

Searching the Best Location for a New Restaurant in London

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1. Introduction

1.1 Background

London is the capital and largest city of United Kingdom, it is considered one of the world's most important cities. It's financial influence and diverse culture attract people around the world to work and live in London. London is the most populated city in the UK, and the second most populated in Europe. With such dense population, the demand for restaurants is high in London, and the restaurant business constantly attracts investors. One of the most important business decisions to make when opening a restaurant, is choosing the best location that help the business to succeed.

1.2 Problem

The problem here is to find the area that is the best for opening a new restaurant, based on current locations of restaurants. Areas currently contain the most restaurants are more popular for the restaurant business, and are potentially better for opening new restaurants. Further details can be explored, such as which type of cuisine is more popular in each area, this will help the client to determine what type of restaurant could be potentially attract more customer in each area.

1.3 Interest

The results of this study can help clients who wants to open new restaurants planning the best location for their new business.

2. Data

2.1 Data sources

We use list of areas of London from Wikipedia page https://en.wikipedia.org/wiki/List_of_areas_of_London to define areas in London. And use Foursquare API to retrieve restaurants and their locations within each area.

2.2 Data selection

The list of total 60 boroughs in London are acquired from the Wikipedia page using python BeautifulSoup package. The latitude and longitude are obtained through python geopy.geocoders for each borough, and are added to the data frame.

Foursquare API is used to search for venues that belong to the category of "food". The coordinates of each borough are used to search for food venues, a radius of 300 m is used for each borough. A total of 1660 venues are obtained through this search method, a list of venue names, coordinates, and categories are recorded. An example of the obtained data is shown in the screenshot below.

	Borough	Latitude	Longitude	Venue	Venue lat	Venue lng	Venue cat
0	Bexley, Greenwich	51.451242	0.065413	Boulangerie Jade	51.492575	0.070559	Bakery
1	Bexley, Greenwich	51.451242	0.065413	The Taproom SE18	51.492198	0.071456	Pub
2	Bexley, Greenwich	51.451242	0.065413	Costa Coffee	51.433422	0.102713	Coffee Shop
3	Bexley, Greenwich	51.451242	0.065413	Le Délice	51.456610	-0.019732	Bakery
4	Bexley, Greenwich	51.451242	0.065413	Saikei	51.492256	0.009579	Chinese Restaurant

2.3 Data processing

The statistics of venues are calculated, including the total number of food venues in each borough, the most common category in every borough, and where are the venues located within the borough. These statistics will help determine the best location for a new restaurant in London.

3. Methodology

We group the venues by the borough they belong to. The boroughs with more than 50 venues within the 300 m radius of their center coordinates are shown to have 50 venues, since Foursquare search venue can only show 50 venues at most. The number of venues here indicate the density of restaurants in the area, not the total number of venues.

The 19 boroughs with more than 50 venues within the radius are selected for further examination, since we look for area with more venues. Three of the 19 boroughs have the same coordinates, remove “Camden and Islington” and “Islington & City”, keeping only “Islington” for further investigation. The number of categories is calculated. There is total 106 categories of food venues, such as café, French restaurant, juice bar, and etc.

The frequency of each categories appear in each borough is calculated, and the top 10 categories of each borough is sorted.

A K-mean clustering method is applied to the 17 boroughs, using the top 10 categories, and the boroughs are separated into 3 clusters.

4. Results

The top 20 venue categories are shown in Figure 1. The most popular categories are café, coffee shop, both with number greater than 175 within search. The third and fourth popular food venue is Italian restaurant and Indian restaurant, both have number greater than 75 within search.

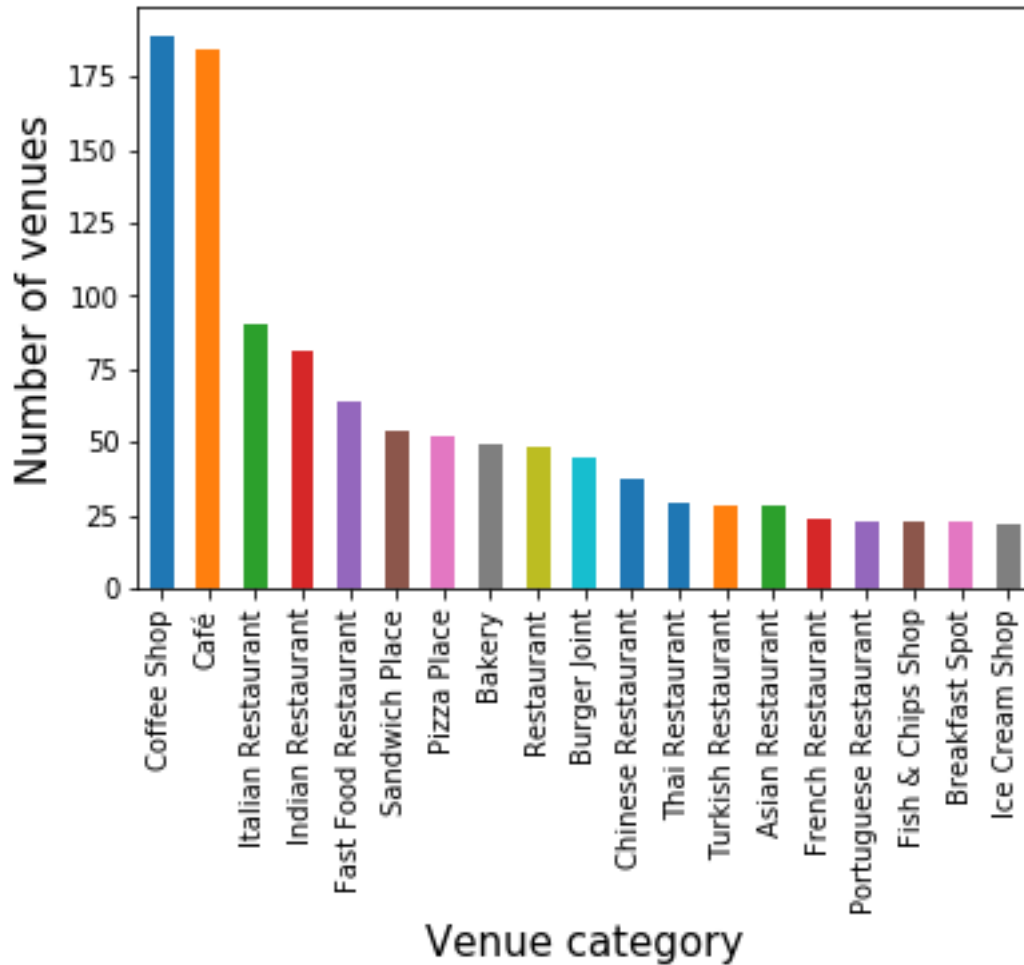


Figure 1 Number of total searched venues in London for top 20 most popular food categories.

Among the 59 boroughs in London, 17 of them have more restaurant business than the others. The names of the boroughs are listed in Table 1 along with the top 3 categories of food venues within the area of search.

Table 1 Boroughs in London with more than 50 food venues within the area of search. The top 3 categories of food venues, and the cluster label of each borough.

Cluster labels	Borough	Latitude	Longitude	1 most common cat	2 most common cat	3 most common cat
0	Bromley	51.402	0.01	Café	Coffee Shop	Fast Food Restaurant

0	Camden	51.54	-0.13	Coffee Shop	Café	Caribbean Restaurant
0	Haringey	51.58	-0.10	Café	Indian Restaurant	Bakery
0	Haringey, Islington	51.56	-0.10	Café	Coffee Shop	Pizza Place
0	Havering	51.54	-0.14	Café	Food Truck	Coffee Shop
0	Lambeth	51.50	-0.11	Café	Coffee Shop	Italian Restaurant
0	Lambeth, Southwark	51.49	-0.10	Café	Coffee Shop	Chinese Restaurant
1	City	51.51	-0.09	Coffee Shop	Sandwich Place	Italian Restaurant
1	City, Westminster	51.50	-0.12	Coffee Shop	Café	Pizza Place
1	Ealing	51.51	-0.30	Coffee Shop	Italian Restaurant	Burger Joint
1	Hammersmith and Fulham	51.49	-0.22	Coffee Shop	Café	Sushi Restaurant
1	Kingston upon Thames	51.40	-0.30	Coffee Shop	Italian Restaurant	Café
1	Lewisham, Southwark	51.50	-0.10	Coffee Shop	Burger Joint	Sandwich Place
1	Southwark	51.50	-0.10	Coffee Shop	Café	Italian Restaurant
1	Westminster	51.49	-0.13	Coffee Shop	Sandwich Place	Italian Restaurant
2	Islington	51.53	-0.09	Italian Restaurant	French Restaurant	Coffee Shop
2	Kensington and Chelsea, Hammersmith and Fulham	51.495	-0.18	Mediterranean Restaurant	Coffee Shop	Italian Restaurant

The 3 clusters are characterized mainly by the most common category of food venue. There are 7 boroughs in cluster 0, 8 boroughs in cluster 1, and 2 boroughs in cluster 2. Cluster 0 has the most café and coffee shop, cluster 1 has the most coffee shop, Italian restaurant and cafe, cluster 2 has the most Italian restaurants and coffee shop.

Figure 2 shows the location of boroughs as color coded by the clusters they belong to. Seven most popular boroughs are located in the center of London, on either side of the River Thames. They are Lambeth Southwark, Lambeth, Lewisham Southwark, Southwark, City of London, City of Westminster, Westminster. These areas have large number of restaurants because many business center, university, and tourism spots are located within these areas.

Other boroughs with most food venues are scattered around center London, they are small populated residential areas (Figure 2). The restaurants in these areas are more likely to attract local residents.

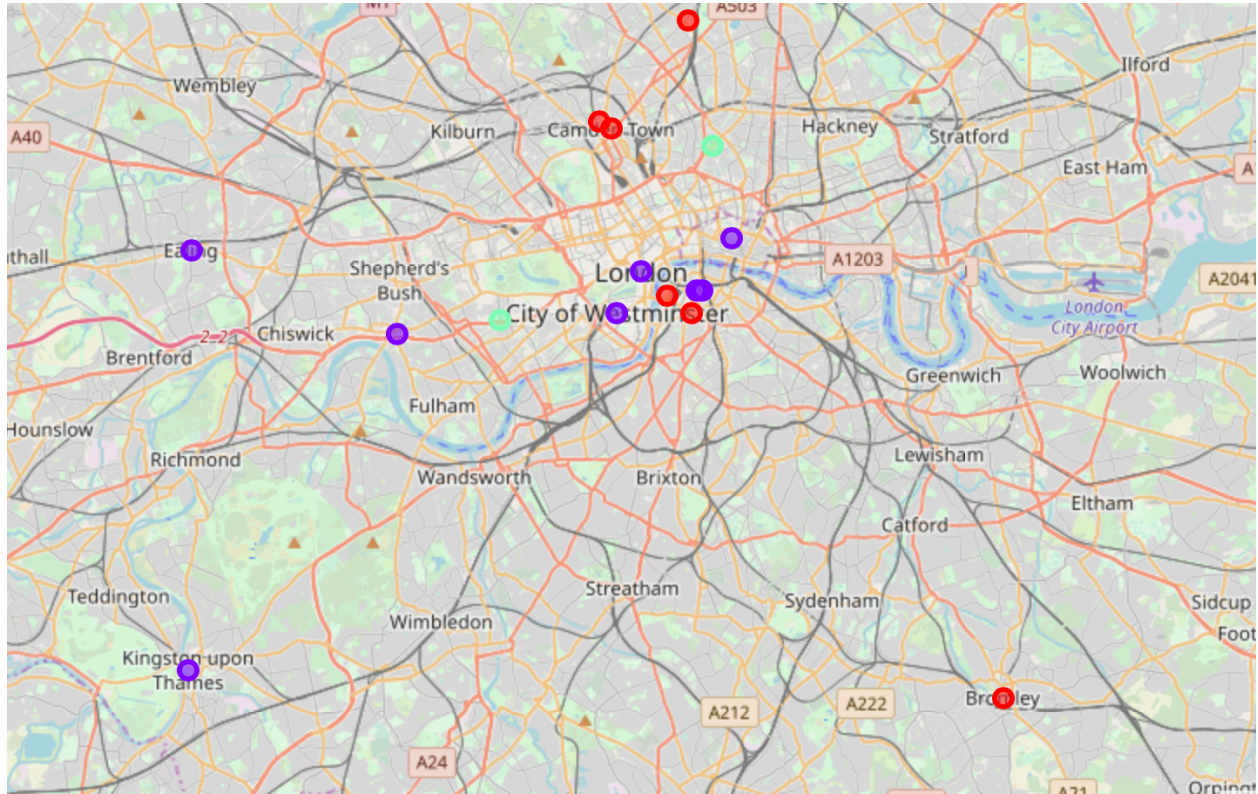


Figure 2 The three clusters and locations of boroughs with more restaurants in London. Red: Cluster 0, Purple: Cluster 1, Green: Cluster 2.

5. Discussion

Based on the results show above, there are two types of boroughs with popular food venues. One is the area near the center of London where most business and tourism spots are located. The other type is the residential areas surrounding center London, where the restaurants provide for local residents.

Café and coffee shops are most popular food venue in both center London and the surrounding residential areas. Italian restaurant is also a popular choice for food venue in residential area outside of center London.

Some other food categories, such as Indian restaurants, fast food restaurant, sandwich place, pizza place, are also very popular, as shown in the total number of these venues in London, but the number of these food categories are not very high in the boroughs that have the most restaurants. There may still potential for these food categories, and the client should consider opening a restaurant of these categories.

6. Conclusion

A study is conducted on selecting the best area in London for a new restaurant business. The study mainly uses location data from Foursquare to find areas with greatest number of food venues, and the most popular food categories of each area.

The study concludes that, café and coffee shops are most popular food categories. Seven boroughs in center London along the River Thames are most popular for restaurant business serving business, tourists, and university students. Eight boroughs of residential areas surrounding center London are good location for restaurants serving local people. Several food categories are also popular, but are much less in number, these categories have potential for a new restaurant.