What is the best place to open an Asian restaurant in Paris

Ngoc Thu NGUYEN

April 18, 2020

I. Introduction

Imagine an Asian who is planning to move to Paris and who want to open a restaurant there. Paris is a big city in the world which attracts many people to come live here or to visit, so it is a good idea to open a restaurant. That person knows many Asian recipes (Vietnamese food, Chinese food and Thai food) so his restaurant will serve these food. The essential question that need to be answered is : Where is the best place to set his restaurant in order to maximize the profit?

In reality, to answer this question it is necessary to consider multiple factors such as the population, the average income, the concurrence, land price, the transport proximity, etc. That requires a lot of time and effort and it is not suitable in this project to consider all these factors, so I decided to study 2 factors: the population and the most common venues of each neighborhood in Paris, which requires Foursquare location data.

This study aims to help those who want to open a restaurant but also any other business to understand the characteristic of different areas of a city, from what they can decide the ideal place to set their business.

II. Data

In this project, the following data are needed:

- Data about the population of Paris, available here, which corresponds to the year of 2019.
- JSON file of the border of all the neighborhoods, available here. This data enables to visualize the population on a choropleth map.
- Geographic location of the neighborhoods, which enable to examine them. Initially, I used the Nominatim library. However, by showing these coordinates on the map, I saw that they were not in the geographic center of each neighborhood, which could give incorrect result of the most common venues. So I decided to look for more precise coordinates from Internet and I found the data on the same website of the JSON file. That website collects various certified administrative data of the France, so it is a trusted source for our project. From these coordinates data, we will employ Foursquare data to examine each neighborhood of Paris, the result will give us the idea of the best place to open the Asian restaurant.

III. Methodology

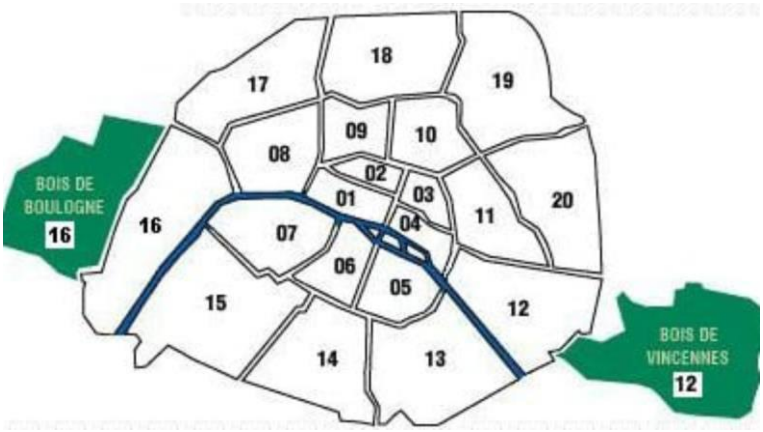
Firstly, data of the twenty neighborhoods of Paris are scrapped and visualized.

Secondly, if there is any problem on the data in the first step, it will be cleaned and then prepared to be in the suitable format, which enable the execution of the next parts. In reality, there is not many thing to do in this stage because the data is simple. I have just to add a column of the neighborhoods' name into the population dataset to match with the JSON file containing the neighborhoods coordinates, which is necessary for the visualization of the population on a choropleth map.

Once data is cleaned, we can explore the neighborhoods of Paris and cluster them using the Scikit Learn library. This will provide us an overview of Paris, which is necessary for the final decision.

IV. Exploratory Data Analysis

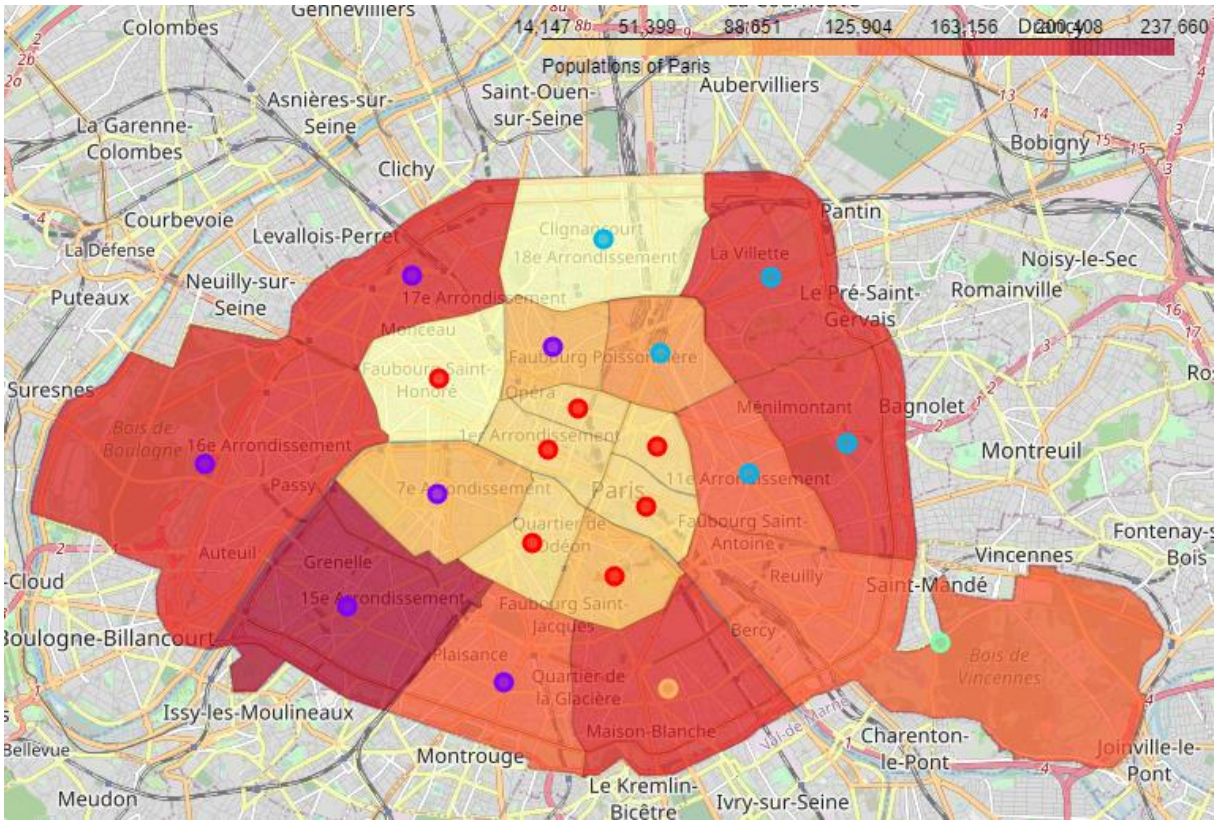
For a better localization of readers, I searched for the scheme of all the twenty neighborhoods of Paris (enumerated from the 1st to the 20th arrondissement) below:



After the scrapping and the preparation of data, I obtain the following data frame :

	Neighborhood	Population in thousand	Name	Latitude	Longitude
0	1st arrondissement	16338	Louvre	48.862563	2.336443
1	2nd arrondissement	20410	Bourse	48.868279	2.342803
2	3rd arrondissement	35469	Temple	48.862872	2.360001
3	4th arrondissement	27795	Hôtel-de-Ville	48.854341	2.357630
4	5th arrondissement	59947	Panthéon	48.844443	2.350715
5	6th arrondissement	41831	Luxembourg	48.849130	2.332898
6	7th arrondissement	53415	Palais-Bourbon	48.856174	2.312188
7	8th arrondissement	37053	Elysée	48.872721	2.312554
8	9th arrondissement	60235	Opéra	48.877164	2.337458
9	10th arrondissement	92660	Entrepôt	48.876130	2.360728
10	11th arrondissement	148339	Popincourt	48.859059	2.380058
11	12th arrondissement	142661	Reuilly	48.834974	2.421325
12	13th arrondissement	183117	Gobelins	48.828388	2.362272
13	14th arrondissement	138218	Observatoire	48.829245	2.326542
14	15th arrondissement	235469	Vaugirard	48.840085	2.292826
15	16th arrondissement	167706	Passy	48.860392	2.261971
16	17th arrondissement	169375	Batignolles-Monceau	48.887327	2.306777
17	18th arrondissement	196143	Butte-Montmartre	48.892569	2.348161
18	19th arrondissement	187760	Buttes-Chaumont	48.887076	2.384821
19	20th arrondissement	196884	Ménilmontant	48.863461	2.401188

From this data frame, I use the Foursquare API to get the 100 most popular venues of each neighborhood within a radius of 1 km. Then, by applying the KMeans algorithm of the Scikit Learn library, I can categorize the twenty neighborhoods of Paris into 5 clusters as shown below:



In [40]:
```
merged.loc[merged['Cluster Labels'] == 0, merged.columns[[0] + list(range(5, merged.shape[1]))]]
```

Out[40]:

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	1st arrondissement	0	French Restaurant	Hotel	Japanese Restaurant	Plaza	Italian Restaurant	Art Museum	Coffee Shop	Wine Bar	Historic Site	Spa
1	2nd arrondissement	0	French Restaurant	Hotel	Wine Bar	Cocktail Bar	Cheese Shop	Italian Restaurant	Japanese Restaurant	Bookstore	Pedestrian Plaza	Boutique
2	3rd arrondissement	0	French Restaurant	Art Gallery	Clothing Store	Wine Bar	Cocktail Bar	Hotel	Bookstore	Italian Restaurant	Deli / Bodega	Gourmet Shop
3	4th arrondissement	0	French Restaurant	Plaza	Japanese Restaurant	Garden	Bakery	Hotel	Park	Art Museum	Ice Cream Shop	Cocktail Bar
4	5th arrondissement	0	French Restaurant	Bakery	Plaza	Japanese Restaurant	Italian Restaurant	Indie Movie Theater	Museum	Hotel	Café	Coffee Shop
5	6th arrondissement	0	French Restaurant	Hotel	Plaza	Italian Restaurant	Seafood Restaurant	Garden	Wine Bar	Bistro	Indie Movie Theater	Cupcake Shop
7	8th arrondissement	0	Hotel	French Restaurant	Boutique	Garden	Clothing Store	Women's Store	Art Gallery	Pastry Shop	Park	Plaza

In [41]:
```
merged.loc[merged['Cluster Labels'] == 1, merged.columns[[0] + list(range(5, merged.shape[1]))]]
```

Out[41]:

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
6	7th arrondissement	1	French Restaurant	Hotel	Plaza	Coffee Shop	Garden	Historic Site	History Museum	Cocktail Bar	Italian Restaurant	Café
8	9th arrondissement	1	French Restaurant	Hotel	Wine Bar	Plaza	Italian Restaurant	Cocktail Bar	Bistro	Chocolate Shop	Cheese Shop	Pizza Place
13	14th arrondissement	1	French Restaurant	Hotel	Italian Restaurant	Vietnamese Restaurant	Bar	Sushi Restaurant	Pizza Place	Japanese Restaurant	Bakery	Bistro
14	15th arrondissement	1	French Restaurant	Italian Restaurant	Hotel	Korean Restaurant	Bakery	Japanese Restaurant	Persian Restaurant	Coffee Shop	Thai Restaurant	Lebanese Restaurant
15	16th arrondissement	1	French Restaurant	Bakery	Italian Restaurant	Park	Garden	Plaza	Japanese Restaurant	Art Museum	Pool	Lake
16	17th arrondissement	1	French Restaurant	Italian Restaurant	Hotel	Bakery	Restaurant	Park	Pastry Shop	Mediterranean Restaurant	Turkish Restaurant	Bagel Shop

In [42]:
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merged.loc[merged['Cluster Labels'] == 2, merged.columns[[0] + list(range(5, merged.shape[1]))]]
```

Out[42]:

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
9	10th arrondissement	2	French Restaurant	Coffee Shop	Italian Restaurant	Cocktail Bar	Pizza Place	Japanese Restaurant	Bakery	Asian Restaurant	Bistro	Wine Shop
10	11th arrondissement	2	French Restaurant	Bar	Restaurant	Bistro	Cocktail Bar	Italian Restaurant	Café	Wine Bar	Moroccan Restaurant	Coffee Shop
17	18th arrondissement	2	French Restaurant	Bar	Bistro	Restaurant	Café	Pizza Place	Art Gallery	Italian Restaurant	Plaza	Middle Eastern Restaurant
18	19th arrondissement	2	French Restaurant	Bar	Café	Bistro	Concert Hall	Italian Restaurant	Pool	Asian Restaurant	Beer Bar	Bed & Breakfast
19	20th arrondissement	2	Bar	French Restaurant	Bakery	Theater	Café	Music Venue	Bistro	Wine Shop	Bookstore	Cemetery

In [43]:
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merged.loc[merged['Cluster Labels'] == 3, merged.columns[[0] + list(range(5, merged.shape[1]))]]
```

Out[43]:

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
11	12th arrondissement	3	Lake	French Restaurant	Zoo Exhibit	Bistro	Hotel	Zoo	Italian Restaurant	Japanese Restaurant	Monument / Landmark	Dance Studio

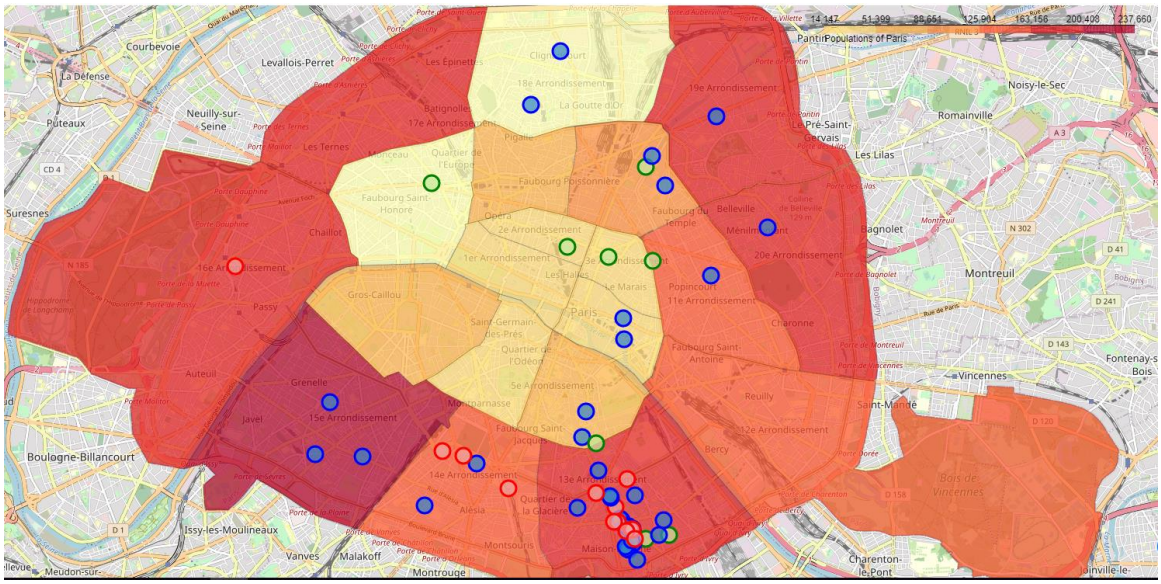
In [44]:
```
merged.loc[merged['Cluster Labels'] == 4, merged.columns[[0] + list(range(5, merged.shape[1]))]]
```

Out[44]:

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
12	13th arrondissement	4	Vietnamese Restaurant	Thai Restaurant	Asian Restaurant	French Restaurant	Chinese Restaurant	Hotel	Japanese Restaurant	Bakery	Juice Bar	Cambodian Restaurant

Because the business is about food, we will focus only on the restaurants. As we can see, the most common venue in most of neighborhoods of Paris is French restaurants, except the 13th arrondissement (represented by the orange point on the choropleth map) where the most common venues are essentially Asian restaurants, which constitute itself a cluster.

To have another view, I visualize the different Asian restaurants on the map, with three origins: Vietnamese, Chinese and Thai. On this map, I use the green color to design the restaurant with a good rating (≥ 8.5/10), the red color to design the bad rating restaurant (≤ 7.5/10) and the blue color for the rest. The rating is obtained using the request for details of each venue.



In general, restaurants are popular in the areas far from Paris center, which is normal because land price is less expensive. These are also the areas with high population density, which is one of the key factors for the profit of a restaurant.

Now, take a look on a specific neighborhood: the 13th arrondissement. This map completes the observation from the clustering above and explains why the 13th arrondissement neighborhood constitute itself a cluster. Indeed, most of Asian restaurants are presents here, it can be considered as a "Asian Food Neighborhood". By my understanding about Paris, this is the neighborhood where there are many Asian people, essentially Vietnameses and Chineses. The neighborhood is also easily accessible by the common transport (RER and metro), so it is normal that this area attracts many Asian food businesses.

So, it can be interesting to open a restaurant in the 13th arrondissement neighborhood to benefit by the inhabitants (many Asian people live here), and the reputation of this area about Asian food. The clients of a restaurant can be local inhabitants but also the tourists. In fact, Paris is one of the most attractive city for tourism with 18 million people visit here in 2018. And the 13th arrondissement is the first area which they think about when they want to taste Asian gastronomies. So having the restaurant in this area will give the owner a high chance to receive many clients and to boost the profit. The risk of concurrence may be high here, but as we can see on the map, most of the restaurant have average rating (< 8.5), there are just some good rated restaurants. The rating is one of the key factor for the success of a restaurant because the majority of tourists decide to go to a restaurant based on its rating. Therefore, what is important is the quality of the service and the marketing strategy and the number of restaurants in concurrence is not a real problem.

V. Conclusion

In this study, I predict the ideal place to open a Asian restaurant only based on the population and the data about existing identical restaurants in Paris. I identified the neighborhood with a completely higher density of Asian restaurants than the other ones, which is the most famous neighborhood for Asian gastronomy. I also visualize the rating of these restaurants to see if there are many well evaluated ones here. These aspects are important for the final decision. However, in reality, it is not enough to consider just these factors. Other factors have to be examined such as land price, accessibility, proximity of the source of materials, etc.