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## **French Restaurant Opportunity in Paris**

### **1. Introduction:**

#### **1.1 Background:**

Over the past decades, migration to France has grown exponentially, more specifically, to Paris. The city has turned into a multicultural city, losing a little of its own identity. International restaurants have grown significantly to meet the demand of immigrants. Consequently, restaurants of all types of food are found everywhere. Even though the international population is growing off the charts, the French population is still significant.

#### **1.2 Objective:**

In this project, we will take a deep look to the most popular venues in every neighborhood of Paris. Our hypothesis is that French Restaurants will show among the top 5 venues in every neighborhood. However, if it is the case that French Restaurants are not showing as a top 5 venue, then a business opportunity is found for that specific neighborhood.

#### **1.3 Target Audience:**

The target audience identified for this project are the French people living in Paris and looking for a nice traditional French restaurant.

French people living in a specific neighborhood where there are not many French restaurants around will benefit from the results of this project.

### **2. Data Gathering:**

#### **2.1 Data Sources:**

In this project we will use two different sources of data to test our hypothesis:

- Foursquare Data: Information on the variety of venues in each of the 20 neighborhoods or "arrondissements" in Paris, France.
- Paris Data: Excel spreadsheet with information on latitude, longitude, French population, non-French population, ages, gender, etc.

#### **2.2 Data Analysis:**

These two sets of data will be cross analyzed to assess the possibility of opening a French restaurant in Paris.

More specifically, and as an example, I will analyze what neighborhood from all 20 in Paris is a great candidate to be the location of a new French restaurant.

I will look at the top 10 venues on each neighborhood and select those neighborhoods where French restaurants are not among the top 10.

Once potential neighborhoods are selected/identified, I will look at their French/Immigrants ratio. I will make the decision on what is the best neighborhood to locate the business based on the highest French/Immigrants ratio.

This process will ensure we will have enough demand to have a profitable business (restaurant).

### 3. Methodology:

3.1 Cleaning the data: First, we clean the data and make sure we have all the information we need to move to the next steps. Key information from our data is the following:

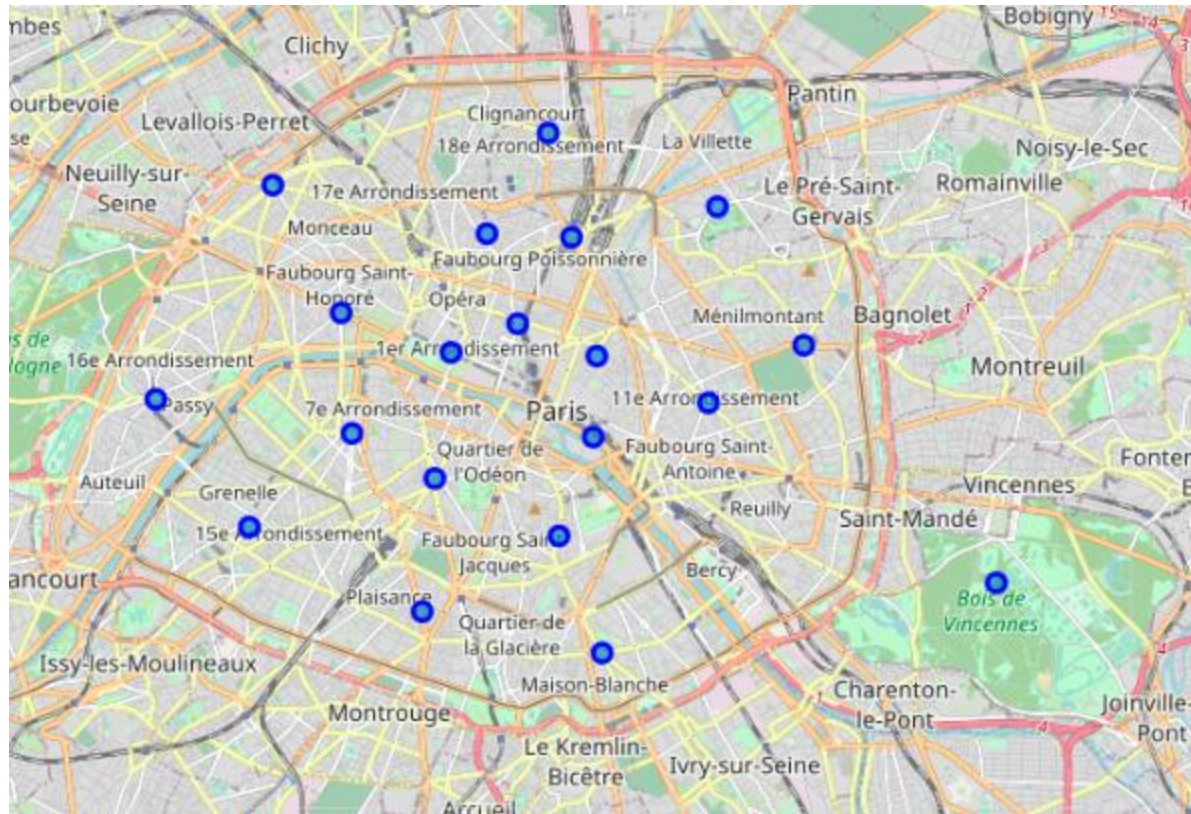
- Arrondissement / Neighborhood
- Latitude and Longitude
- Population
- French People: Column 'France'
- Non-French People: Column 'Other'

Moreover, we take some initial steps to understand the structure of our data frame (e.g. shape and columns).

3.2 Descriptive statistics: The next step is to understand the data using descriptive statistics. In this step we look at the mean, standard deviation, minimum, maximum, etc.

	Postal Code	Latitude	Longitude	Population	Area	Males	Females	0-9 years
count	20.00000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000
mean	75010.50000	48.859640	2.344130	109376.300000	4.346350	51445.100000	57931.200000	10253.850000
std	5.91608	0.018505	0.038008	72056.491126	2.374044	33570.771118	38566.606146	7351.641709
min	75001.00000	48.826200	2.274900	16266.000000	0.992000	8369.000000	7897.000000	1225.000000
25%	75005.75000	48.846775	2.322250	40027.000000	2.172750	18077.750000	21949.250000	3402.250000
50%	75010.50000	48.860850	2.346800	113168.000000	3.984500	53622.000000	59546.000000	10569.000000
75%	75015.25000	48.871375	2.359300	170990.750000	6.098000	79430.500000	92240.500000	16520.000000
max	75020.00000	48.891600	2.435100	233392.000000	8.502000	105507.000000	127885.000000	21677.000000

3.3 Visualizing Paris and its neighborhoods: Once we get a better picture of how our data is distributed, we move to the next step which is mapping the 20 neighborhoods of Paris.



3.4 Foursquare data: Using our credentials, we extract information from Foursquare API. We collect the list of venues for each of the 20 neighborhoods of Paris.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Louvre	48.864	2.3311	Grand Bassin Rond	48.862880	2.329295	Fountain
1	Louvre	48.864	2.3311	Balagan	48.865432	2.329680	Israeli Restaurant
2	Louvre	48.864	2.3311	Musée des Arts Décoratifs	48.863077	2.333393	Art Museum
3	Louvre	48.864	2.3311	Place des Pyramides	48.863924	2.332224	Plaza
4	Louvre	48.864	2.3311	Kosyuen 華修園	48.864163	2.333567	Tea Room

3.5 Venues by neighborhood: We have a list of 1392 different venues in our target city, Paris. We now need to organize our results by grouping all these venues by neighborhood.

	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighborhood						
Batignolles-Monceau	35	35	35	35	35	35
Bourse	100	100	100	100	100	100
Butte-Montmartre	69	69	69	69	69	69
Buttes-Chaumont	35	35	35	35	35	35
Elysee	89	89	89	89	89	89
Enclos-St-Laurent	83	83	83	83	83	83
Gobelins	100	100	100	100	100	100
Hotel-de-Ville	100	100	100	100	100	100
Louvre	100	100	100	100	100	100
Luxembourg	61	61	61	61	61	61
Menilmontant	59	59	59	59	59	59
Observatoire	40	40	40	40	40	40
Opera	79	79	79	79	79	79
Palais-Bourbon	59	59	59	59	59	59
Pantheon	75	75	75	75	75	75
Passy	71	71	71	71	71	71
Popincourt	85	85	85	85	85	85
Reuilly	8	8	8	8	8	8
Temple	98	98	98	98	98	98
Vaugirard	46	46	46	46	46	46

3.6 Sorting the neighborhoods by count of venues: The next step in this process is to identify neighborhoods that don't have enough venues.

	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighborhood						
Reuilly	8	8	8	8	8	8
Batignolles-Monceau	35	35	35	35	35	35
Buttes-Chaumont	35	35	35	35	35	35
Observatoire	40	40	40	40	40	40
Vaugirard	46	46	46	46	46	46
Menilmontant	59	59	59	59	59	59
Palais-Bourbon	59	59	59	59	59	59
Luxembourg	61	61	61	61	61	61
Butte-Montmartre	69	69	69	69	69	69
Passy	71	71	71	71	71	71
Pantheon	75	75	75	75	75	75
Opera	79	79	79	79	79	79
Enclos-St-Laurent	83	83	83	83	83	83
Popincourt	85	85	85	85	85	85
Elysee	89	89	89	89	89	89
Temple	98	98	98	98	98	98
Gobelins	100	100	100	100	100	100
Hotel-de-Ville	100	100	100	100	100	100
Louvre	100	100	100	100	100	100
Bourse	100	100	100	100	100	100

3.7 Getting our first takeaway: It seems that there are not many venues in Reuilly. This could lead to an opportunity to open a business in this area, but we will need to take further steps to make sure this idea makes sense.

3.8 One hot encoding: Using the one hot encoding technique, we take our first steps to quantify the number of venues by type. The venue type we are interested in is French Restaurants.

	Neighborhood	Accessories Store	African Restaurant	Argentinian Restaurant	Art Gallery	Art Museum	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	Auvergne Restaurant	...	Trail	Train Station	Udon Restaurant	Vegetarian / Vegan Restaurant
0	Louvre	0	0	0	0	0	0	0	0	0	...	0	0	0	0
1	Louvre	0	0	0	0	0	0	0	0	0	...	0	0	0	0
2	Louvre	0	0	0	0	1	0	0	0	0	...	0	0	0	0
3	Louvre	0	0	0	0	0	0	0	0	0	...	0	0	0	0
4	Louvre	0	0	0	0	0	0	0	0	0	...	0	0	0	0

	Neighborhood	Accessories Store	African Restaurant	Argentinian Restaurant	Art Gallery	Art Museum	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	Auvergne Restaurant	...	Trail	Train Station	Udon Restaurant	Vegetarian / Vegan Restaurant
0	Batignolles-Monceau	0.00	0.000000	0.028571	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.000
1	Bourse	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.010000	0.000000	0.000000	...	0.00	0.000000	0.00	0.000
2	Butte-Montmartre	0.00	0.014493	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.014
3	Buttes-Chaumont	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.000
4	Elysee	0.00	0.000000	0.000000	0.033708	0.011236	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.000
5	Enclos-St-Laurent	0.00	0.024096	0.000000	0.012048	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.012048	0.00	0.012
6	Gobelins	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.150000	0.000000	0.000000	...	0.01	0.000000	0.00	0.000
7	Hotel-de-Ville	0.00	0.000000	0.000000	0.010000	0.010000	0.01	0.000000	0.000000	0.000000	...	0.01	0.000000	0.00	0.000
8	Louvre	0.01	0.000000	0.000000	0.000000	0.020000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.03	0.000
9	Luxembourg	0.00	0.000000	0.000000	0.032787	0.016393	0.00	0.000000	0.016393	0.000000	...	0.00	0.000000	0.00	0.000
10	Menilmontant	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.000
11	Observatoire	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.025
12	Opera	0.00	0.012658	0.000000	0.000000	0.012658	0.00	0.012658	0.000000	0.000000	...	0.00	0.000000	0.00	0.025
13	Palais-Bourbon	0.00	0.000000	0.000000	0.000000	0.016949	0.00	0.016949	0.000000	0.000000	...	0.00	0.000000	0.00	0.016
14	Pantheon	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.000
15	Passy	0.00	0.014085	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.014085	0.00	0.000
16	Popincourt	0.00	0.011765	0.000000	0.000000	0.011765	0.00	0.011765	0.000000	0.000000	...	0.00	0.000000	0.00	0.011
17	Reuilly	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	...	0.00	0.000000	0.00	0.000

3.9 Top 10 venues: We take the top 10 venues for each of the 20 neighborhoods in Paris.

	Neighborhood	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	Batignolles-Monceau	French Restaurant	Hotel	Bakery	Italian Restaurant	Sandwich Place	Breakfast Spot	Mediterranean Restaurant	Gym Pool	Moroccan Restaurant	Pastry Shop
1	Bourse	French Restaurant	Cocktail Bar	Bakery	Wine Bar	Italian Restaurant	Hotel	Salad Place	Coffee Shop	Bistro	Pastry Shop
2	Butte-Montmartre	French Restaurant	Bar	Bistro	Café	Italian Restaurant	Plaza	Pizza Place	Convenience Store	Vietnamese Restaurant	Coffee Shop
3	Buttes-Chaumont	French Restaurant	Supermarket	Bar	Italian Restaurant	Pool	Hotel	Lebanese Restaurant	Seafood Restaurant	Breakfast Spot	Spa
4	Elysee	French Restaurant	Hotel	Garden	Café	Plaza	Art Gallery	Shoe Store	Outdoor Sculpture	Cosmetics Shop	Coffee Shop
5	Enclos-St-Laurent	French Restaurant	Hotel	Restaurant	Coffee Shop	Bakery	Japanese Restaurant	Seafood Restaurant	Bistro	Bar	Korean Restaurant
6	Gobelins	Vietnamese Restaurant	Asian Restaurant	Thai Restaurant	Chinese Restaurant	French Restaurant	Cambodian Restaurant	Supermarket	Bakery	Juice Bar	Gym / Fitness Center
7	Hotel-de-Ville	French Restaurant	Plaza	Creperie	Ice Cream Shop	Hotel	Pedestrian Plaza	Coffee Shop	Wine Bar	Bar	Italian Restaurant
8	Louvre	Hotel	Japanese Restaurant	Plaza	French Restaurant	Coffee Shop	Italian Restaurant	Jewelry Store	Garden	Tea Room	Cosmetics Shop
9	Luxembourg	French Restaurant	Hotel	Bakery	Ice Cream Shop	Cosmetics Shop	Chocolate Shop	Bistro	Department Store	Art Gallery	Pastry Shop
10	Menilmontant	French Restaurant	Bar	Bistro	Bakery	Japanese Restaurant	Sushi Restaurant	Café	Plaza	Park	Italian Restaurant
11	Observatoire	French Restaurant	Bakery	Pizza Place	Bistro	Sushi Restaurant	Restaurant	Bar	Italian Restaurant	Tea Room	Vegetarian / Vegan Restaurant
12	Opera	French Restaurant	Bistro	Hotel	Bakery	Bar	Pizza Place	Japanese Restaurant	Italian Restaurant	Café	Gym / Fitness Center
13	Palais-Bourbon	French Restaurant	Hotel	Café	Plaza	History Museum	Dessert Shop	Park	Coffee Shop	Garden	Historic Site
14	Pantheon	French Restaurant	Hotel	Italian Restaurant	Bar	Bakery	Science Museum	Garden	Korean Restaurant	Supermarket	Coffee Shop
15	Passy	French Restaurant	Hotel	Italian Restaurant	Bakery	Cosmetics Shop	Supermarket	Food & Drink Shop	Japanese Restaurant	Clothing Store	Restaurant
16	Popincourt	French Restaurant	Bar	Café	Bistro	Cocktail Bar	Vietnamese Restaurant	Pastry Shop	Bakery	Italian Restaurant	Supermarket
17	Reuilly	Bike Rental / Bike Share	Recreation Center	Sports Club	Stadium	Forest	National Park	Tennis Stadium	Women's Store	Fast Food Restaurant	Frozen Yogurt Shop
18	Temple	French Restaurant	Bakery	Italian Restaurant	Japanese Restaurant	Coffee Shop	Cocktail Bar	Restaurant	Sandwich Place	Seafood Restaurant	Hotel
19	Vaugirard	Italian Restaurant	Persian Restaurant	Hotel	French Restaurant	Bakery	Plaza	Indian Restaurant	Restaurant	Brasserie	Park

3.10 French restaurant opportunities: 16 out of the 20 neighborhoods in Paris have French Restaurant as the top venue of the area. From the remaining 4 neighborhoods, 2 have French Restaurant as the top 4 venue and 1 has it as top 5. There is only one neighborhood, Reuilly, that doesn't have French Restaurant in the top 5 venues list, not even in the top 10.

3.11 French population: Now that we identified Reuilly as a potential area to locate a new French Restaurant, we want to make sure we will get enough demand to make our business successful.

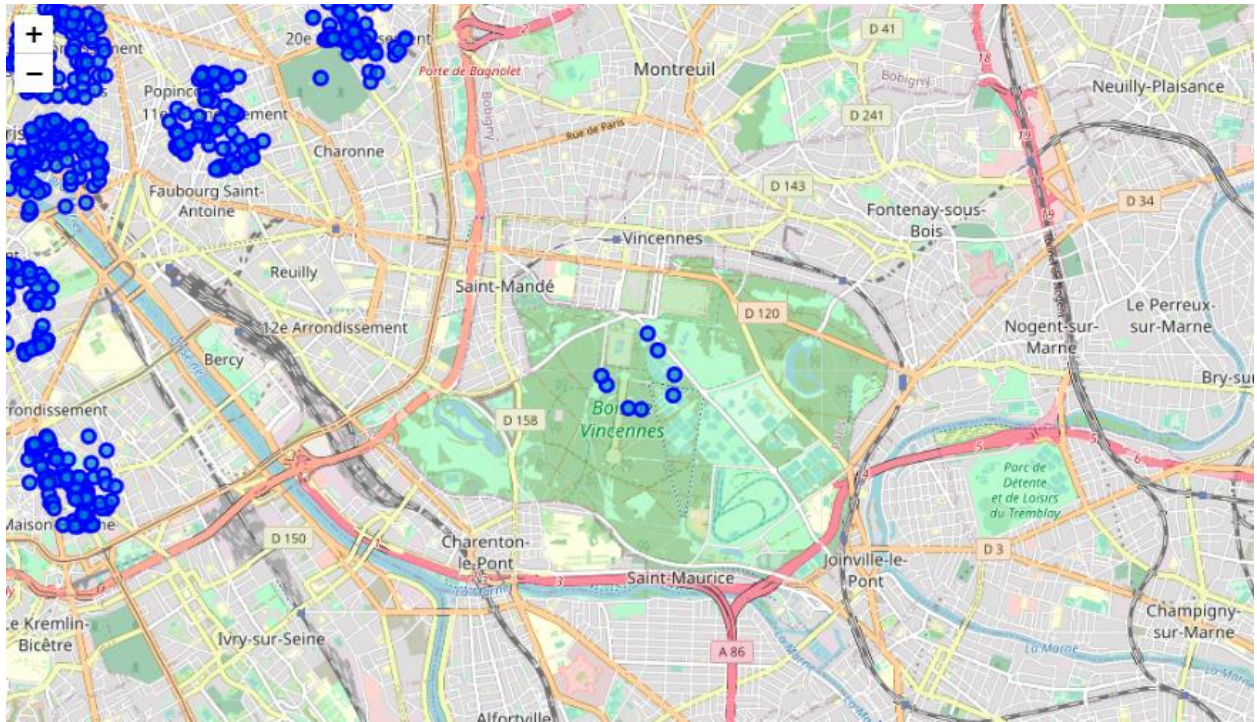
The next step is to calculate a French / non-French population ratio by neighborhood and sort the results in descending order.



	Neighborhood	% French Population
11	Reuilly	0.890339
5	Luxembourg	0.879100
8	Opera	0.878012
4	Pantheon	0.877570
14	Vaugirard	0.868415
16	Batignolles-Monceau	0.868156
7	Elysee	0.867692
12	Gobelins	0.865408
10	Popincourt	0.861337
0	Louvre	0.859523
13	Observatoire	0.858124
3	Hotel-de-Ville	0.854244
1	Bourse	0.852919
19	Menilmontant	0.852436
2	Temple	0.845552
6	Palais-Bourbon	0.844550
15	Passy	0.843635
9	Enclos-St-Laurent	0.840935
17	Butte-Montmartre	0.828134
18	Buttes-Chaumont	0.827939

- 3.12 Interestingly again, Reuilly makes it to the top of the list, meaning Reuilly has the highest French to non-French population among all 20 neighborhoods.
- 3.13 Reuilly in a map: Now let's take a look the neighborhood Reuilly. As seen in the image below, Reuilly doesn't have many venues around. Also, it is a neighborhood that is far away from the other 19.





- 3.14 Population by neighborhood: At this point we know there is an interesting French to non-French population ratio in Reuilly, but how about the total population? Is it big enough to open a new business (restaurant) in this area?

As shown below, Reuilly ranks 9<sup>th</sup> in terms of population (140,296), significantly above the average population of Paris' 20 neighborhoods (109,376).

	Neighborhood	Population
14	Vaugirard	233392
19	Menilmontant	195814
17	Butte-Montmartre	195233
18	Buttes-Chaumont	187015
12	Gobelins	182099
16	Batignolles-Monceau	167288
15	Passy	166361
10	Popincourt	146643
11	Reuilly	140296
13	Observatoire	135964
9	Enclos-St-Laurent	90372
8	Opera	59555
4	Pantheon	58850
6	Palais-Bourbon	51367
5	Luxembourg	41100
7	Elysee	36808
2	Temple	34115
3	Hotel-de-Ville	28088
1	Bourse	20900
0	Louvre	16266

#### 4. Results:

- 4.1 Count of venues by neighborhood: Reuilly is shown as the neighborhood with the least venues across all neighborhoods in Paris. There are only 8 venues in this area, significantly below the second and third lowest ones, Batignolles-Monceau and Buttes-Chaumont with 35 venues each.
- 4.2 French restaurant as a top venue: Reuilly is the only out of the 20 neighborhoods that doesn't have French Restaurant as a top 10 venue. All the other 19 neighborhoods have French Restaurant ranked in the top 5 venue.
- 4.3 French population: A French to non-French population ratio was calculated. Reuilly ranked first among all 20 neighborhoods in this metric meaning there is unsatisfied demand in this area. French people from Reuilly need to go to other neighborhoods to find a French restaurant and enjoy French food.
- 4.4 Market size - population: French to non-French population ratio could be high, but it is not significant if the total population of this neighborhood is not big enough (i.e. attractive).

Reuilly was ranked 9<sup>th</sup> in this metric with a population of 140,296 people living in this area, which is significantly above (~30%) the average population of a neighborhood in Paris (109,376).

5. Discussion:

Even though the results show there are numerous of reasons to open a new French restaurant in Reuilly, it is important to clarify that this analysis has only covered a few areas.

It is advised to run further analysis to strengthen the feasibility of opening a French restaurant.

As far as recommendations, Reuilly is a neighborhood that is slightly disconnected to the heart of Paris, which may affect the opportunity to attracting potential customers from other neighborhoods.

6. Conclusion:

Reuilly is a potential location to open a new French restaurant due to several factors identified along this project such as the lack of supply and the unsatisfied demand in this neighborhood. Without much or any competition at all, this new French restaurant has a significant opportunity to be extremely successful and profitable.