

# Capstone Project - Property Prices in Paris

IBM Applied Data Science Course

*By Sebastien Serville, February 2020*

## Introduction / Business Problem

I'm living in Paris (France) and as most of the big cities around the World one the biggest concerns for Parisians is to find a place to live. Apartment and house prices increased by 248% since 2000 (<http://www.leparisien.fr/immobilier/10-000-euros-le-m2-a-paris-l-evolution-du-prix-de-l-immobilier-dans-la-capitale-5-graphiques-05-09-2019-8145984.php>). The aim of this project is to analyse the prices in Paris boroughs and districts and to identify venues available in each district. We will also look at the impact of the venues on the property prices. This analysis will be helpful for people who want to buy a property in Paris as it will provide the mean price per sqm and the most common venues in the neighborhood. It will help them to select the best locations based on their budget and the type of venues they are interested in (restaurants, museums, parks...). People looking at buying an investment property will also be interested in this analysis so they can buy a property at the best price and in a popular neighborhood.

## Data

To be able to complete this analysis, we will need to get the price of the properties (houses and apartments) recently sold. I decided to use data provided by the French government on the properties sold from 1st January 18 to 30th June 19. Data for the second half of 2019 is not yet available.

1. **Paris Property Sales data** (csv file): It provides a list of properties sold in Paris between January 18 and June 19. Important fields are address, postcode, price, size, latitude, longitude, type of sales - <https://www.data.gouv.fr/fr/datasets/5c4ae55a634f4117716d5656/#>
2. **Paris districts** (geojson file): It provides the list of Paris districts with geographical data (central point and polygon) <https://www.data.gouv.fr/fr/datasets/arrondissements-1/>
3. **Paris boroughs** (geojson file): It provides the list of Paris boroughs with geographical data (central point and polygon) <https://www.data.gouv.fr/fr/datasets/quartiers-administratifs/>
4. **Foursquare API** for location data: Foursquare provided location based services and they allow developers to get a list of venues in a city, district or neighborhood. It will be used in this project to identify the number and type of venues available in a neighborhood - <http://www.foursquare.com>

By analysing and combining this data we will be able to define the mean property prices in Paris districts and to identify the venues that impact the most the prices.

## Methodology

Below are the steps and methodology I used to complete this project:

1. Identify data sources

- a. Property prices in Paris by districts and / or by boroughs
  - b. Districts and boroughs of Paris with geospatial information
  - c. Venues data with their categories
2. Prepare data
  - a. Data cleansing and formatting
3. Process and analyse data
  - a. Use standard formulas to calculate mean price per sqm and number of sales by district and boroughs
  - b. Use data visualisation method (graphs, maps, tables...) to get insight from data
  - c. Use clustering method and machine learning to understand impact of venues on property prices
4. Review results and conclude

## Identify data sources

It was easy to identify data sources because property prices, districts and boroughs data is available on the Open Data Website managed by French authorities. I decided to Focus on property prices from 2018 and 2019 as it's enough to get the average price per sqm in Paris districts. For 2019, only January to June 19 data was available. Data for the second half of the year will be available on April 20 only. Venues data is available through Foursquare API.

## Prepare Data

### Property Prices

Before starting to analyse property prices, I had to review the format of the files available on the French Open Data Website. Sales data is organised by department and by year on this Website so I only downloaded 2 files:

- 75\_2018.csv = Property sales data for Paris from January 18 to December 18
- 75\_2019.csv = Property sales data for Paris from January 19 to June 19

I noticed that only a few columns were required for the analysis I was ready to complete. These columns are:

- Id\_mutation = Unique identifier of the sales
- Date\_mutation = Date of sales
- nature\_mutation = Type of sales
- Valeur\_fonciere = Sale Price in Euro
- Adresse\_numero = Street number
- Adresse\_nom\_voie = Street name
- Code\_postal = Postcode. It also identifies the district number (example: 75001 = 1st District)
- Surface\_reelle\_bati = Size of the property in square meter
- Nombre\_pieces\_principales = Number of rooms in the property
- Longitude
- Latitude

I kept only the above columns and I removed the other columns.

The next step was to analyse the data to remove inconsistent data. I noticed that the price of some properties is very low or very high so I removed all records where the property price was below 10,000 Euro or above 100,000,000 Euro.

I also removed records where the longitude, latitude or size of the property were null.

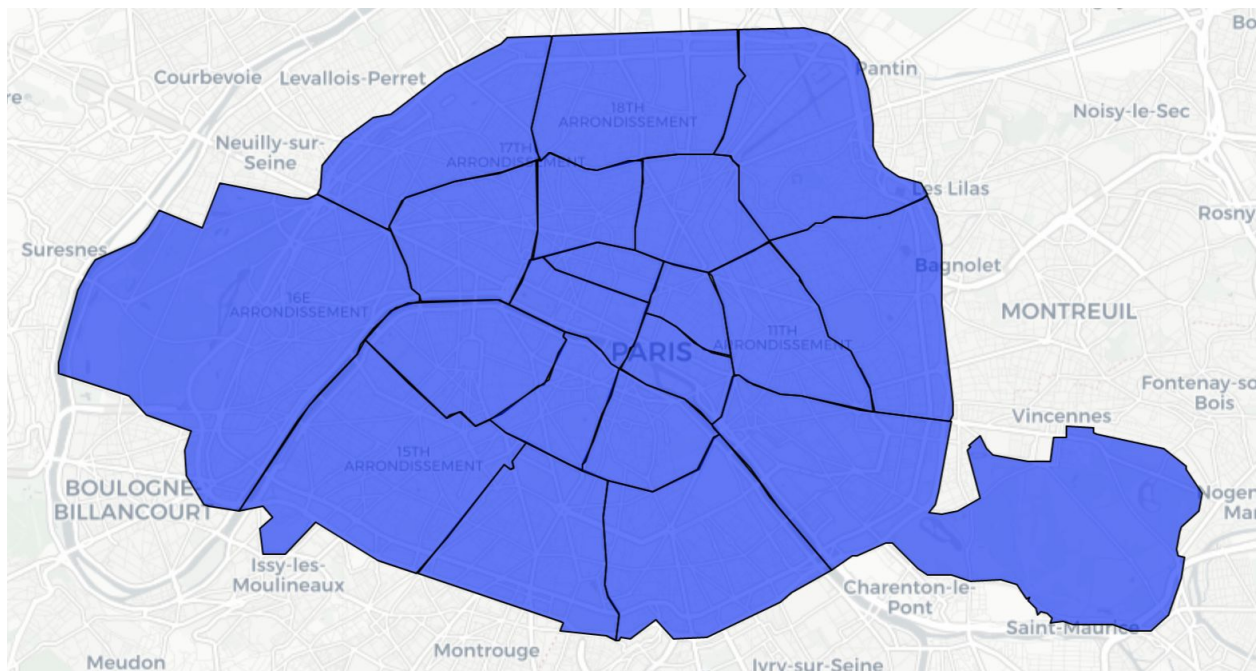
Finally, I added a column with the price per sqm that I used later in my analysis.

$$[\text{Price per Sqm}] = [\text{Sale Price}] / [\text{Size of the Property}]$$

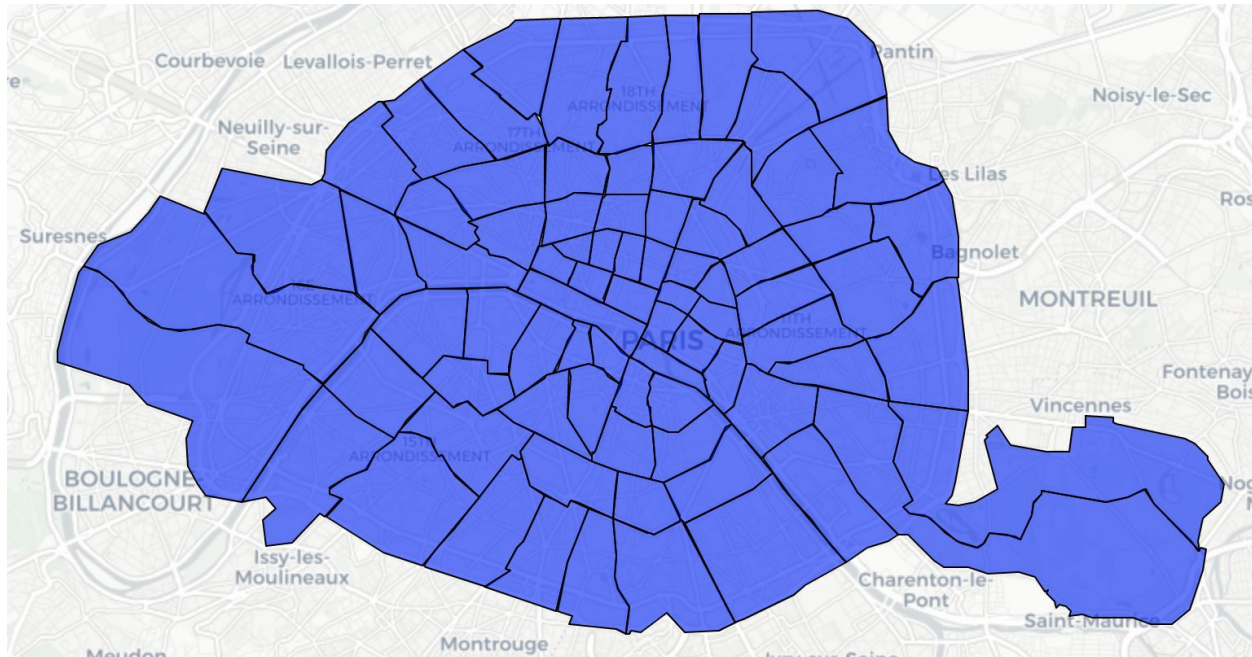
## Districts & Boroughs

I wanted to show the data on maps so I imported the geojson files of Paris districts and boroughs and I saved the data into dataframes to be able to display the districts and boroughs on maps.

There are 20 districts in Paris numbered from 1 to 20.



There are 4 administrative boroughs per district so there are 80 boroughs in Paris.



## Identifying boroughs

District numbers were available in the sales data files through the postcodes. However, the borough's names were not available in this file so I had to find a way to add them in it.

I used the property localisation (longitude and latitude) and the geospatial data of the boroughs to identify the correct borough.

The easiest way was to check for each property if the coordinate of the property were in the polygon defined by the geospatial data of a borough. I knew in which district the boroughs and the properties were located so I just had to check in which on the 4 boroughs of the district a property was located.

*Example:* Property A is located in district 1. The 4 boroughs in this district are:

1. Saint Germain L'Auxerrois
2. Halles
3. Palais Royal
4. Place Vendome

Using a loop I check if coordinates of Property A were in borough 1, 2 3 or 4 and then I added the name and id of the borough the Property Price dataframe.

I used the Point and Polygon objects of the [Shapely library](#). Here is the Python code I used:

```
# Identify the borough of each property available in our dataset
df_results = []
for lat, lng, dist_bor in zip(df_data_price.latitude, df_data_price.longitude, df_data_price.district):
    for bor_id, bor_name, bor_dist, bor_poly in zip(df_boroughs.id, df_boroughs.name, df_boroughs.district, df_boroughs.polygon):
        if dist_bor == bor_dist:
            point = Point(lng, lat)
            polygon = Polygon(bor_poly[0])
            if polygon.contains(point):
                df_results.append([bor_id, bor_name])
```

The dataset is ready to be analysed!

## Venue Data

I used [Foursquare API](#) to get location data and venues located in each borough. Results of the call to the API come in a json file in a pre-defined format so it was easy to parse it and to import the venue data we required in a dataframe.

## Process & Analyse Data

I started to use basic statistical methods to calculate:

- The number of sales per district and per borough
- The mean price per sqm per district and per borough
- The distribution of the price per sqm in the dataset
- The number of sales and price per sqm by apartment types (number of rooms)

This first analysis gave me a good idea of the content of the dataset and I noticed that some outliers had to be removed so it wouldn't impact the data analysis. I removed the records where the price per sqm was too low or too high because the price and / or the number of sqm were incorrect.

I used different types of charts to present the data and to get better insights:

- Histograms to show the distribution of the data
- Bar charts to compare data from one district or borough to the others
- Boxplot charts to show the mean, first quartile, third quartile, min and max of the dataset
- Maps to plot data by location because they are really easy to understand

The next step was to get location data from Foursquare API to understand how venues impact the price of the properties available in Paris. I decided to get the top 100 venues in a borough by using its central point.

Once done, I used one hot encoding and I calculated the mean of the frequency of occurrence of each category of venues. It was necessary to use K-mean clustering to see how the boroughs can be grouped based on the venue categories available.

## Review Results and Conclude

At the end, I reviewed the results of the analysis to answer the following questions:

1. What are the most expensive and cheapest districts or boroughs?
2. What is the average price per sqm for a property in Paris?
3. What is the volume of properties sold in Paris?
4. Do venues located close to a property have an impact on its price?

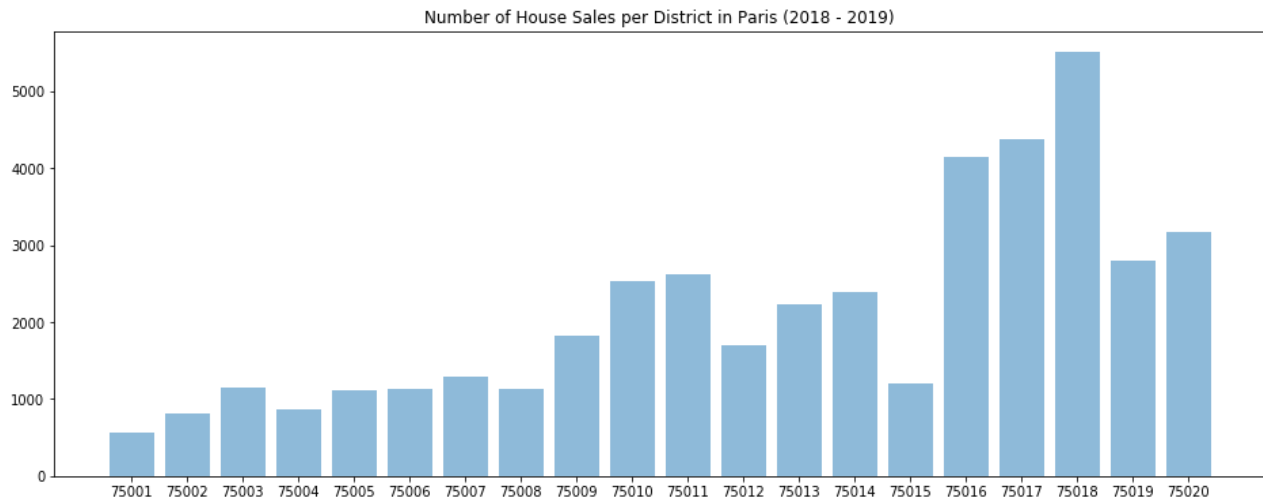
## Results



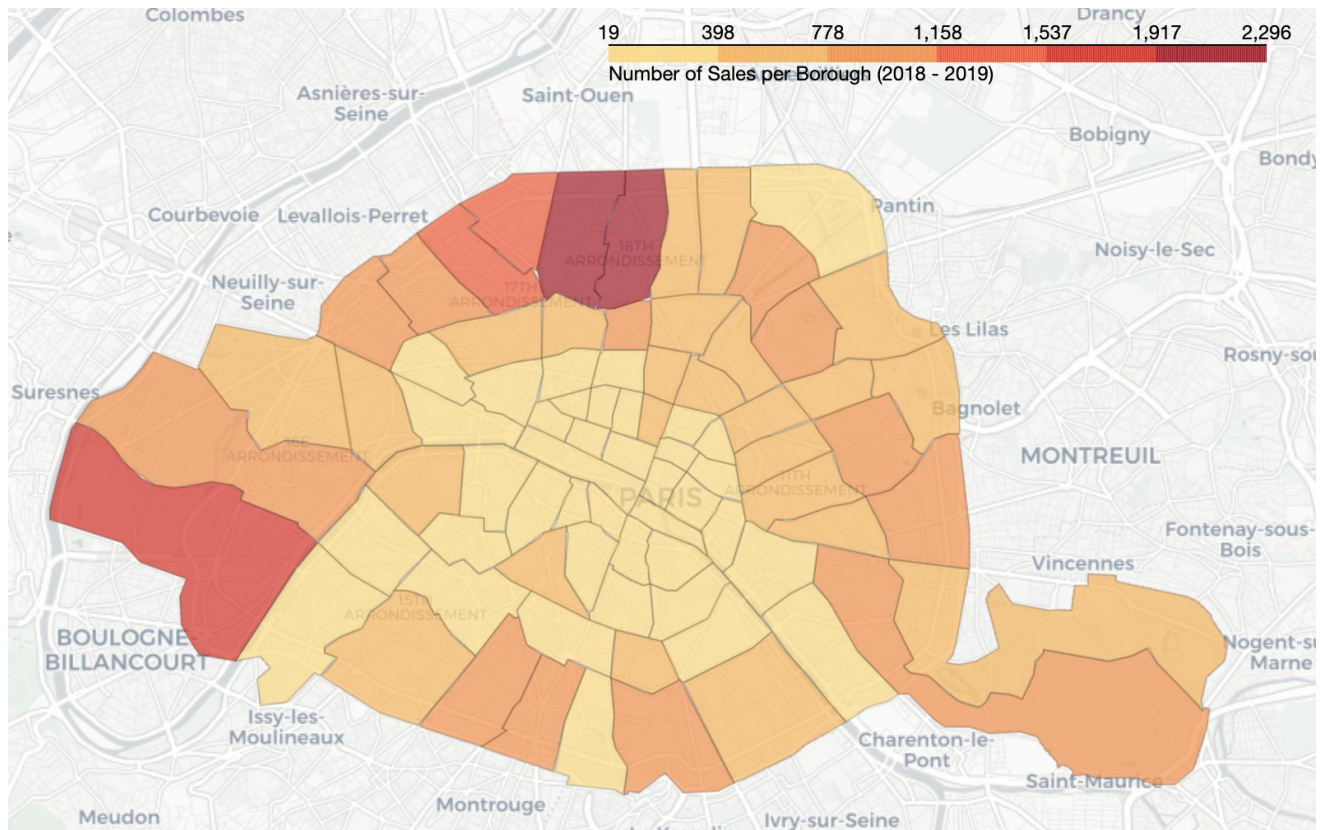
## Property Sales

42,570 properties were sold in Paris from January 2018 to June 2019. However, the number of properties sold varies a lot from one district to the other. For example, there have been 563 sales in the 1st district and 5,509 sales in the 18th district.

The graph below shows the number of sales by district during this period.



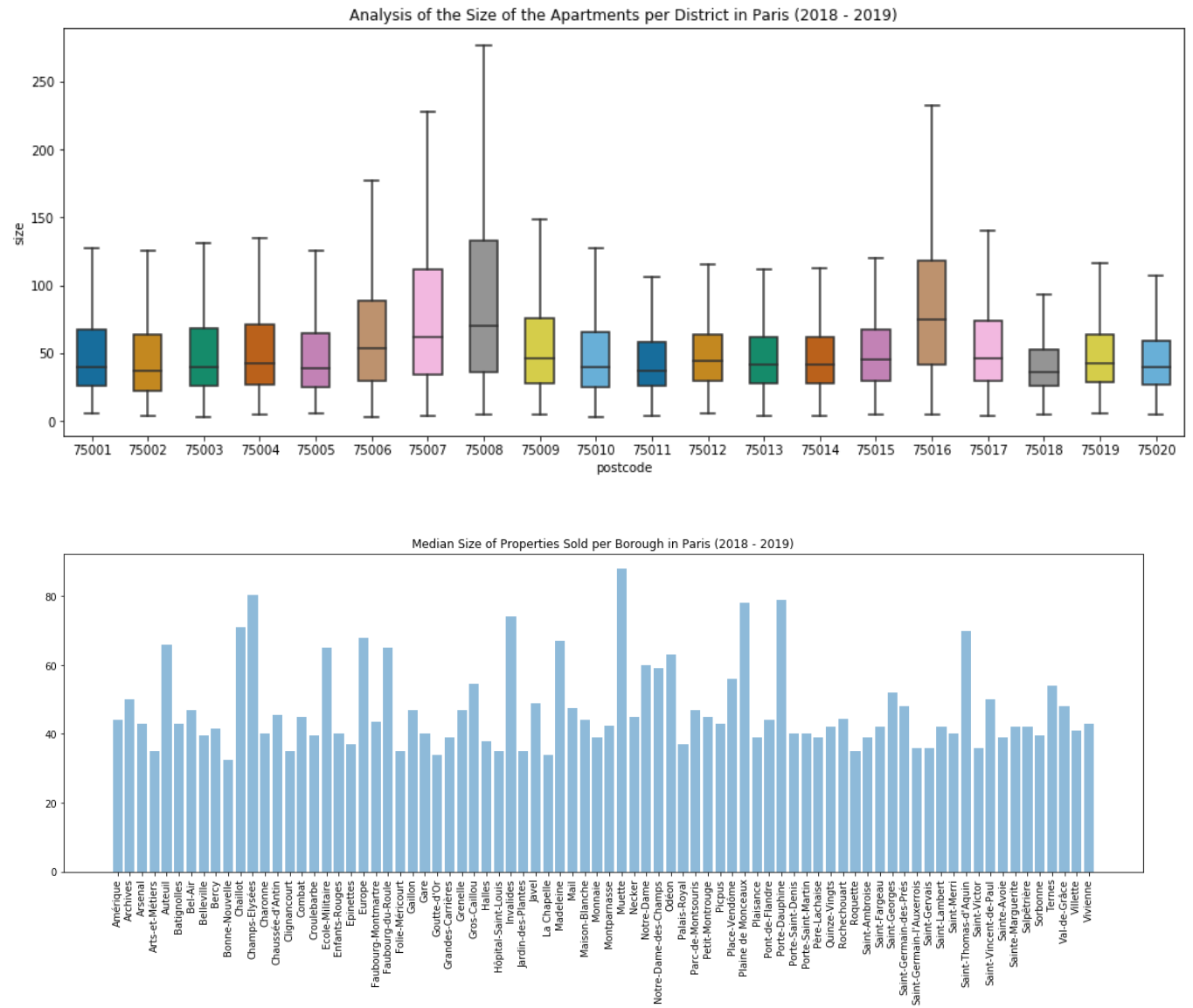
We analysed the number of sales by borough and we showed the results on the map below.

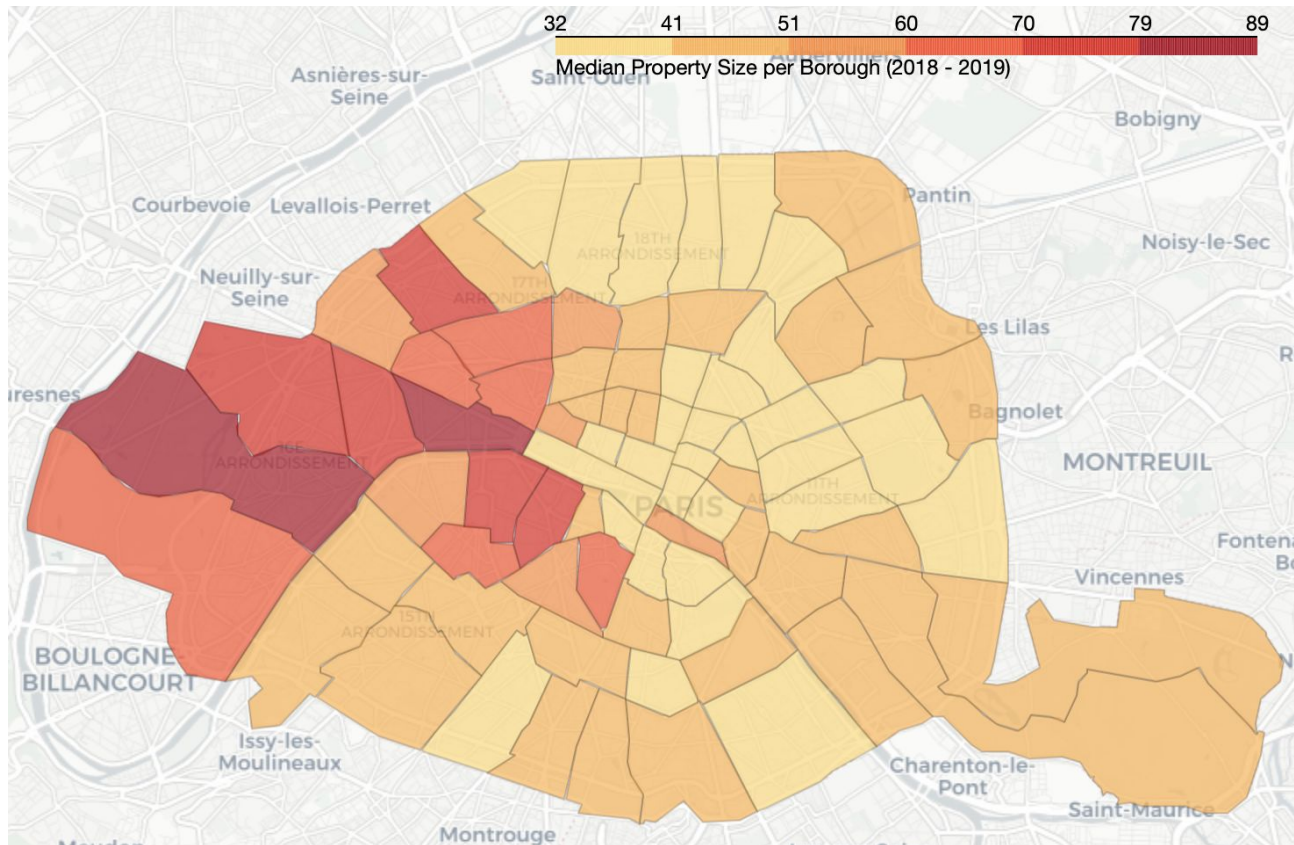


This map shows that less properties are sold in the boroughs in the center in Paris than in the ones in the fringes of the city. We will see later the reasons for these differences.

### Property Size

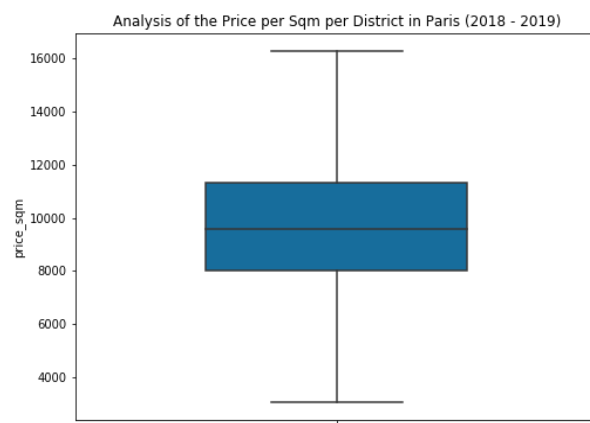
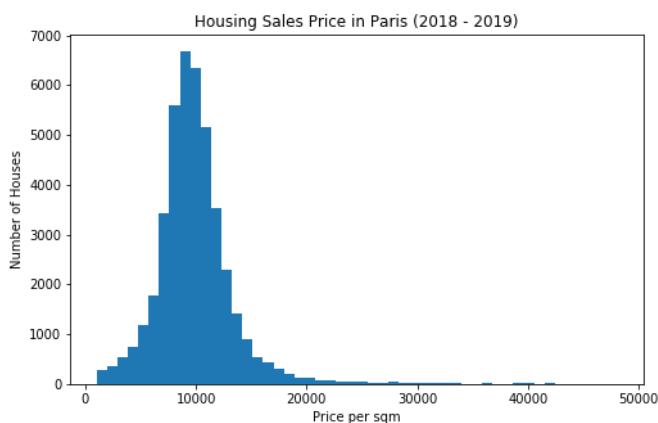
The median size of the apartments sold in Paris is 44 sqm. However, the median size of the apartments sold in the period we are looking at varies from one borough to the other. Apartments on the West side of Paris are larger than in the other boroughs.





## Property Prices

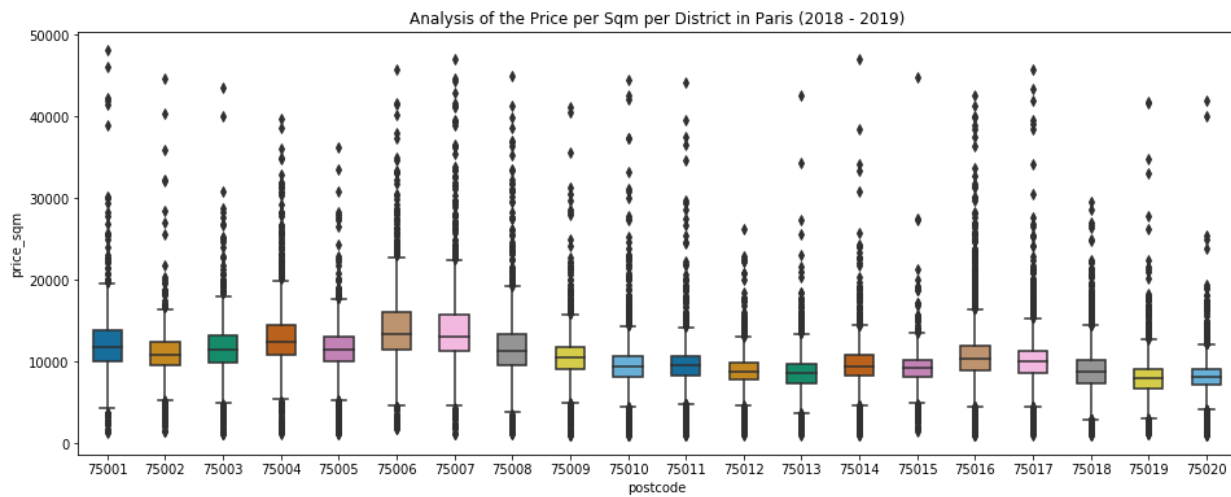
Then we looked at the property prices to understand the differences between boroughs. The mean price of properties sold in Paris in 2018 and in the first half of 2019 is 9,900 Euro and most of the properties were sold for a price per sqm between 8,000 Euro and 12,000 Euro.



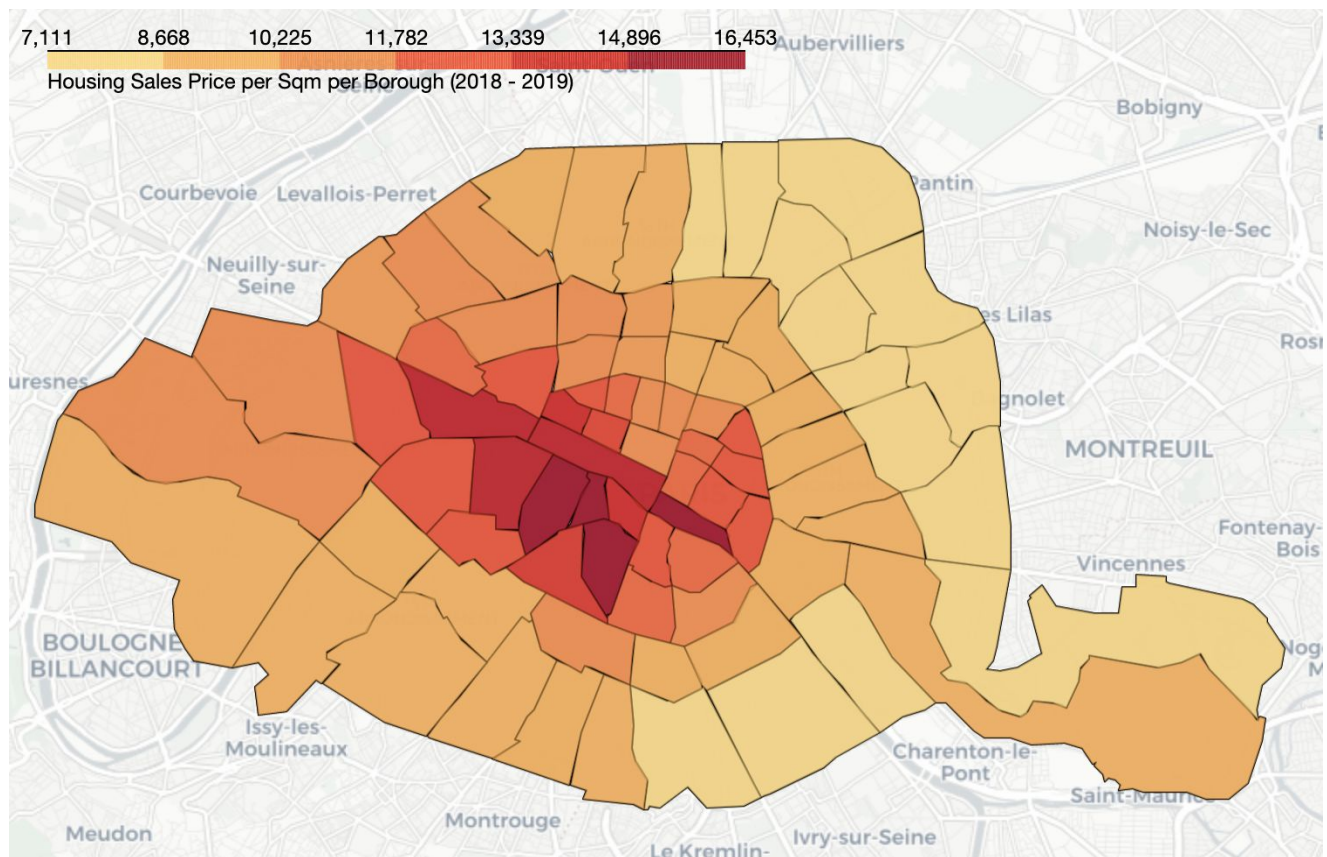
*We removed the outliers from the boxplot chart so it is easier to read.*

We wanted to look at the most expensive and the cheapest locations to buy a property in Paris so we started to look at the property prices per district. The chart below shows that while the mean price is well below 10,000 Euro per sqm in some districts, it is close to 12,000 Euro in other districts.





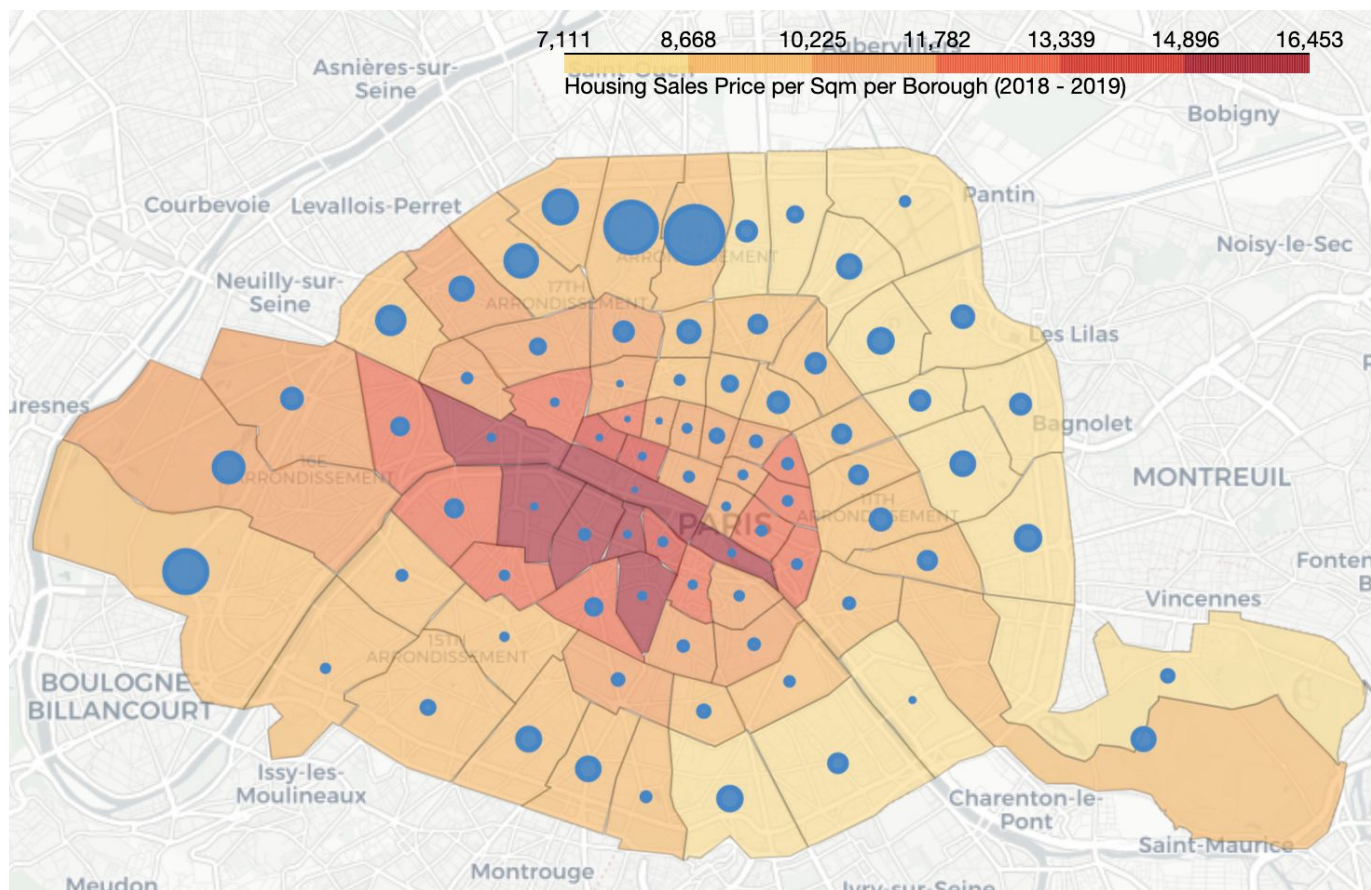
We plotted this data into a map to understand where the properties are more expensive. It's obvious that the most expensive boroughs are in the centre and in the West side of Paris and the cheapest ones are on the East side of the city.



## Number of Sales and Price per Sqm

We can see in the map below that there is, in the centre of Paris, a correlation between the number of sales and the price per sqm. The size of the dots in the map relates to the number of sales so the lower the number of sales, the higher the price per sqm. It makes sense because if the number of sales is low we can assume that the number of properties available is low so their price will be higher. It's true only if people want to live in these boroughs but we know that the districts in the centre of Paris are in high demand.

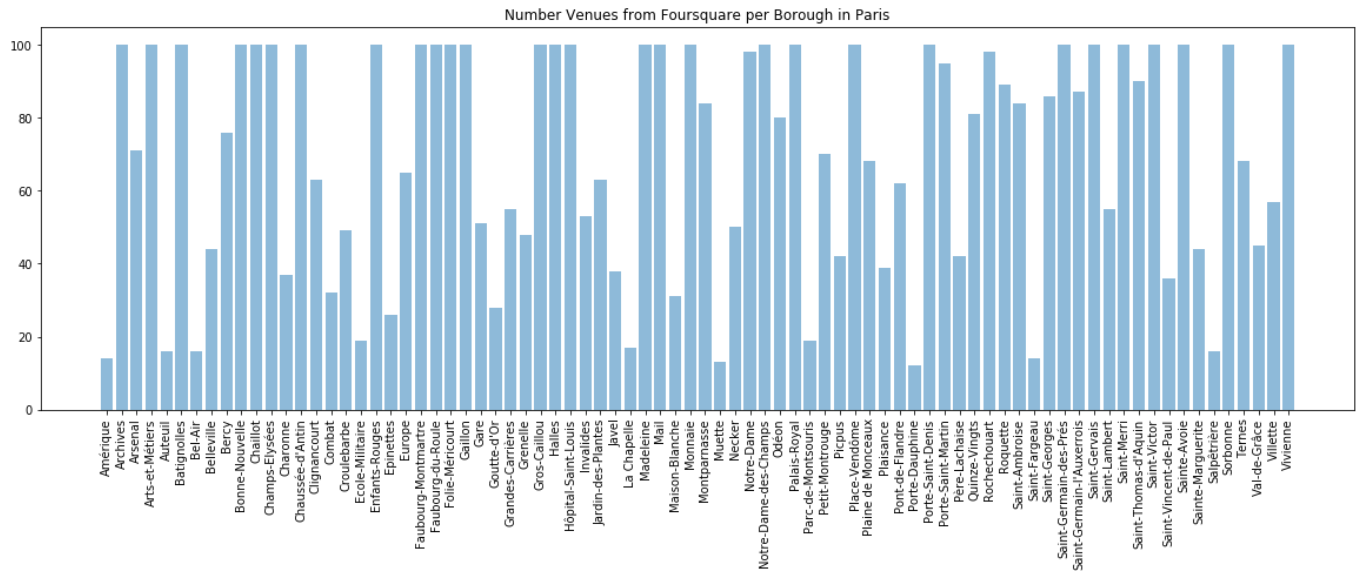
However, there are some exceptions on the East side of Paris where the price is low and the number of sales is low as well. It means that other factors have an impact on the price per sqm. We will look at some other factors in the next section of this report.



## Venues

We got from the Foursquare API the top 100 venues in each neighborhood. To do so we used the central point of the borough except for 3 boroughs (Picpus, Bel-Air and Muette) because their central points were in a park so not enough venues were returned.

The graph below shows the number of venues returned by borough.



There are a total of 306 venue categories and the top 10 venue categories are listed in the table below. French people like food with 8 venue categories related to food in this top 10!

Venue Category	Venue
French Restaurant	704
Hotel	448
Italian Restaurant	207
Bar	169
Bakery	168
Café	159
Bistro	141
Coffee Shop	134
Japanese Restaurant	131
Plaza	117

After identifying the top 10 venue categories by borough, we used K-mean clustering methodology to classify the boroughs with the same venue categories. We use K = 7 because it was the number of clusters that provided the better classification with a good distribution of the boroughs in each cluster. The table below shows the number of boroughs in each cluster.

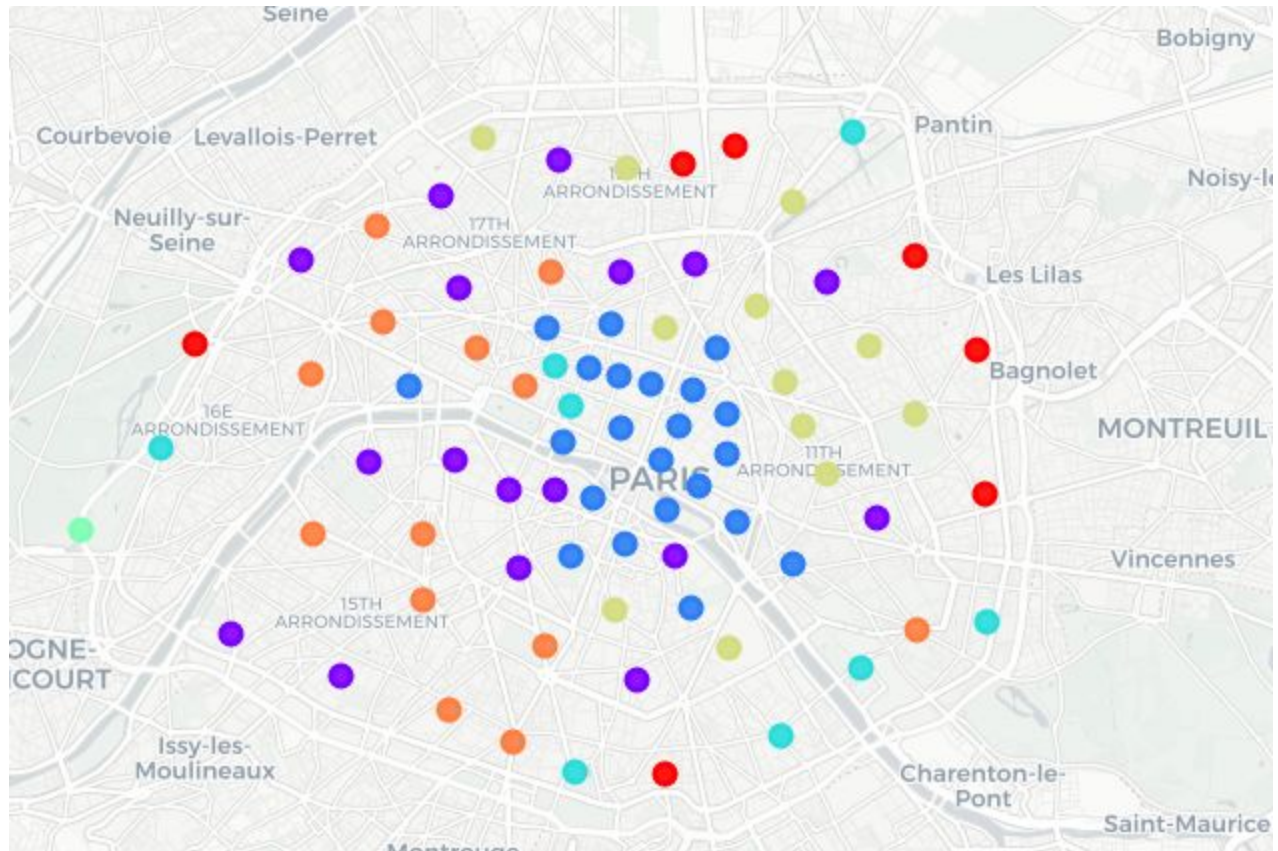
Cluster Labels	id
0	7
1	17
2	22
3	8
4	1
5	12
6	13

We examined the clusters to identify the most common categories of venue so we were able to describe each of them.

Cluster Id	Description	No of Borough	Color
0	Residential area with supermarkets, cafes, restaurants, fast foods and parks	7	Red
1	Touristic area with many hotels, restaurants, places to go out, parks, museums and few shops	17	Purple
2	Shopping and touristic area with hotels, restaurants, many shops, museums and art galleries	22	Blue
3	Area with many hotels, international restaurants and theaters	8	Cyan
4	Recreation area with venues for outdoor activities, sport and museums	1	Green
5	Nightlife area with many bars, restaurants, bistros, cafes	12	Yellow
6	Shopping areas with many shops, hotels, restaurants	13	Orange

The map below shows the cluster each borough belongs to using the colors defined in the above table. We can see that the neighborhoods in the center of Paris are the most touristic ones with a high number of touristic venues. Nightlife areas are on the East side and the shopping areas more on the West side. There are some residential areas on the fringes of the city.

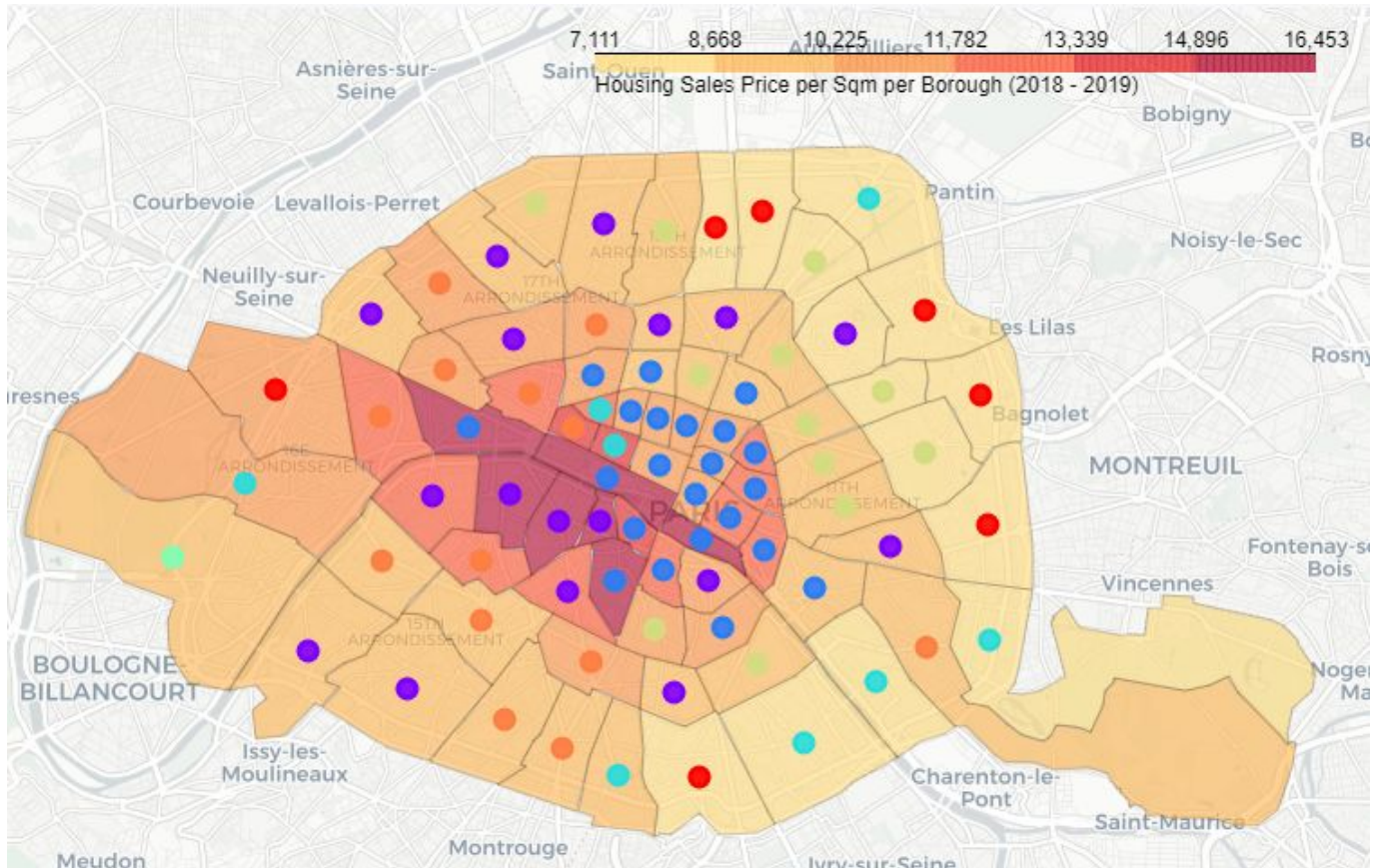




Finally, we looked at the impact of the categories of venues on the property prices. To do so, we used a map to plot the cluster a borough belongs to and we also showed the average price per sqm of the properties in the boroughs. The map below shows these two items using the colors defined earlier to identify each cluster.

We can see that the touristic areas are the most expensive while the residential areas are usually the cheapest ones.





## Discussion

It's important to note that there are some limitations in this analysis due to the data we used and some hypothesis we made:

- We had to remove some records from the property sales dataset because the prices were too low or too high. It would be interesting to understand why some of these prices are so low or so high.
- We used the central point of the borough to identify the venues in a 500m radius. We can see on the maps that some boroughs are bigger than others so 500m may not be enough. In addition, we will certainly get different results if we use a different point to get the venue data from Foursquare.
- We noticed that there are many restaurants in Paris so many of the venues we got are restaurants. It would be interesting to remove these categories of venues to see other categories impact the price of the properties.

## Conclusion

This analysis of property prices in Paris and venues available in each neighborhood allowed us to identify the most expensive and the cheapest areas where to buy a property. The most expensive boroughs are in the center of the city close to the touristic sites, famous restaurants and shops while the

cheapest properties are on the North-East, East and South-East of Paris. These neighborhoods are not so touristy and they are more residential with supermarkets, cafes and parks.

The average price per sqm in Paris is close to 10,000 Euro but it varies from almost 50% (8,000 to 12,000 Euro) from one borough to the other. It looks like there are less properties available in the centre of Paris because the number of sales is much lower than in the other districts. Of course, it impacts the price of the properties.

Other factors could impact the price of properties so it would be interesting to analyse the items below to understand how they correlate with the property prices:

- Facilities available in a neighborhood (schools, hospitals, post offices...)
- Transportation like subway, bus or tram stations
- Criminality and public security
- Property features (floor, standing, amenities...)

It's also possible to use property sales data from previous years to understand how prices have changed in Paris. Data from 2014 is available on the French government Website. Using 5 years worth of data would help us to build a model that can predict property prices in the next few years depending on their location.

# Appendices

## Districts

Postcode	District	Postcode	District	Postcode	District	Postcode	District
75001	1st District	75006	6th District	75011	11th District	75016	16th District
75002	2nd District	75007	7th District	75012	12th District	75017	17th District
75003	3rd District	75008	8th District	75013	13th District	75018	18th District
75004	4th District	75009	9th District	75014	14th District	75019	19th District
75005	5th District	75010	10th District	75015	15th District	75020	20th District

## Boroughs

id	name	district	id	name	district	id	name	district
1	Saint-Germain-l'Auxerrois	1	31	Madeleine	8	61	Auteuil	16
2	Halles	1	32	Europe	8	62	Muette	16
3	Palais-Royal	1	33	Saint-Georges	9	63	Porte-Dauphine	16
4	Place-Vendôme	1	34	Chaussée-d'Antin	9	64	Chaillot	16
5	Gaillon	2	35	Faubourg-Montmartr e	9	65	Ternes	17
6	Vivienne	2	36	Rochechouart	9	66	Plaine de Monceaux	17
7	Mail	2	37	Saint-Vincent-de-Pa ul	10	67	Batignolles	17
8	Bonne-Nouvelle	2	38	Porte-Saint-Denis	10	68	Epinettes	17
9	Arts-et-Métiers	3	39	Porte-Saint-Martin	10	69	Grandes-Carières	18
10	Enfants-Rouges	3	40	Hôpital-Saint-Louis	10	70	Clignancourt	18

11	Archives	3	41	Folie-Méricourt	11	71	Goutte-d'Or	18
12	Sainte-Avoie	3	42	Saint-Ambroise	11	72	La Chapelle	18
13	Saint-Merri	4	43	Roquette	11	73	Villette	19
14	Saint-Gervais	4	44	Sainte-Marguerite	11	74	Pont-de-Flandre	19
15	Arsenal	4	45	Bel-Air	12	75	Amérique	19
16	Notre-Dame	4	46	Picpus	12	76	Combat	19
17	Saint-Victor	5	47	Bercy	12	77	Belleville	20
18	Jardin-des-Plantes	5	48	Quinze-Vingts	12	78	Saint-Fargeau	20
19	Val-de-Grâce	5	49	Salpêtrière	13	79	Père-Lachaise	20
20	Sorbonne	5	50	Gare	13	80	Charonne	20
21	Monnaie	6	51	Maison-Blanche	13			
22	Odéon	6	52	Croulebarbe	13			
23	Notre-Dame-des-Champs	6	53	Montparnasse	14			
24	Saint-Germain-des-Prés	6	54	Parc-de-Montsouris	14			
25	Saint-Thomas-d'Aquin	7	55	Petit-Montrouge	14			
26	Invalides	7	56	Plaisance	14			
27	Ecole-Militaire	7	57	Saint-Lambert	15			
28	Gros-Caillou	7	58	Necker	15			
29	Champs-Élysées	8	59	Grenelle	15			
30	Faubourg-du-Roule	8	60	Javel	15			

# Clusters

## Cluster 0

Name	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
Maison-Blanche	French Restaurant	Plaza	Bakery	Chinese Restaurant	Bistro	Café	Food & Drink Shop	Beer Store	Park	Diner
Porte-Dauphine	Tennis Court	Gym / Fitness Center	Park	Café	College Theater	Plaza	Supermarket	Pizza Place	Metro Station	Grocery Store
Goutte-d'Or	Bar	Asian Restaurant	Supermarket	Chinese Restaurant	Fast Food Restaurant	Theater	Farmers Market	Sushi Restaurant	Thai Restaurant	Bakery
La Chapelle	Chinese Restaurant	Soccer Field	Supermarket	Thai Restaurant	Garden	Gym Pool	Vietnamese Restaurant	French Restaurant	Farmers Market	Mexican Restaurant
Amérique	French Restaurant	Supermarket	Bakery	Park	Grocery Store	Café	Metro Station	Asian Restaurant	Bistro	Bed & Breakfast
Saint-Fargeau	Supermarket	Bakery	Café	Diner	Tram Station	Arts & Entertainment	Pizza Place	French Restaurant	Plaza	Japanese Restaurant
Charonne	Supermarket	Bar	Hotel	Fast Food Restaurant	Pizza Place	Café	Japanese Restaurant	Tram Station	Bus Stop	French Restaurant

## Cluster 1

Name	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
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Saint-Victor	French Restaurant	Hotel	Bakery	Museum	Italian Restaurant	Japanese Restaurant	Park	Pub	Plaza	Wine Bar
Notre-Dame-des-Champs	French Restaurant	Hotel	Bakery	Japanese Restaurant	Bistro	Italian Restaurant	Café	Steakhouse	Creperie	Cosmetics Shop
Saint-Germain-des-Prés	French Restaurant	Hotel	Italian Restaurant	Café	Wine Bar	Sandwich Place	Plaza	Ramen Restaurant	Chocolate Shop	Clothing Store
Saint-Thomass-d'Aquin	French Restaurant	Hotel	Café	Bakery	Coffee Shop	American Restaurant	Sandwich Place	Tailor Shop	Historic Site	Art Gallery
Invalides	French Restaurant	Hotel	Plaza	Café	History Museum	Park	Art Museum	Italian Restaurant	Smoke Shop	Cocktail Bar
Gros-Caillou	French Restaurant	Italian Restaurant	Hotel	Café	Coffee Shop	Bakery	Ice Cream Shop	Bistro	Dessert Shop	Cheese Shop
Europe	French Restaurant	Hotel	Pizza Place	Sandwich Place	Thai Restaurant	Bakery	Pub	Bistro	Modern European Restaurant	Lebanese Restaurant
Rochechouart	French Restaurant	Hotel	Bakery	Italian Restaurant	Coffee Shop	Vegetarian / Vegan Restaurant	Bar	Pizza Place	Vietnamese Restaurant	Bistro
Saint-Vincent-de-Paul	Indian Restaurant	French Restaurant	Hotel	Hostel	African Restaurant	Wine Shop	Italian Restaurant	Israeli Restaurant	Theater	Bistro
Sainte-Marguerite	French Restaurant	Bar	Hotel	Bistro	Gym / Fitness Center	Coffee Shop	Beer Bar	Chocolate Shop	Brasserie	Thai Restaurant
Croulebarbe	French Restaurant	Sushi Restaurant	Bar	Sandwich Place	Bakery	Park	Hotel	Italian Restaurant	Gaming Cafe	Korean Restaurant

Saint-Lam bert	French Restaurant	Hotel	Thai Restaurant	Bakery	Italian Restaurant	Coffee Shop	Multiplex	Sushi Restaurant	Supermarke t	Steakhous e
Javel	French Restaurant	Hotel	Pizza Place	Café	Bike Rental / Bike Share	Sushi Restaurant	Plaza	Vietnames e Restaurant	Spanish Restaurant	Restaurant
Ternes	French Restaurant	Italian Restaurant	Hotel	Seafood Restaurant	Moroccan Restaurant	Pub	Park	Japanese Restaurant	Asian Restaurant	Bakery
Batignolles	French Restaurant	Hotel	Italian Restaurant	Bar	Bistro	Café	Japanese Restaurant	Park	Chinese Restaurant	Turkish Restaurant
Grandes-Car rières	French Restaurant	Bar	Restauran t	Hotel	Italian Restaurant	Bistro	Pizza Place	Park	Bakery	Wine Bar
Combat	French Restaurant	Bar	Park	Italian Restaurant	Restauran t	Thai Restaurant	Plaza	Beer Garden	Scenic Lookout	Bistro

## Cluster 2

Name	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
Saint-Germ ain-l'Auxerr ois	French Restaurant	Hotel	Café	Plaza	Coffee Shop	Historic Site	Bar	Art Museum	Ramen Restaurant	Exhibit
Halles	French Restaurant	Bakery	Hotel	Café	Coffee Shop	Clothing Store	Plaza	Italian Restaurant	Burger Joint	Restaurant
Vivienne	French Restaurant	Japanese Restaurant	Italian Restaurant	Bistro	Café	Korean Restaurant	Wine Bar	Pastry Shop	Clothing Store	Toy / Game Store

Paris Neighborhoods and Their Notable Landmarks											
Le Marais	Mail	Cocktail Bar	French Restaurant	Bakery	Italian Restaurant	Salad Place	Restaurant	Thai Restaurant	Coffee Shop	Hotel	Wine Bar
	Bonne-Nouvelle	Cocktail Bar	French Restaurant	Coffee Shop	Wine Bar	Hotel	Bar	Bakery	Italian Restaurant	Pizza Place	Museum
Le Centre	Arts-et-Métiers	French Restaurant	Hotel	Italian Restaurant	Cocktail Bar	Restaurant	Coffee Shop	Chinese Restaurant	Moroccan Restaurant	Bar	Café
	Enfants-Rouges	Café	Bistro	Coffee Shop	Restaurant	Wine Bar	Clothing Store	Bakery	Art Gallery	Boutique	French Restaurant
Le Nord	Archives	French Restaurant	Clothing Store	Coffee Shop	Hotel	Bistro	Pastry Shop	Art Gallery	Cocktail Bar	Burger Joint	Italian Restaurant
	Sainte-Avoye	French Restaurant	Café	Restaurant	Chinese Restaurant	Coffee Shop	Bakery	Italian Restaurant	Hotel	Japanese Restaurant	Cocktail Bar
Le Est	Saint-Merri	French Restaurant	Art Gallery	Plaza	Coffee Shop	Ice Cream Shop	Cocktail Bar	Clothing Store	Bar	Cosmetics Shop	Bakery
	Saint-Gervais	French Restaurant	Pastry Shop	Clothing Store	Tapas Restaurant	Plaza	Hotel	Ice Cream Shop	Wine Bar	Gourmet Shop	Italian Restaurant
Le Ouest	Arsenal	French Restaurant	Hotel	Gastropub	Plaza	Italian Restaurant	Park	Seafood Restaurant	Pedestrian Plaza	Tapas Restaurant	Cocktail Bar
	Notre-Dame	French Restaurant	Plaza	Bakery	Japanese Restaurant	Ice Cream Shop	Italian Restaurant	Coffee Shop	Wine Bar	Café	Cheese Shop
Le Sud	Jardin-des-Plantes	French Restaurant	Hotel	Garden	Science Museum	Museum	Bakery	Italian Restaurant	Greek Restaurant	Moroccan Restaurant	Plaza
	Sorbonne	Hotel	French Restaurant	Plaza	Bakery	Indie Movie Theater	Pastry Shop	Mexican Restaurant	Coffee Shop	Pub	Ice Cream Shop
Le Centre	Monnaie	French Restaurant	Hotel	Plaza	Cocktail Bar	Wine Bar	Ice Cream Shop	Bistro	Seafood Restaurant	Café	Bar
	Odéon	French Restaurant	Hotel	Bistro	Café	Ice Cream Shop	Bakery	Italian Restaurant	Fountain	Pizza Place	Pastry Shop

Champs-Élysées	French Restaurant	Hotel	Boutique	Clothing Store	Italian Restaurant	Garden	Art Gallery	Steakhouse	Plaza	Japanese Restaurant
Chaussée-d'Antin	French Restaurant	Hotel	Coffee Shop	Café	Department Store	Clothing Store	Women's Store	Sandwich Place	Bistro	Italian Restaurant
Faubourg-Montmartre	French Restaurant	Hotel	Bistro	Burger Joint	Pizza Place	Pedestrian Plaza	Sandwich Place	Coffee Shop	Thai Restaurant	Creperie
Porte-Saint-Martin	Coffee Shop	French Restaurant	Cocktail Bar	Bar	Hotel	Bakery	Theater	Café	Asian Restaurant	Pizza Place
Quinze-Vingts	French Restaurant	Coffee Shop	Sandwich Place	Hotel	Bar	Bakery	Italian Restaurant	Convenience Store	Farmers Market	Cocktail Bar

### Cluster 3

Name	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
Palais-Royal	Japanese Restaurant	French Restaurant	Coffee Shop	Hotel	Plaza	Café	Ramen Restaurant	Italian Restaurant	Historic Site	Bistro
Gaillon	Hotel	Japanese Restaurant	French Restaurant	Italian Restaurant	Sandwich Place	Bookstore	Plaza	Jewelry Store	Bakery	Korean Restaurant
Bel-Air	Tram Station	Residential Building (Apartment / Condo)	Track	Fruit & Vegetable Store	Bistro	Dance Studio	Sandwich Place	French Restaurant	Park	Food & Drink Shop
Bercy	Hotel	Italian Restaurant	Breakfast Spot	Museum	Bakery	French Restaurant	Wine Bar	Supermarket	Convenience Store	Sushi Restaurant
Gare	Hotel	Café	Japanese Restaurant	Vietnamese Restaurant	Sandwich Place	Thai Restaurant	French Restaurant	Fast Food Restaurant	Italian Restaurant	Coffee Shop

Parc-de-Montsouris	Italian Restaurant	Theater	French Restaurant	Chinese Restaurant	Sushi Restaurant	Middle Eastern Restaurant	Kebab Restaurant	Diner	Restaurant	Gym
Muette	Plaza	Garden	Castle	Coffee Shop	Cafeteria	Bus Stop	Bus Station	Art Museum	Italian Restaurant	Park
Pont-de-Flandre	Hotel	Restaurant	French Restaurant	Asian Restaurant	Japanese Restaurant	Café	Bakery	Movie Theater	Tram Station	Rock Club

### Cluster 4

Name	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
Auteuil	4	Tennis Court	Stadium	Garden	Racecourse	Museum	Botanical Garden	French Restaurant	Office	Outdoors & Recreation	Sporting Goods Shop

### Cluster 5

name	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
Val-de-Grâce	French Restaurant	Hotel	Bar	Asian Restaurant	Science Museum	Café	Bistro	Creperie	Italian Restaurant	Indie Movie Theater
Porte-Saint-Denis	French Restaurant	Pizza Place	Coffee Shop	Hotel	Bar	Bakery	Japanese Restaurant	Burger Joint	Korean Restaurant	Bistro
Hôpital-Saint-Louis	French Restaurant	Bar	Wine Bar	Café	Coffee Shop	Asian Restaurant	Bistro	Pizza Place	Italian Restaurant	Thai Restaurant



<b>Folie-Méricourt</b>	French Restaurant	Bar	Restaurant		Bakery	Hotel	Italian Restaurant	Creperie	Gym	Bistro	Juice Bar
<b>Saint-Ambroise</b>	French Restaurant	Bar	Restaurant	Coffee Shop		Bistro	Bakery	Cocktail Bar	Italian Restaurant	Japanese Restaurant	Café
<b>Roquette</b>	French Restaurant	Bar	Bistro	Italian Restaurant	Cocktail Bar		Pastry Shop	Supermarket	Japanese Restaurant	Café	Pizza Place
<b>Salpêtrière</b>	French Restaurant	Indian Restaurant	Pizza Place	Mediterranean Restaurant		Bar	Bakery	Cajun / Creole Restaurant	Gym / Fitness Center	Chinese Restaurant	Sushi Restaurant
<b>Epinettes</b>	French Restaurant	Hotel	Supermarket	Japanese Restaurant	Restaurant		Turkish Restaurant	Sushi Restaurant	Pedestrian Plaza	Gym / Fitness Center	Ethiopian Restaurant
<b>Clignancourt</b>	French Restaurant	Bar	Pizza Place	Café	Bistro	Restaurant		Cheese Shop	Coffee Shop	Hotel	Park
<b>Villette</b>	Bar	Café	Hotel	French Restaurant	Supermarket	Multiplex	Food Truck	Fast Food Restaurant	Italian Restaurant		Bistro
<b>Belleville</b>	Bar	French Restaurant	Café	Japanese Restaurant	Hotel	Beer Store	Theater	Thai Restaurant	Chinese Restaurant		Burger Joint
<b>Père-Lachaise</b>	Bakery	Bar	Bistro	Japanese Restaurant	French Restaurant	Plaza	Wine Shop	Park	Italian Restaurant		Cemetery

## Cluster 6

Name	Cluster Label	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
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Place-Vendôme	6	French Restaurant	Hotel	Jewelry Store	Boutique	Japanese Restaurant	Chocolate Shop	Dessert Shop	Bookstore	Hotel Bar	Plaza
Ecole-Militaire	6	Hotel	French Restaurant	Plaza	Bistro	Garden	Dessert Shop	Pastry Shop	Café	Farmers Market	Diner
Faubourg-du-Roule	6	Hotel	French Restaurant	Clothing Store	Cosmetics Shop	Italian Restaurant	Department Store	Japanese Restaurant	Jewelry Store	Asian Restaurant	Pastry Shop
Madeleine	6	Hotel	French Restaurant	Boutique	Women's Store	Gourmet Shop	Clothing Store	Dessert Shop	Hotel Bar	Theater	Asian Restaurant
Saint-Georges	6	Hotel	French Restaurant	Italian Restaurant	Cocktail Bar	Plaza	Bakery	Vietnamese Restaurant	Theater	Comedy Club	Lounge
Picpus	6	Hotel	French Restaurant	Supermarket	Bistro	Café	Chinese Restaurant	Bakery	Ice Cream Shop	Beer Bar	Sushi Restaurant
Montparnasse	6	French Restaurant	Hotel	Bar	Bakery	Italian Restaurant	Bistro	Sushi Restaurant	Café	Park	Wine Shop
Petit-Montrouge	6	Hotel	French Restaurant	Supermarket	Italian Restaurant	Sushi Restaurant	Discount Store	Bakery	Bistro	Sandwich Place	Plaza
Plaisance	6	Hotel	French Restaurant	Bistro	Bar	Japanese Restaurant	Grocery Store	Gym	Food & Drink Shop	Modern European Restaurant	Music Venue
Necker	6	French Restaurant	Hotel	Café	Bakery	Korean Restaurant	Gym / Fitness Center	Dessert Shop	Metro Station	Bistro	Brasserie
Grenelle	6	Hotel	French Restaurant	Japanese Restaurant	Bistro	Bakery	Indian Restaurant	Coffee Shop	Italian Restaurant	Gym / Fitness Center	Cheese Shop

Chaillot	6	Hotel	French Restaurant	Italian Restaurant	Café	Plaza	Bakery	Art Museum	Bar	Pub	Chinese Restaurant
Plaine de Monceaux	6	French Restaurant	Hotel	Italian Restaurant	Bakery	Asian Restaurant	Plaza	Bistro	Restaurant	Café	Supermarket