114	81
	Bank	52	104	68	27	24	58	60	44
	Cosmetics Shop	82	115	199	32	11	62	208	117
	Salon / Barbershop	107	177	220	36	26	67	212	137
Travel & Transport	Hotel	54	52	87	40	29	53	86	158
	Bus Stop	39	56	61	33	37	51	53	36
	Bus Station	16	25	25	19	6	18	26	22

Count clusters on the map
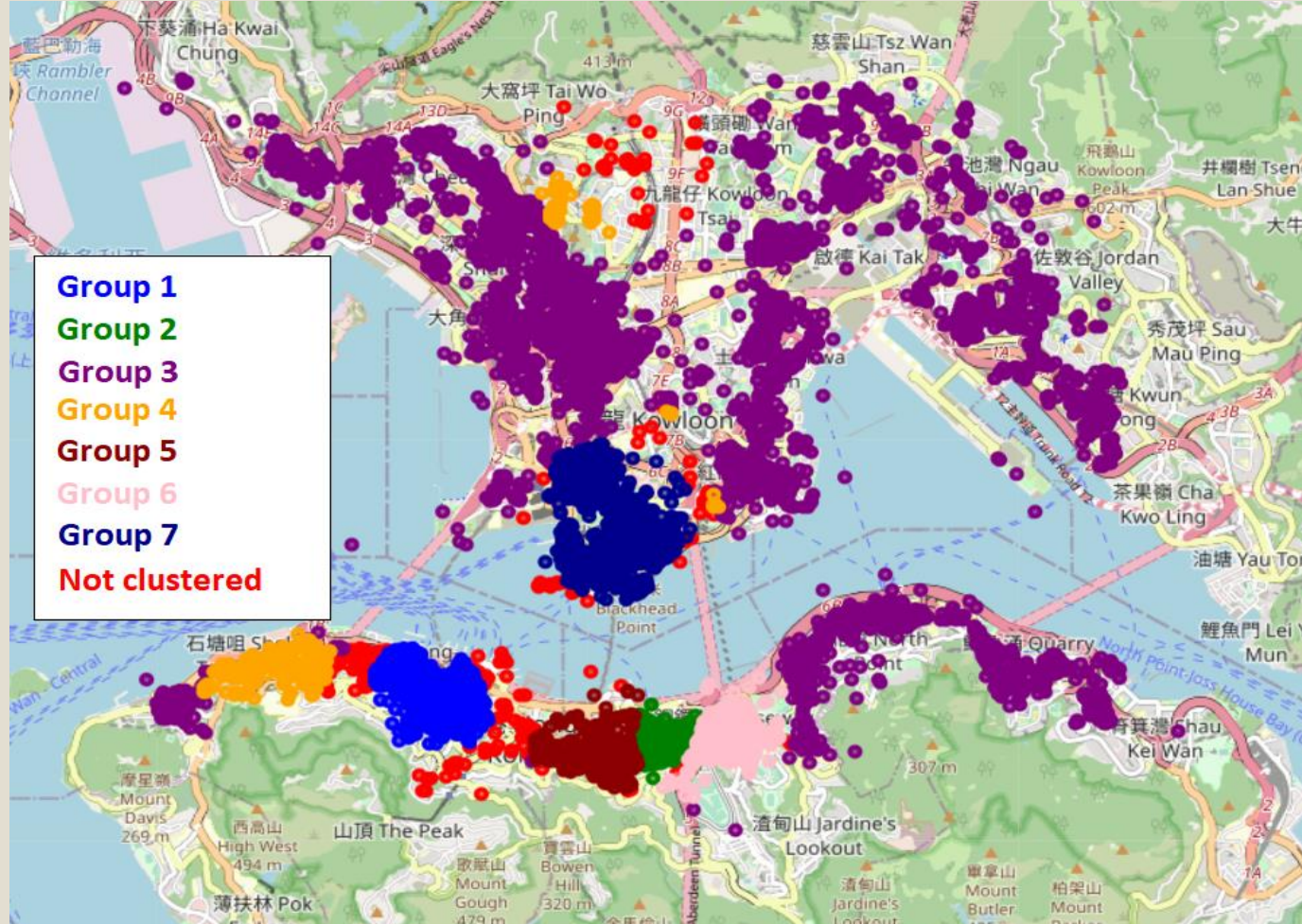
Weight clusters by k-means

Cluster	1	2	3	4	5	6	7	8	9	10
Arts & Entertainment	4	2	2	3	2	4	3	3	2	3
Professional & Other Places	21	13	13	21	14	21	9	13	19	17
Nightlife Spot	6	5	2	3	5	1	2	3	1	2
Food	26	40	47	36	33	40	44	40	24	33
Shop & Service	33	29	22	26	36	22	32	21	20	28
Outdoors & Recreation	3	3	3	4	3	4	2	4	5	4
Travel & Transport	3	5	4	3	3	3	4	5	4	4
College & University	1	1	1	1	1	1	1	5	17	2
Event	0	0	0	0	0	0	0	0	0	0
Residence	3	2	5	3	3	4	3	7	7	8

Unit: %

Weight clusters on the map
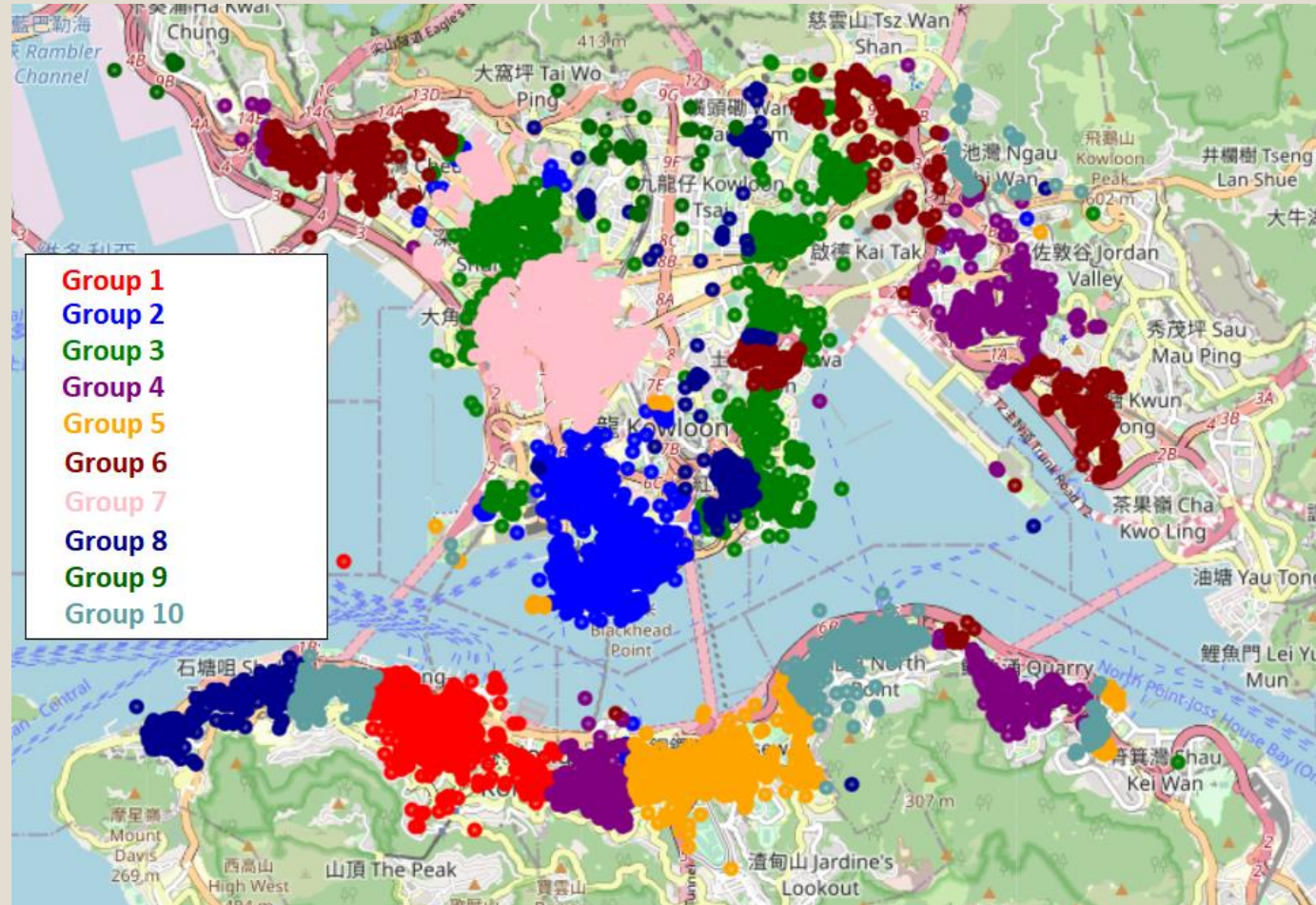
Comparison of likes of the count clusters

Cluster	Mean	StDev	Min	Max
Not clustered	10	33	0	328
1	13	41	0	479
2	7	24	0	229
3	2	11	0	393
4	3	10	0	96
5	8	16	0	195
6	7	22	0	577
7	6	25	0	680

	Not clustered	1	2	3	4	5	6	7
Not clustered								
1	-							
2	-	-						
3	<	<	<					
4	<	<	<	>				
5	-	-	>	>	>			
6	-	-	-	>	>	-		
7	<	<	-	>	>	<	<	

(Sign as the cluster of the row compared to the cluster of the column , "-" indicates no significant difference)

Correlation of likes and venue counts

Category	Rank r
Outdoors & Recreation	0.21
Nightlife Spot	0.20
Shop & Service	0.20
Professional & Other Places	0.18
Arts & Entertainment	0.18
Travel & Transport	0.17
Food	0.16
Residence	0.15
College & University	0.13
Event	0.03
Total Number of Nearby Venues	0.20

Category	Rank r	Test p	Mean Number of Venues	Std of the Means	Std/Mean
Coffee Shop	0.21	0.00	6	6	1.0
Athletics & Sports	0.20	0.00	9	9	1.0
Clothing Store	0.20	0.00	37	59	1.6
Bar	0.19	0.00	23	36	1.6
Office	0.18	0.00	26	34	1.3
Café	0.18	0.00	15	15	1.1
Salon / Barbershop	0.16	0.00	15	24	1.6
Food & Drink Shop	0.16	0.00	12	11	0.9
Medical Center	0.15	0.00	24	40	1.6
Residential Building (Apartment / Condo)	0.15	0.00	12	11	0.9
Bakery	0.15	0.00	9	7	0.8
Hotel	0.15	0.00	7	9	1.3
Asian Restaurant	0.12	0.00	119	92	0.8
Bus Stop	0.08	0.00	4	2	0.7
Bus Station	0.03	0.00	2	2	1.2

Correlation of likes and venue counts

Category	Rank r	Test p
Office	0.14	0.00
Coffee Shop	0.10	0.00
Residential Building (Apartment / Condo)	0.09	0.00
Athletics & Sports	0.07	0.00
Hotel	0.07	0.00
Bakery	0.07	0.00
Bus Station	0.06	0.00
Asian Restaurant	0.03	0.00
Salon / Barbershop	0.00	0.84
Bus Stop	0.00	0.94
Medical Center	0.00	0.60
Food & Drink Shop	-0.01	0.17
Clothing Store	-0.03	0.00
Café	-0.03	0.00
Bar	-0.06	0.00

Category	Rank r	Test p
Salon / Barbershop	0.25	0.00
Residential Building (Apartment / Condo)	0.25	0.00
Clothing Store	0.17	0.00
Medical Center	0.14	0.00
Hotel	0.12	0.00
Athletics & Sports	0.10	0.00
Office	0.06	0.00
Bus Station	0.02	0.04
Food & Drink Shop	0.01	0.24
Café	-0.02	0.06
Coffee Shop	-0.07	0.00
Bakery	-0.08	0.00
Bar	-0.10	0.00
Bus Stop	-0.13	0.00
Asian Restaurant	-0.17	0.00

Summary

◦ High city density → less obvious clustering

◦ Differentiation of restaurants in different types of districts

→ Colleges, commercial center, tourism center and political & commercial center

◦ Circumstances are not a major factor for the popularity of a restaurant, but city density do influence the popularity

→ An expensive location worth its price