Predicting the best location for a Five Guys restaurant in Paris

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1. Introduction

In this project we will try to find an optimal location for a five guys restaurant. The goal is to find the best location within the Paris city area. The best location is not already filled with fast food restaurant and need to be as close as possible to the train station.
We will use the district and neighborhood to determine witch place would fit the most to open this new restaurant

1.1 Background

Five Guys is an American fast food chain focus on selling burgers, hot dogs and French fries. The company actually have 1500 franchises worldwide, and 1500 projects of opening.

1.2 Problem

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1.3 Interest

The Five Guys group would be really interesseted predicting the best location for the restaurant in order to maximize their future profit. The location being a key point for fast-food restaurant.

2. Data acquisition and cleaning

2.1 Data sources

First, we need to acquire the Paris, district and neighborhood division on the Wikipedia page's.

Datas related to the number of restaurants, kind of restaurant, will be extrat from the foursquare datas.

Geolocalisation data will be use extracted from geocoding API

2.2 Data cleaning

For the first data set, scraped from Wikipedia page, data were just clean by renaming the columns, removing non relevant datas. Formatting the Arrondissement number.

	District	Neighborhood	Population	Density
0	1e	Saint-Germain-l'Auxerrois	1 672	1 924
1	1e	Halles	8 984	21 806
2	1e	Palais-Royal	3 195	11 661
3	1e	Place-Vendôme	3 044	11 316
4	2e	Gaillon	1 345	7 154
5	2e			
6	2e	Mail	5 783	20 802

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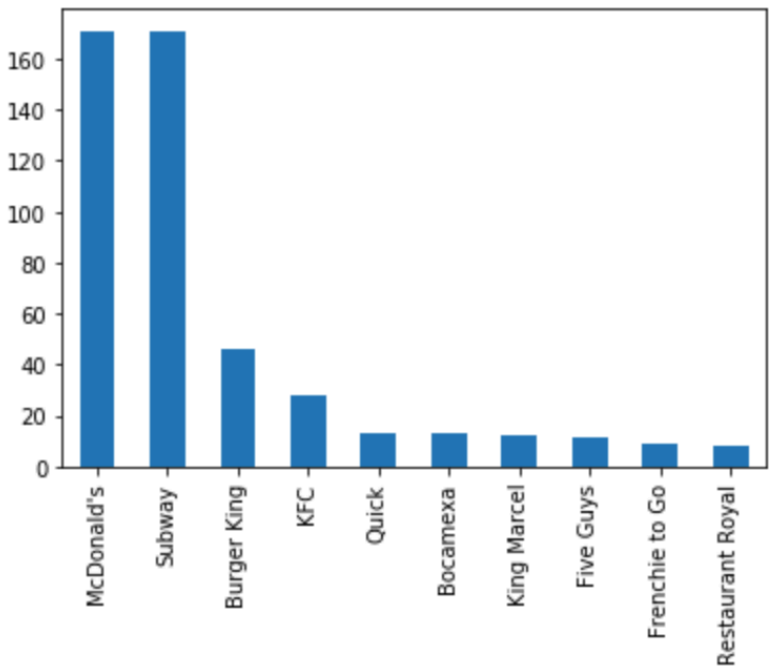
Then we added the geolocalisation (Latitude and longitude) of each Neighborhood. After that, to verify that there were no error, a map of paris was generated using folium.

For the second data set, it was created using querry with the foursquare API to get all fast food close to each Neighborhood, so with the Category ID and the localisation of the Neighborhood, it was done. Afterthat, we had a data set of all venues associated with a neighborhood. A quick diagram was generated in order to see the top fast food in Paris:



3. Data Analysis

3.1 Methodology

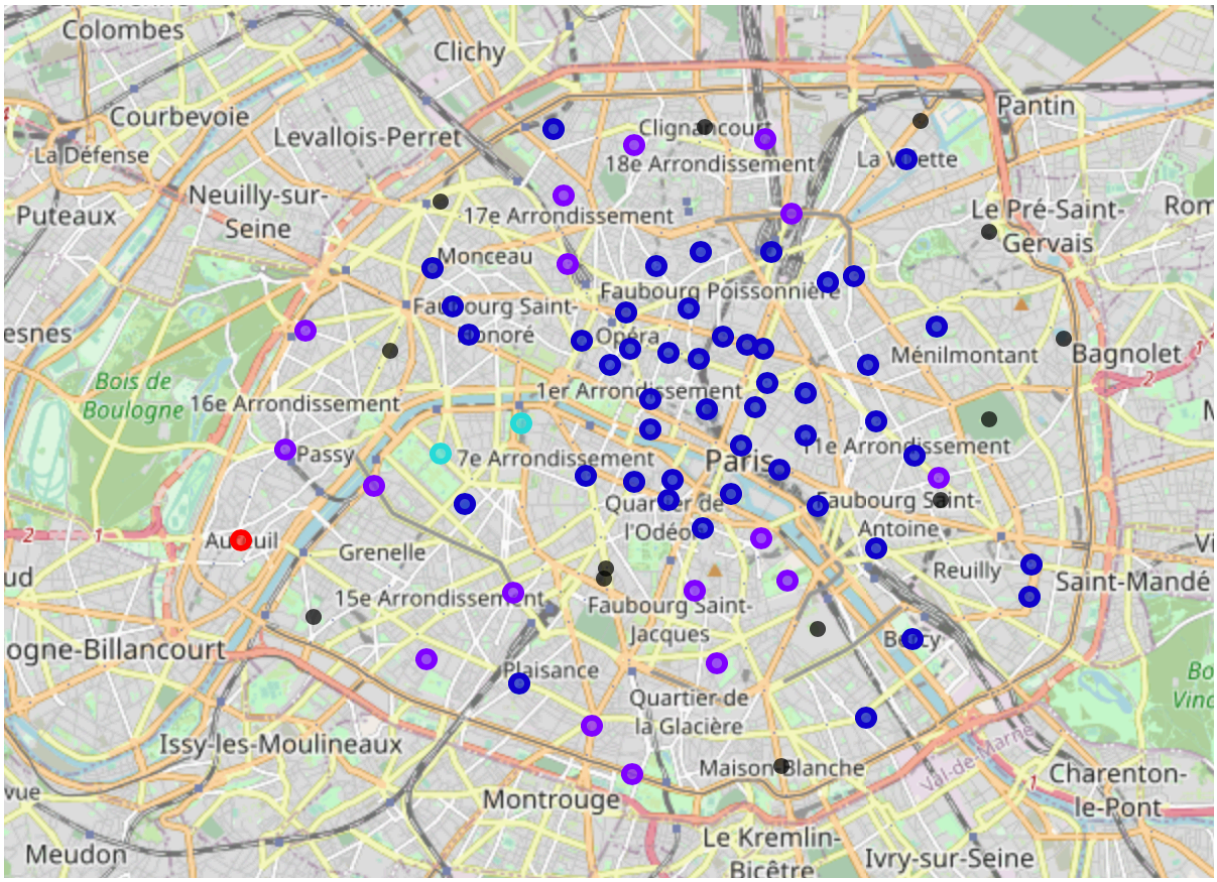
The goal is to find a neighborhood to open a new restaurant, we will cluster datas using K-means algorithm in order to see if there is a cluster of 'Fast food Neighborhood'. Then isolate this neighbordhoods, removing the ones that are already filled with major fast food chains (McDonald's, BK,KFC, etc)

Finally, this will give us a list of potential neighborhood.

Fine tuning of the neighborhood will be done looking closely at each, but manually.

3.2 K-Cluster

K-Means clustering gave us a map of neighborhood with similar fast food profil:



The Red and black districs are residentials neighborhood, so non-relevant for a fast food opening. And Black dots are out of the city center, so also removed.

Thus, we use the blue cluster ton identify the best location.

Removing the neighborhood where McDonald's and Subway are already well installed give us this neighbordhood set:

	District	Neighborhood	Population	Density	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
23	6e	Saint-Germain-des-Prés	5 154	18 277	48.854429	2.333707	3	O'Tacos	Tazio	Mira	Goguette	Croissant Doré
24	7e	Saint-Thomas-d'Aquin	12 661	15 310	48.854926	2.325311	3	Le Comptoir des Saints-Pères	Les Deux Magots	Pizza Vesuvio	Özgül Kebab	G by Gaspard
26	7e	École-Militaire	12 895	15 959	48.851848	2.304756	3	Croc Nivert	Firmine	McDonald's	Café Roussillon	Özgül Kebab
45	12	Picpus	62 947	33 788	48.845075	2.401080	3	Chez Mémé	Chibby's Diner	Burger King	McDonald's	Subway
46	12	Bercy	13 987	7 350	48.836799	2.380847	3	Lucky House	Five Guys	EXKi	Burger King	L'Escale De Bercy
55	14	Plaisance	57 229	32 061	48.831780	2.314025	3	O'wit	Alésia Food	Grec	Kebab Antalya	G by Gaspard

Removing the one, where there is already a Five Guys and BK or other give us this final list:

	District	Neighborhood	Population	Density	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
23	6e	Saint-Germain-des-Prés	5 154	18 277	48.854429	2.333707	3	O'Tacos	Tazio	Mira	Goguette	Croissant Doré
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4. Discussion

The final list is made of 3 location, now the choice depend on the five guys committee.

But looking at the 3 differents neighborhoods, the most relevant is Saint Germain because it's the most touristic place.

5. Conclusions

In this study, I Identify the best place to open a new restaurant. This was done by an overall fast food restaurants analyses and by removing neighborhoods full of chain fast food. The study could have been done with a lot of variables more, such as Square meter price, Correlation with touristic venues. But that was out of scope.

Sources:

https://fr.wikipedia.org/wiki/Liste_des_quartiers_administratifs_de_Paris
https://developer.foursquare.com