Assessment of Competition of Thai Restaurant

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-Business Problem

To assess the competition intensity of Thai restaurant business in different planning areas in Singapore.

-Target Audience

Future business owners who are planning to open a Thai restaurant in Singapore.
What's more, although it's for a Thai restaurant, it can be a reference for other restaurants too, given the similar logic and data applied.

-Interest

Starting a new food and beverage business is always not an easy job and knowing the competition intensity is important to formulate the strategy. There are many factors to take into consideration and some information cannot be discovered by simply looking at the data. Using deep analytics techniques, data science is helping more and more businesses with their daily problems and it's certain that when they encounter such a problem, they would like to see how data science reveals more insights and helps them make wiser decisions.

INTRODUCTION

When it comes to knowing the competition intensity among Thai restaurants in Singapore, we expect that at least the following three are considered:

1) Details about existing Thai restaurants in different areas, such as number and locations;
2) Target customer of the opening restaurant. In this case, let's assume that it targets surrounding residents.
3) The population of each planning area

In order to assess the above considerations, we need the following data:

1) Geographical data including city map, division details of regions and panning areas , information of venues within assessed areas. These will be collected from statistical websites and geographical data provider such as Foursquare, using Foursquare API and geocoders. We will use Folium for plotting the map.
2) Demographic data categorized by area. It is provided by Singapore Department of Statistics. We will use a ratio called "Competitiveness Ratio" to measure the competition intensity in each area.

DATA ACQUISITION AND CLEANING

DATA ACQUISITION AND CLEANING

After acquiring demographic data from government agency and geographical data from data provider, we get the following table as shown on the left (the first 15 rows) :

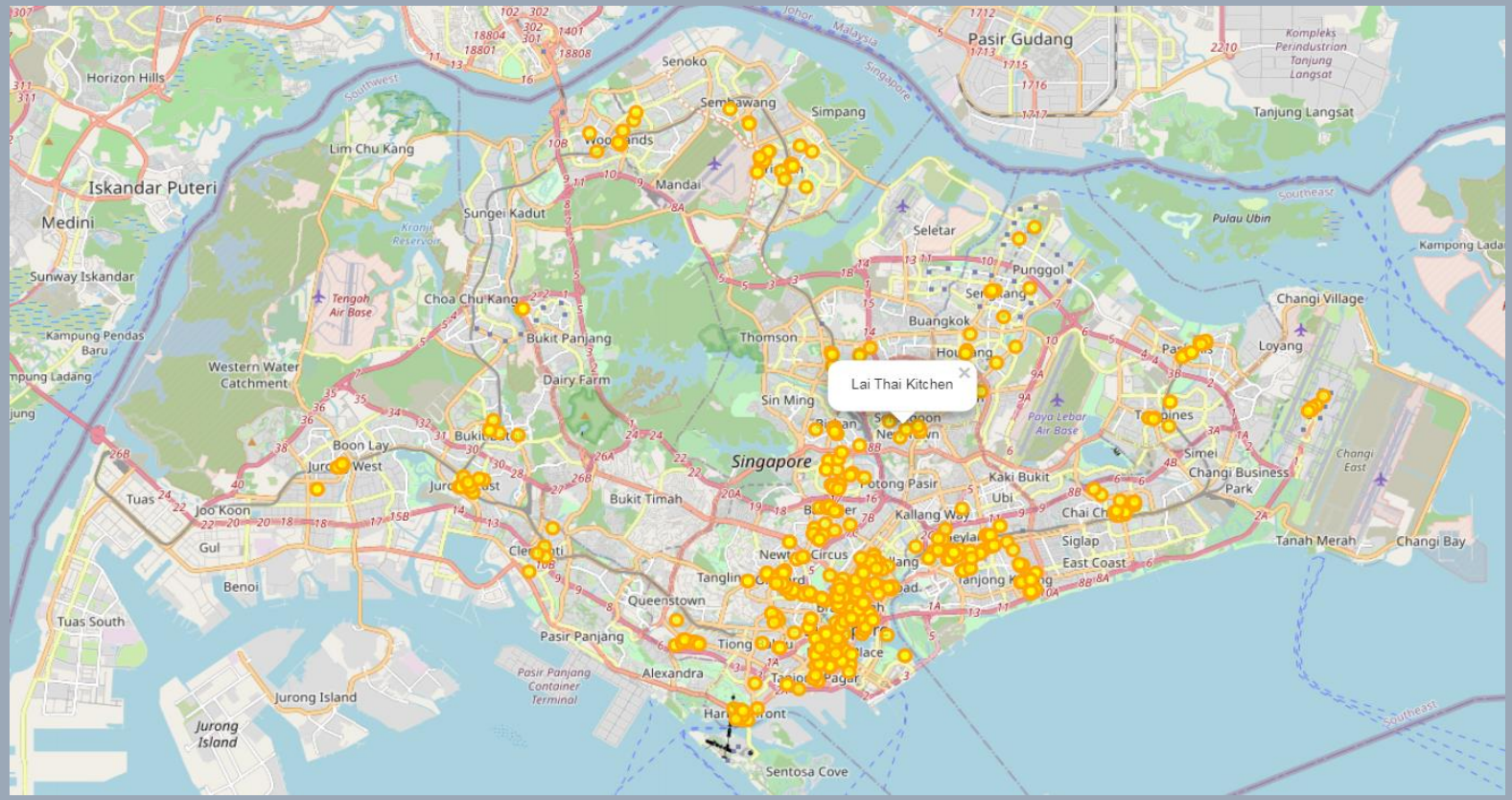
	Area	Latitude	Longitude	Population
0	Ang Mo Kio	1.370080	103.849523	162280.0
1	Bedok	1.323976	103.930216	276990.0
2	Bishan	1.350986	103.848255	87320.0
3	Boon Lay	1.338550	103.705812	40.0
4	Bukit Batok	1.349057	103.749591	158030.0
5	Bukit Merah	1.270439	103.828318	151250.0
6	Bukit Panjang	1.379149	103.761413	138270.0
7	Bukit Timah	1.354690	103.776372	77860.0
8	Central Water Catchment	1.375708	103.801743	0.0
9	Changi	1.351080	103.990064	1850.0
10	Changi Bay	1.316850	104.020649	0.0
11	Choa Chu Kang	1.384749	103.744534	192070.0
12	Clementi	1.315100	103.765231	91990.0
13	Downtown Core	1.287475	103.856033	3190.0
14	Geylang	1.318186	103.887056	110110.0

Next, we retrieve nearby venue data in each area within a radius of 1000 meters using Foursuqare API:

	Area	Area Latitude	Area Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Ang Mo Kio	1.370080	103.849523	Ruan Thai	1.365686	103.848842	Thai Restaurant
1	Ang Mo Kio	1.370080	103.849523	Thai Express	1.369061	103.847810	Thai Restaurant
2	Ang Mo Kio	1.370080	103.849523	Nagara Thai	1.372538	103.855652	Thai Restaurant
3	Ang Mo Kio	1.370080	103.849523	Thonglor Thai Restaurant	1.373030	103.847660	Thai Restaurant
4	Ang Mo Kio	1.370080	103.849523	Na Na Original Thai Food	1.365087	103.848990	Thai Restaurant
5	Ang Mo Kio	1.370080	103.849523	Lotus Thai Restaurant	1.372459	103.848021	Thai Restaurant
6	Ang Mo Kio	1.370080	103.849523	Pok Pok Thai Kitchen	1.366854	103.851089	Thai Restaurant
7	Ang Mo Kio	1.370080	103.849523	Thai Fusion Wanton Mee	1.364278	103.849747	Thai Restaurant
8	Ang Mo Kio	1.370080	103.849523	Thai Ying Luck	1.372132	103.855695	Thai Restaurant
9	Ang Mo Kio	1.370080	103.849523	天天来 Authentic Thai Cuisine	1.365465	103.848442	Thai Restaurant
10	Ang Mo Kio	1.370080	103.849523	Mumma Recipe Thai Food	1.365061	103.849085	Thai Restaurant
11	Ang Mo Kio	1.370080	103.849523	Nakhon Udon Thai Kitchen	1.364892	103.849110	Thai Restaurant
12	Ang Mo Kio	1.370080	103.849523	Chiangmai Thai Kitchen	1.365879	103.852935	Thai Restaurant
13	Ang Mo Kio	1.370080	103.849523	Ratchada Thai Food	1.361889	103.854366	Thai Restaurant
14	Ang Mo Kio	1.370080	103.849523	Thai Steamboat Ala-Carte Buffet	1.374396	103.859047	Thai Restaurant
15	Bedok	1.323976	103.930216	Nangfa Thai Kitchen	1.328464	103.934936	Thai Restaurant
16	Bedok	1.323976	103.930216	Thai Boat Noodle	1.324712	103.932530	Thai Restaurant
17	Bedok	1.323976	103.930216	Thai Fisherman village	1.327365	103.934852	Thai Restaurant
18	Bedok	1.323976	103.930216	Saap saap Thai	1.324496	103.930031	Thai Restaurant
19	Bedok	1.323976	103.930216	Kin Khao Yang Authentic Thai Food	1.324287	103.930640	Thai Restaurant
20	Bedok	1.323976	103.930216	Mana Thai Food	1.327770	103.933833	Thai Restaurant

DATA ACQUISITION AND CLEANING

And map it with names as markers:



DATA ACQUISITION AND CLEANING

In this case, we assume that the Thai restaurant to be opened targets its surrounding residents. Therefore, we have to compare relative density of Thai restaurant in each area. One area can have low Thai restaurant density with a number of Thai restaurants if its population is also large. To compare competition intensity in different areas, we use a ratio calculated by dividing the population by the number of Thai restaurants in the area and name it as 'Competitiveness Ratio'. As the original ratio is big due to the large population figures, we adjust it by dividing it by 1000. The bigger the 'Competitiveness Ratio', the lower the competition in the area. When the 'Competitiveness Ratio' is zero, it means it's not recommended to open the restaurant in that area as the area has no resident.

METHODOLOGY

Using the Thai restaurant data that we get from the previous sections, we can count the number of existing Thai restaurant in each area. Merging coordinates, population and number of Thai restaurants in areas, we get the following table (the first 12 rows):

Area	Latitude	Longitude	Population	Thai Restaurant
Ang Mo Kio	1.370080	103.849523	162280	15
Bedok	1.323976	103.930216	276990	15
Bishan	1.350986	103.848255	87320	10
Boon Lay	1.338550	103.705812	40	5
Bukit Batok	1.349057	103.749591	158030	5
Bukit Merah	1.270439	103.828318	151250	12
Bukit Panjang	1.379149	103.761413	138270	2
Bukit Timah	1.354690	103.776372	77860	0
Central Water Catchment	1.375708	103.801743	0	0
Changi	1.351080	103.990064	1850	5
Changi Bay	1.316850	104.020649	0	0
Choa Chu Kang	1.384749	103.744534	192070	0

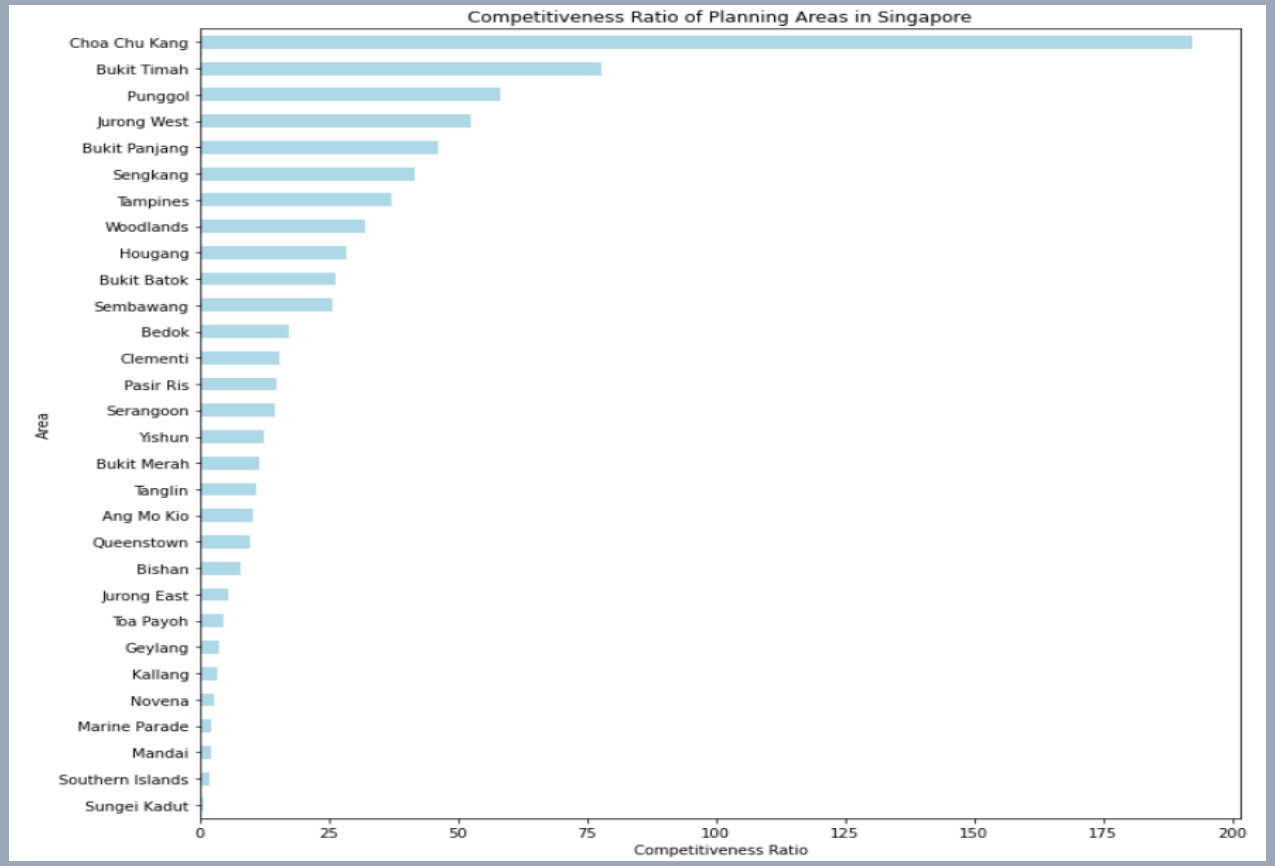
EXPLORATORY DATA ANALYSIS

Now we can calculate the ratio in a new column and rearrange the data frame with descending values based on the 'Competitiveness Ratio'.

Area	Latitude	Longitude	Population	Thai Restaurant	Competitiveness Ratio
Choa Chu Kang	1.384749	103.744534	192070	0	192.070000
Bukit Timah	1.354690	103.776372	77860	0	77.860000
Punggol	1.405197	103.902350	174450	2	58.150000
Jurong West	1.339636	103.707339	262730	4	52.546000
Bukit Panjang	1.379149	103.761413	138270	2	46.090000
Sengkang	1.391924	103.895491	249370	5	41.561667
Tampines	1.354653	103.943571	259900	6	37.128571
Woodlands	1.436897	103.786216	255130	7	31.891250
Hougang	1.370801	103.892544	227560	7	28.445000
Bukit Batok	1.349057	103.749591	158030	5	26.338333
Sembawang	1.449093	103.820055	102640	3	25.660000
Bedok	1.323976	103.930216	276990	15	17.311875

EXPLORATORY DATA ANALYSIS

Also, we also visualize the top 30 areas by generating a bar chart with horizontal bars.



EXPLORATORY DATA ANALYSIS

Based on the result above, the area 'Choa Chu Kang' and 'Bukit Timah' have higher Competitiveness Ratio than the rest because although they have large population, but there is no proper Thai restaurant in these two areas. It means these two areas can be top choices to start a Thai restaurant business.

RESULTS AND DISCUSSION

In this project, leveraging geographical data, we explored the details of Thai restaurants in each planning area in Singapore and we mapped the distribution of them. By counting the number of Thai restaurants in each area, we are provided an idea about the density of Thai restaurants. Furthermore, with demographic data, we calculate a ratio named 'Competitiveness Ratio' in order to compare the relative number of local residents accessible around the future restaurant in different areas.

In this project, we assume the future Thai restaurant targets its surrounding residents. If it wants to target population outside the area it lies, we may consider daily movement of population among different areas, which can give restaurants in central areas more benefits. On the other hand, when choosing location for a business, rent for retail space is also an important consideration and we can take this into account in the future analytics.

CONCLUSION AND FUTURE DIRECTIONS

THANK YOU FOR YOUR TIME!