Capstone Project – Identify a location to start **TOY STORE** in Paris

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1. Introduction:

City of Paris is well known for its art, fashion and museum. The city attracts many tourist population and in 2019, Paris has reported around 35.4 million tourists' arrivals. It has its major share in the France tourist income. Tourism has contributed many direct and indirect employments. This tourist sector is made up mainly of service sectors such as hotels, leisure, retails, catering and transport.

In this most populous city, we assume that starting Toys store Business, close to any famous neighbourhood may attract good number of customers. Selling small models of famous places in and around Paris, traditional and indigenous toys of Paris, may help the retailers.

Thus, in this project we will identify an optimal location for a Toy Store. For this project we have to identify below location

a) The location with least number of toy stores

b) The location which is most commonly visited by children.

2. Data & Analysis:

For this project, the website **'https://frenchmoments.eu/arrondissements-of-paris '**, is used to collect detailsabout neighborhood. Details such as borough, neighborhood and Zip code are obtained from the previously mentioned website using BeautifulSoup.

To get the latitude and longitude details, **geocoders** library is used.

Folium will be used to display all places in Map.

FourSquare API will be used to get neighborhood venues and existing toys store details in all places.

Kmeans (Clustering Algorithm), in Sklearn library is used to group the places based on venue density.

3. Methodology:

Identify the Boroughs and Neighborhood details:

The web page ''**https://frenchmoments.eu/arrondissements-of-paris'** been scrapped using Beautifulsoup and following are the details obtained.

```
print("Borough list - ", borough_list)
print("Neighborhood list - ", neighborhood_list)
```

```
Borough list -  ['1st arrondissement', '2nd arrondissement', '3rd arrondissement', '4th arrondissement', '5th arrondissement', '6t
h arrondissement', '7th arrondissement', '8th arrondissement', '9th arrondissement', '10th arrondissement', '11th arrondissement',
'12th arrondissement', '13th arrondissement', '14th arrondissement', '15th arrondissement', '16th arrondissement', '17th arrondiss
ement', '18th arrondissement', '19th arrondissement', '20th arrondissement']
Neighborhood list -  ['Louvre', 'Bourse', 'Marais - north', 'Marais - south, Notre-Dame', 'Latin Quarter', 'St. Germain-des-Prés,
Luxembourg Garden', 'Eiffel Tower, Invalides', 'Arc de Triomphe, Champs-Élysées', 'Opéra Garnier, Grands Boulevards', 'Canal Saint
-Martin', 'Faubourg St. Antoine - Oberkampf', 'Bercy, Bois de Vincennes', 'Tolbiac, Gobelins, Paris Rive Gauche', 'Montparnasse',
'Vaugirard, Grenelle', 'Passy, Auteuil', 'Batignolles, Monceau', 'Montmartre', 'La Villette, Buttes-Chaumont', 'Belleville, Ménilm
ontant']
```

Now that we have obtained the Borough and Neighborhood details, let us explore further to get coordinates of all locations.

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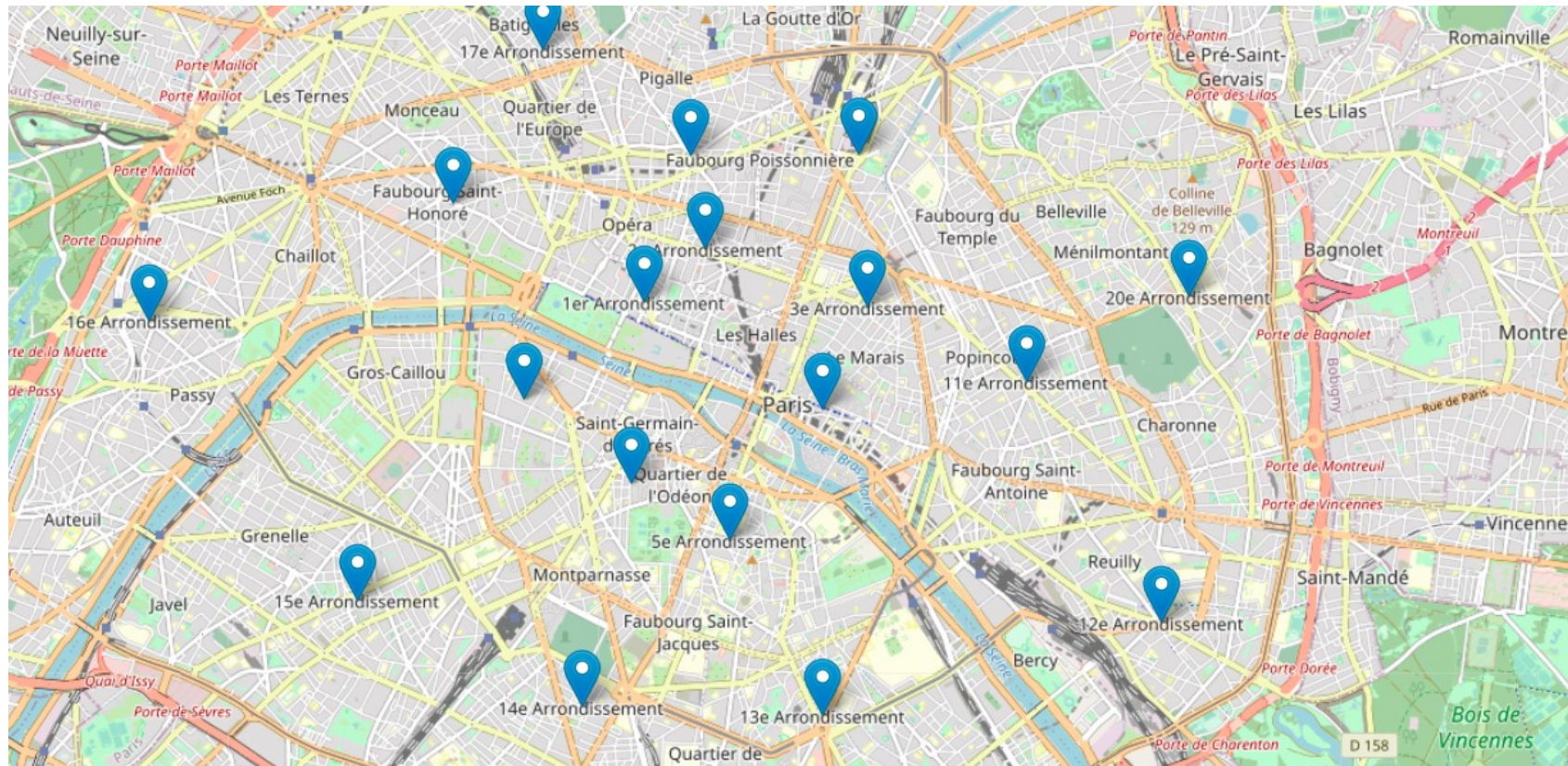## *Get the Coordinates using geocoders:*

Using geocoders, obtain the latitude and longitude details of all Neighborhoods.

Out[4]:

	Borough	Neighborhood	Postal Code	Latitude	Longitude
0	1st arrondissement	Louvre	75001	48.8646144	2.334396
1	2nd arrondissement	Bourse	75002	48.868743	2.341688
2	3rd arrondissement	Marais – north	75003	48.864212	2.360936
3	4th arrondissement	Marais – south, Notre-Dame	75004	48.8562021	2.3556193
4	5th arrondissement	Latin Quarter	75005	48.8460591	2.3445228
5	6th arrondissement	St. Germain-des-Prés, Luxembourg Garden	75006	48.8504333	2.3329507
6	7th arrondissement	Eiffel Tower, Invalides	75007	48.8570281	2.3201953
7	8th arrondissement	Arc de Triomphe, Champs-Élysées	75008	48.87225991745448	2.311689291751072
8	9th arrondissement	Opéra Garnier, Grands Boulevards	75009	48.876019	2.339962
9	10th arrondissement	Canal Saint-Martin	75010	48.876106	2.35991
10	11th arrondissement	Faubourg St. Antoine – Oberkampf	75011	48.858416	2.379703
11	12th arrondissement	Bercy, Bois de Vincennes	75012	48.8396154	2.3957517

Attached below the map generataed that shows all arrondissments in Paris.

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Capture existing Toy Store details:

Using Foursquare API, query the existing Toy store details in all the arrondissement of Paris. Below is the list of Toy stores in the radius of 1.5 kms from centre of each arrondissements.

```
In [22]: print("Total number of TOYS Store:", df_paris_toys_store.shape[0])

         Total number of TOYS Store: 21
```

Below are the details of toy store dataframe.

```
Total Number of Toys store : 21
```

21]:

	index	Borough	Neighbourhood	Borough Latitude	Borough Longitude	Store Name	Venue Type	Store Latitude	Store Longitude
0	0	1st arrondissement	Louvre	48.8646144	2.334396	Toys"R"Us	Toy / Game Store	48.876202	2.324837
1	2	1st arrondissement	Louvre	48.8646144	2.334396	Pulp's Toys	Toy / Game Store	48.851367	2.346638
2	4	2nd arrondissement	Bourse	48.868743	2.341688	Toys"R"Us	Toy / Game Store	48.876202	2.324837
3	7	2nd arrondissement	Bourse	48.868743	2.341688	Pulp's Toys	Toy / Game Store	48.851367	2.346638
4	9	3rd arrondissement	Marais – north	48.864212	2.360936	Toys"R"Us	Toy / Game Store	48.859749	2.369441
5	11	3rd arrondissement	Marais – north	48.864212	2.360936	Manga Toys	Toy / Game Store	48.854262	2.376240

Lets further explore the common venues in each arrondissment. This is done to understand the neighborhood futher.
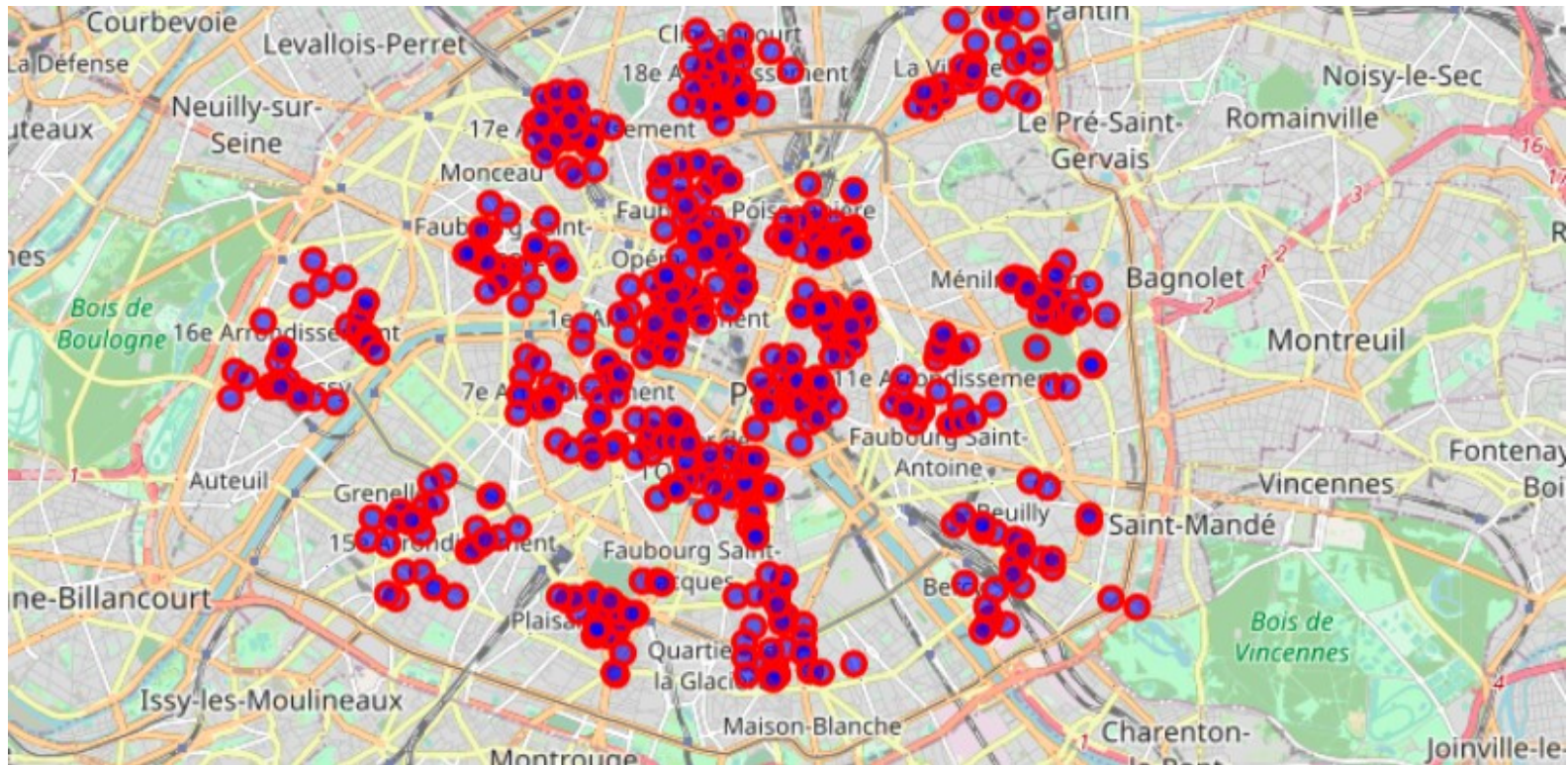
Get the common venues in the Neighborhood:

Using Foursquare explore API, all the venues around each neighborhood is obtained. Below is the detailed list. This may be less accurate data, because we have considered only the venues around a radius of 1.5 kms, more precise data can be obtained by increasing the radius.

out[75]:

	Borough	Neighbourhood	Borough Latitude	Borough Longitude	Venue Name	Venue Type	Venue Latitude	Venue Longitude
0	1st arrondissement	Louvre	48.8646144	2.334396	Sanukiya	Udon Restaurant	48.864713	2.333805
1	1st arrondissement	Louvre	48.8646144	2.334396	Jardin du Palais Royal	Garden	48.864941	2.337728
2	1st arrondissement	Louvre	48.8646144	2.334396	Palais Royal	Historic Site	48.863236	2.337127
3	1st arrondissement	Louvre	48.8646144	2.334396	Musée des Arts Décoratifs	Art Museum	48.863077	2.333393
4	1st arrondissement	Louvre	48.8646144	2.334396	On the Bab	Korean Restaurant	48.866417	2.335110
5	1st arrondissement	Louvre	48.8646144	2.334396	Boulangerie Aki	Bakery	48.866211	2.335458
6	1st arrondissement	Louvre	48.8646144	2.334396	LouLou	Italian Restaurant	48.862804	2.333500

Below is the map view of above said locations:

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The list is further scrutinized to get the 15 most common locations in each neighborhood.

Out[77]:

	Borough	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	11th most common venue	12th most common venue
0	10th arrondissement	Coffee Shop	African Restaurant	French Restaurant	Breakfast Spot	Bakery	Salad Place	Juice Bar	Korean Restaurant	Seafood Restaurant	Shanxi Restaurant	Boxing Gym	Café
1	11th arrondissement	Bistro	Cocktail Bar	Wine Bar	French Restaurant	Moroccan Restaurant	Pizza Place	Park	Dance Studio	Beer Store	Mexican Restaurant	Record Shop	Restauran
2	12th arrondissement	French Restaurant	Museum	Chinese Restaurant	Bistro	Bakery	Beer Bar	Department Store	Seafood Restaurant	Shopping Plaza	Portuguese Restaurant	Creperie	Farmers Marke
3	13th arrondissement	French Restaurant	Japanese Restaurant	Asian Restaurant	Thai Restaurant	Park	Gaming Cafe	Basque Restaurant	Cambodian Restaurant	Dessert Shop	Italian Restaurant	Bistro	Put
4	14th arrondissement	French Restaurant	Bar	Bakery	Italian Restaurant	Tea Room	Brasserie	Japanese Restaurant	Ice Cream Shop	Gourmet Shop	Wine Shop	Art Gallery	Wine Ba
5	15th arrondissement	French Restaurant	Korean Restaurant	Park	Lebanese Restaurant	Italian Restaurant	Hotel	Corsican Restaurant	Plaza	Russian Restaurant	Pastry Shop	Bookstore	Indian Restauran
6	16th arrondissement	French Restaurant	Hotel	Italian Restaurant	Plaza	Burger Joint	Garden	Restaurant	Bakery	Food & Drink Shop	Japanese Restaurant	Middle Eastern Restaurant	Museum
7	17th arrondissement	French Restaurant	Wine Bar	Bar	Coffee Shop	Farmers Market	Indian Restaurant	Pizza Place	Pastry Shop	Park	Creperie	Lebanese Restaurant	Kore Restaur

Cluster the location:

The unsupervised cluster algorithm – Kmeans from Sklearn library is used for clustering. Clustering the data will help us to identify the venue density.

In this case, we have considered the number of clusters as 4 and clustering done based on the venue types. After applying machine learning algorithm, we have observed the following

Cluster 1 : Common venues are Restaurants and bars

	Label	Borough	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 mos commo venu
1	0	11th arrondissement	Cocktail Bar	Bistro	Wine Bar	French Restaurant	Organic Grocery	Gluten-free Restaurant	Café	Seafood Restaurant	Mexican Restaurant	Restaurar
2	0	12th arrondissement	French Restaurant	Museum	Chinese Restaurant	Bistro	Bakery	Wine Bar	Beer Bar	Creperie	Seafood Restaurant	Portugues Restaurar
8	0	18th arrondissement	French Restaurant	Italian Restaurant	Bistro	Bar	Plaza	Café	Scenic Lookout	Burger Joint	Breakfast Spot	Beer Stor
9	0	19th arrondissement	Beer Bar	Café	Pizza Place	French Restaurant	Music Venue	Bar	Bistro	Restaurant	Drive-in Theater	Brewer
11	0	20th arrondissement	French Restaurant	Bakery	Plaza	Bar	Music Venue	Moroccan Restaurant	Mexican Restaurant	Cemetery	Roof Deck	Loung
12	0	2nd arrondissement	Cocktail Bar	Hotel	French Restaurant	Sushi Restaurant	Pizza Place	Plaza	Creperie	Cycle Studio	Donut Shop	Englis Restaurar

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Cluster 2: Common venues are French Restaurants and bar

	Label	Borough	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
3	1	13th arrondissement	French Restaurant	Japanese Restaurant	Thai Restaurant	Asian Restaurant	Park	Pool	Basque Restaurant	Café	Burger Joint	Gaming Cafe
4	1	14th arrondissement	French Restaurant	Bar	Bakery	Italian Restaurant	Wine Shop	Wine Bar	Ice Cream Shop	Japanese Restaurant	Pizza Place	Coffee Shop
5	1	15th arrondissement	French Restaurant	Korean Restaurant	Italian Restaurant	Park	Lebanese Restaurant	Bar	Gastropub	Russian Restaurant	Corsican Restaurant	Bookstore
6	1	16th arrondissement	French Restaurant	Hotel	Italian Restaurant	Bakery	Plaza	Garden	Restaurant	Burger Joint	Food & Drink Shop	Museum
7	1	17th arrondissement	French Restaurant	Wine Bar	Bar	Coffee Shop	Farmers Market	Japanese Restaurant	Indie Movie Theater	Creperie	Pastry Shop	Park

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Cluster 3: Common venues are Restaurants and Museums.

	Label	Borough	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
10	2	1st arrondissement	Plaza	Historic Site	Art Museum	Udon Restaurant	Korean Restaurant	Japanese Restaurant	Italian Restaurant	Cocktail Bar	Café	Bubble Tea Shop
17	2	7th arrondissement	French Restaurant	Historic Site	Art Museum	Coffee Shop	Garden	Plaza	Bookstore	Furniture / Home Store	Italian Restaurant	Exhibit
18	2	8th arrondissement	French Restaurant	Hotel	Cosmetics Shop	Bar	Coffee Shop	Plaza	Department Store	Café	Jewelry Store	Boutique

Cluster 4: Coffee shops and restaurants

[280]:

	Label	Borough	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	3	10th arrondissement	Coffee Shop	Breakfast Spot	African Restaurant	French Restaurant	Taco Place	Sandwich Place	Korean Restaurant	Juice Bar	Seafood Restaurant	Shanxi Restaurant
13	3	3rd arrondissement	Coffee Shop	Cocktail Bar	Italian Restaurant	Wine Bar	Sandwich Place	Seafood Restaurant	Chinese Restaurant	Brasserie	Farmers Market	Speakeasy

4. Results:

Map to show number of toy store in each location:

I have generated the below graph to show the number of toys store in each location. From the above datapoints, it is clear that there are only limited number of toy stores in surroundings of each neighborhood.

Count of Toys Store in each Arrondissments
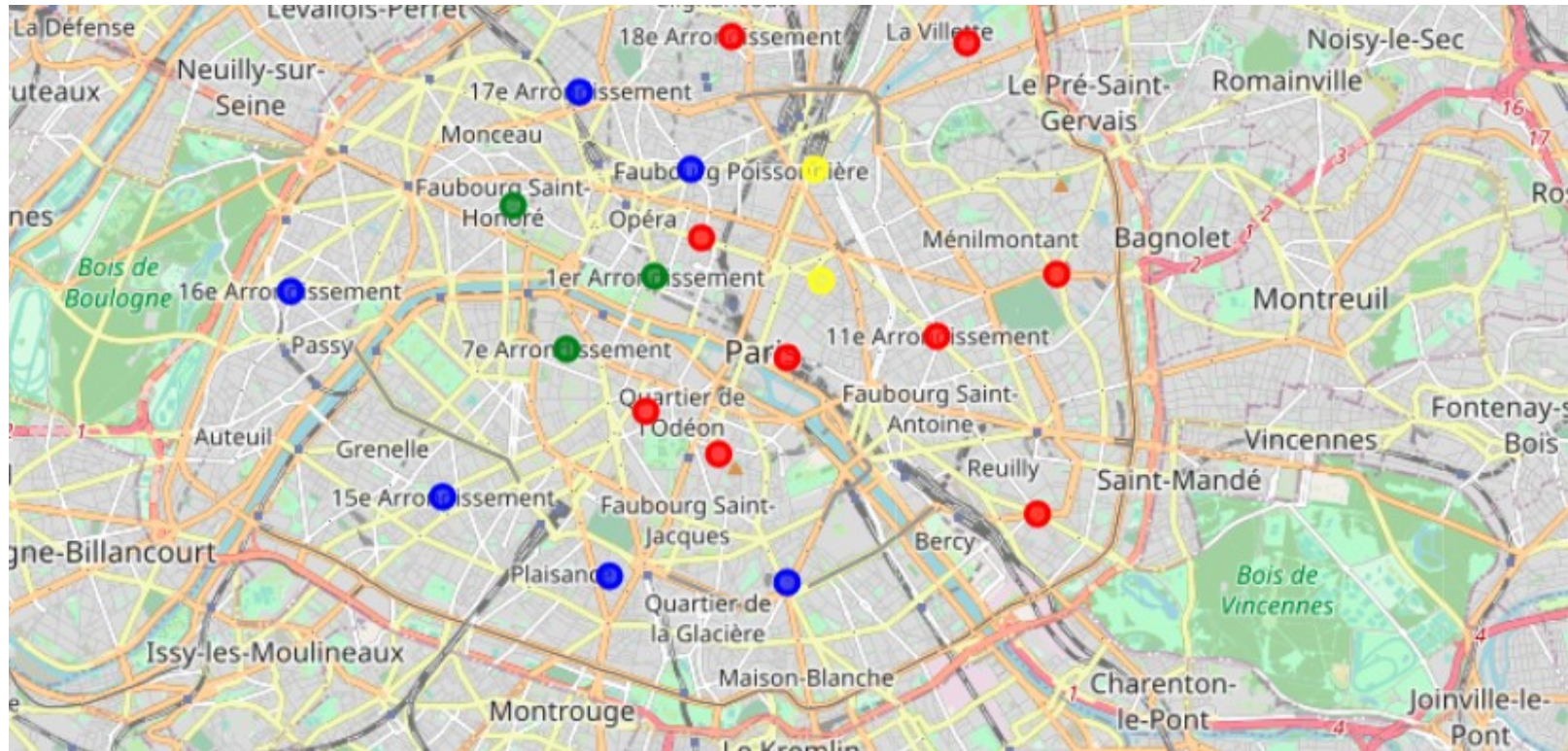
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Folium Map based on Venue Clusters:

Cluster 1 (Red) : Common venues are Restaurants and bars

Cluster 2 (Blue) : Common venues are French Restaurants and bar

Cluster 3 (Green) : Common venues are Restaurants and Museums.

Cluster 4 (Yellow) : Coffee shops and restaurants

5. Discussion:

Paris, is the most populous city, visited by many people. The city hosts many business such as tourism, hotels, tours and many retail business.

All data has been obtained using FourSquare API. Further analysis is done using visualization and map techniques.

I used the Kmeans algorithm as part of this clustering study.

I also performed data analysis using the toys store and venue details obtained from I ended the study by visualizing the data and clustering information on the paris MAP using Folium.

6. Conclusion:

From the analysis done, following can be concluded

   a) in 7th, 10th, 13th, 14th, 15th, 16th, 18th and 20th arrondissements has no Toy stores

   b) Cluster 3 has museums and art gallery which will be most commonly visited by children.

Also, the most famous – **Eiffel Tower**, is located at 7th Arrondissement. Hence the ideal place to start a Toy store will be at 7th Arrondissement.

7. References:

1) https://frenchmoments.eu/arrondissements-of-paris

2) FourSquare API