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NEIGHBORHOODS

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Identification of appropriate  
location for new Italian  
restaurant in Paris



# Problem Statement

- Paris is very attractive for small and medium-sized enterprises.
- This also means that market is very competitive.
- The high cost of living also increases the cost of business and makes it challenging.
- One of the main parameters in restaurant successful launching is location.
- It makes such analytical work important in restaurant businesses.

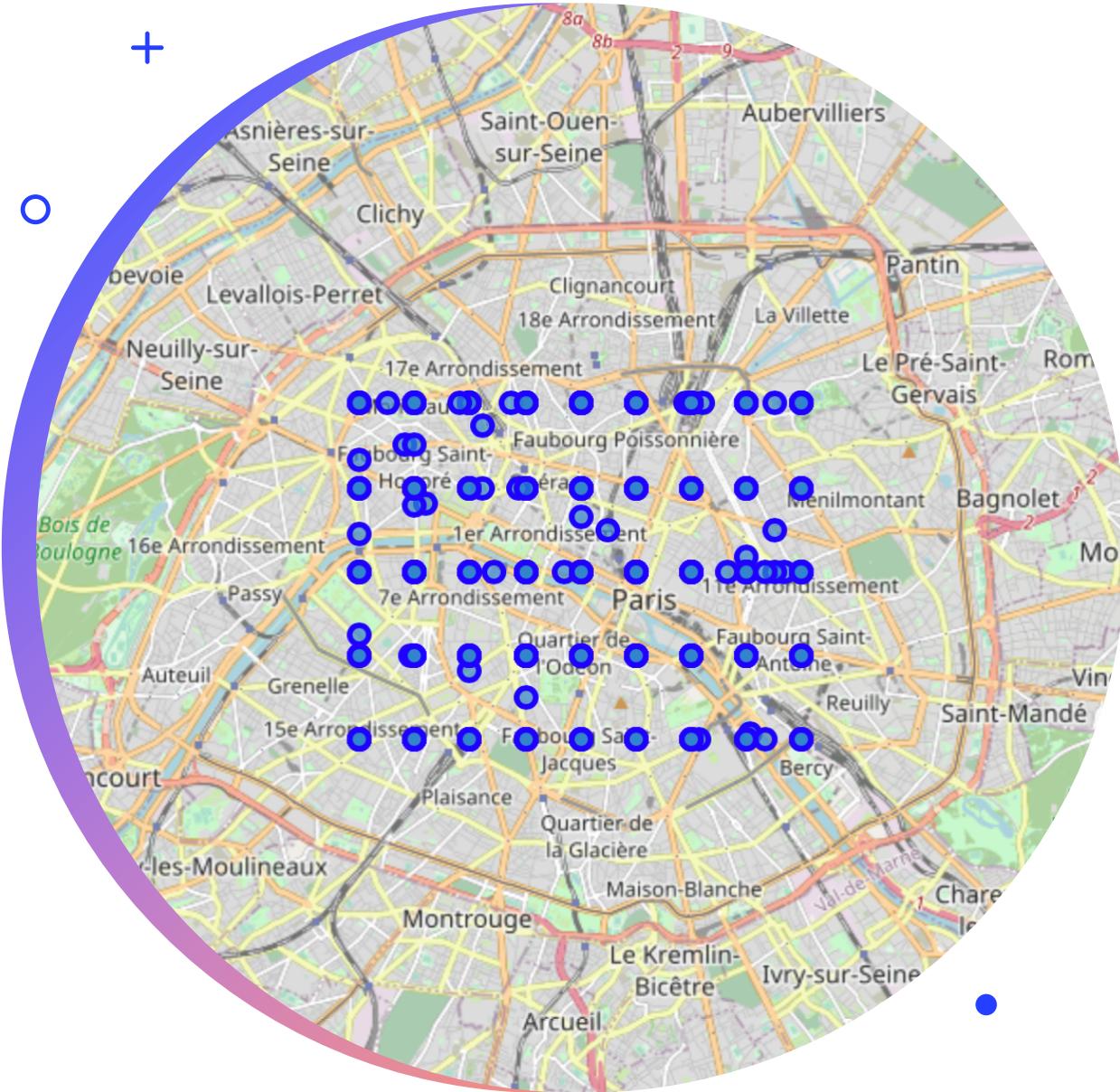
**Location for Italian restaurant in Paris**

# Data acquisition

- Paris metro station location scraped from RATP, official information website for Paris metropolitan users.
  - <https://dataratp2.opendatasoft.com/>
- Foursquare API is used to explore different business activities with detailed information in neighborhood with Paris metro stations.
  - <https://foursquare.com>
- These two datasets are combined with coordinate data: longitude and latitude.

# Data cleaning

- Data for more than 25,000 station were scraped at the beginning.
- Concentrating on the Paris city central part and removing same stations but in different direction helped to reduce dataset up to 481 station.
- Only proper information for each station was used, such as:
  - Station name
  - Latitude of the station
  - Longitude of the station



# Foursquare API and Folium

The geographical coordinate of Paris are:

Latitude: 48.8566969 Longitude: 2.3514616.

Using Folium Map stations gained before are shown on the map/

# Foursquare API



- CLIENT\_ID = Foursquare ID
- CLIENT\_SECRET = Foursquare Secr
- VERSION = '20200310'
- LIMIT = 50
- Radius = 150
- categoryId = for food we use  
‘4d4b7105d754a06374d81259’

	Station	Station Latitude	Station Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	ABBE GROULT	48.84	2.30	Je thé...me	48.838866	2.300375	French Restaurant
1	ABBE GROULT	48.84	2.30	Les Vignes du Liban	48.839402	2.300697	Lebanese Restaurant
2	ABBE GROULT	48.84	2.30	L'Inattendu	48.840485	2.299322	French Restaurant
3	ABBE GROULT	48.84	2.30	Le Cap	48.840937	2.300072	French Restaurant
4	ABBE GROULT	48.84	2.30	Le Quartier du Pain	48.839282	2.300139	Bakery
...	...	...	...	...	...	...	...
3856	YVONNE LE TAC	48.88	2.34	Le Clou	48.880905	2.340473	French Restaurant
3857	YVONNE LE TAC	48.88	2.34	Sushi Shop	48.878660	2.339924	Sushi Restaurant
3858	YVONNE LE TAC	48.88	2.34	Le Pain Quotidien	48.880030	2.340560	Breakfast Spot
3859	YVONNE LE TAC	48.88	2.34	L'Oriental	48.880744	2.341271	Moroccan Restaurant
3860	YVONNE LE TAC	48.88	2.34	1ndix Café	48.880764	2.341361	Café

3860 call results

# Dataset Preparation

- Locations are located close to each other, so some venues were categorized for multiple stations.
- Checking ‘Venue’, ‘Venue Latitude’ and ‘Venue Longitude’ columns, duplications were removed.
- It reduced the number of rows to 481, and pivot table created.

	Station	African Restaurant	Alsatian Restaurant	American Restaurant	Asian Restaurant	Auvergne Restaurant	BBQ Joint	Bagel Shop	Bakery	Bistro	...	Souvlaki Shop	Spanish Restaurant	Steakhouse	Rest
0	ABBE GROULT	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.166667	0.166667	...	0.0	0.0	0.0	0.0
1	ABBESSES	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.166667	0.000000	...	0.0	0.0	0.0	0.0
2	ALIBERT	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0
3	ALLERAY	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0
4	ALLERAY-LA QUINTINIE	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.166667	0.166667	...	0.0	0.0	0.0	0.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
457	VOLTAIRE - LEON BLUM	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.250000	...	0.0	0.0	0.0	0.0
458	WAGRAM	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0
459	WAGRAM - COURCELLES	0.25	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0
460	WAGRAM - PRONY	0.25	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0
461	YVONNE LE TAC	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.166667	0.000000	...	0.0	0.0	0.0	0.0

# Most Common Venues for Stations

- From pivot table demonstrated above, for each station only 10 most common venue categorized were chosen using coefficients (values) in that pivot table.

	Station	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	ABBE GROULT	French Restaurant	Bistro	Lebanese Restaurant	Bakery	Falafel Restaurant	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant	Ethiopian Restaurant
1	ABBESSES	French Restaurant	Bakery	Breakfast Spot	Café	Sushi Restaurant	Moroccan Restaurant	Creperie	Eastern European Restaurant	Dim Sum Restaurant	Diner
2	ALIBERT	French Restaurant	Vietnamese Restaurant	Diner	Vegetarian / Vegan Restaurant	Italian Restaurant	Japanese Restaurant	Eastern European Restaurant	Restaurant	Gastropub	Bagel Shop
3	ALLERAY	French Restaurant	Italian Restaurant	Vietnamese Restaurant	Ethiopian Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant	Fast Food Restaurant

# Clustering

- Most popular unsupervised learning K-means algorithm was used to cluster stations.
- 5 clusters with similar to each other in terms of venue types located nearby were created.

	Station	Latitude	Longitude	ClusterLabels	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 Co
0	ABBE GROULT	48.840000	2.300000	0	French Restaurant	Bistro	Lebanese Restaurant	Bakery	Falafel Restaurant	Dim Sum Restaurant	Diner	Donut Shop	Eur Rest
1	ABBESSES	48.880000	2.340000	0	French Restaurant	Bakery	Breakfast Spot	Café	Sushi Restaurant	Moroccan Restaurant	Creperie	Eastern European Restaurant	Dir Rest
2	ALIBERT	48.870000	2.370000	0	French Restaurant	Vietnamese Restaurant	Diner	Vegetarian / Vegan Restaurant	Italian Restaurant	Japanese Restaurant	Eastern European Restaurant	Restaurant	Gas
3	ALLERAY	48.840000	2.310000	2	French Restaurant	Italian Restaurant	Vietnamese Restaurant	Ethiopian Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eur Rest

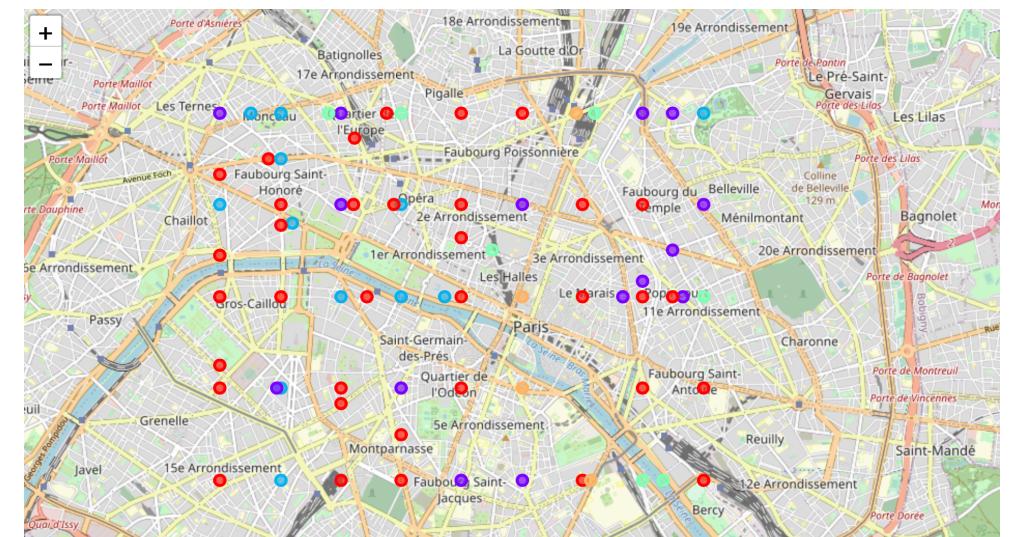
Red color – Cluster 0

Violet color – Cluster 1

Blue color – Cluster 2

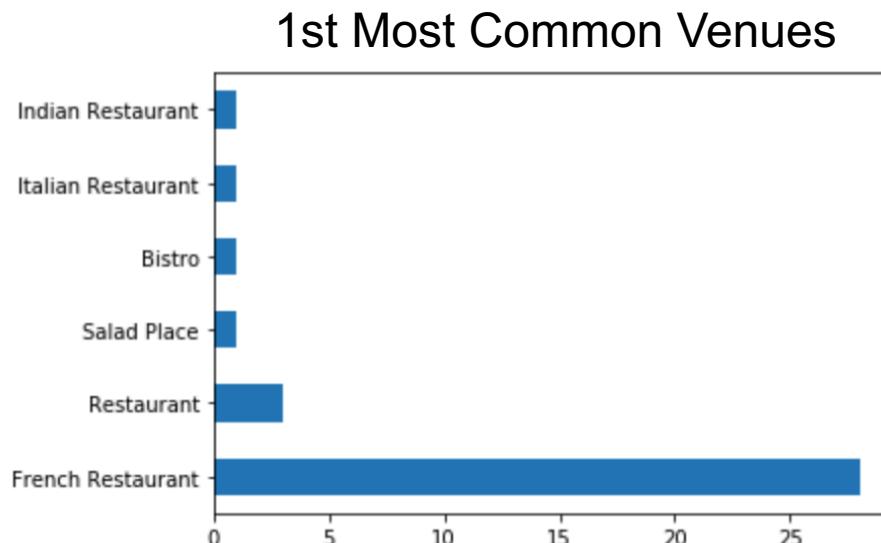
Green color – Cluster 3

Orange color – Cluster 4



# Clusters

Cluster 0: Total number – 35



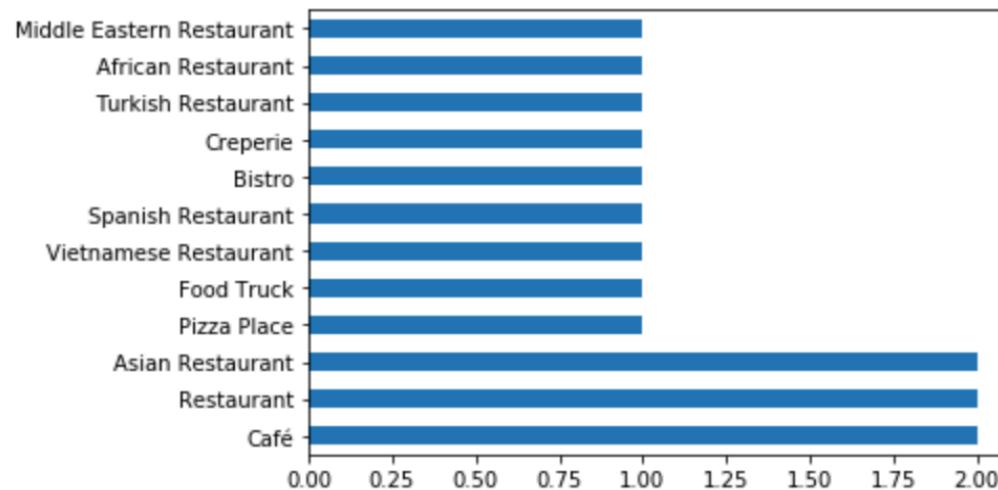
	Station	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	ABBE GROULT	French Restaurant	Bistro	Lebanese Restaurant	Bakery	Falafel Restaurant	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant	Ethiopian Restaurant
1	ABBESSES	French Restaurant	Bakery	Breakfast Spot	Café	Sushi Restaurant	Moroccan Restaurant	Creperie	Eastern European Restaurant	Dim Sum Restaurant	Diner
2	ALIBERT	French Restaurant	Vietnamese Restaurant	Diner	Vegetarian / Vegan Restaurant	Italian Restaurant	Japanese Restaurant	Eastern European Restaurant	Restaurant	Gastropub	Bagel Shop
5	ALMA - MARCEAU	French Restaurant	Seafood Restaurant	Brasserie	Café	Sandwich Place	Falafel Restaurant	Mediterranean Restaurant	Vietnamese Restaurant	Dim Sum Restaurant	Diner
6	ALMA-MARCEAU	French Restaurant	Italian Restaurant	Café	Bakery	Indian Restaurant	Asian Restaurant	Chinese Restaurant	Pizza Place	Vietnamese Restaurant	Eastern European Restaurant

As it can be seen from the table and figure above, this cluster is mainly associated with French Restaurant.

# Clusters

Cluster 1: Total number – 15

1st Most Common Venues

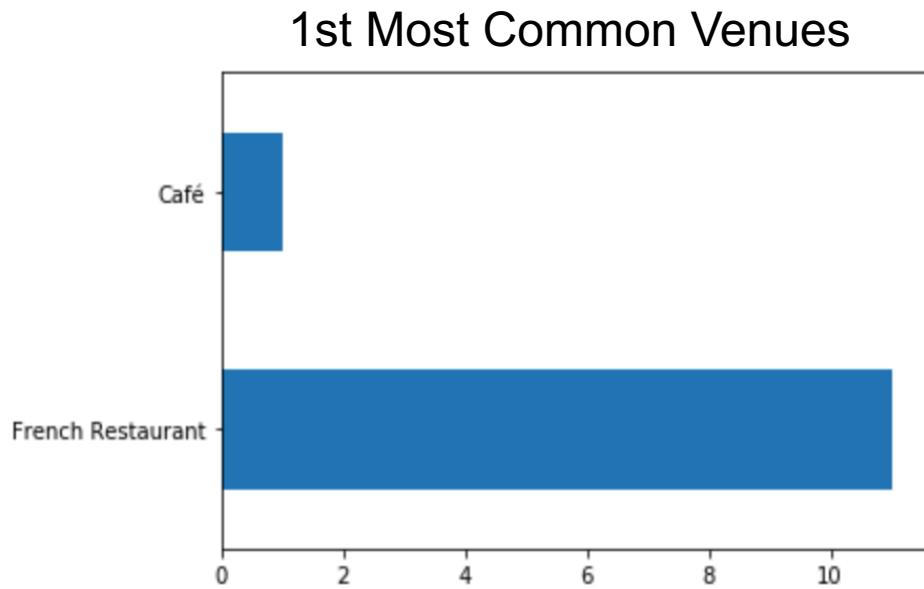


	Station	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
7	ANJOU - CHAUVEAU LAGARDE	Café	Sushi Restaurant	Cafeteria	Salad Place	Sandwich Place	Spanish Restaurant	Pizza Place	Asian Restaurant	French Restaurant	Fast Food Restaurant
17	ASSAS - DUGUAY TROUIN	Pizza Place	Café	Sandwich Place	Bakery	Eastern European Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Vietnamese Restaurant
35	BELLEVILLE	Restaurant	BBQ Joint	Diner	Spanish Restaurant	Pizza Place	Fondue Restaurant	Food Truck	Fast Food Restaurant	French Restaurant	Corsican Restaurant
37	BERTHOLLET - VAUQUELIN	Café	Greek Restaurant	French Restaurant	Tapas Restaurant	Japanese Restaurant	Pizza Place	Moroccan Restaurant	Mexican Restaurant	Donut Shop	Deli / Bodega
40	BOLIVAR	Food Truck	Vietnamese Restaurant	Corsican Restaurant	Greek Restaurant	Gastropub	French Restaurant	Fondue Restaurant	Fast Food Restaurant	Falafel Restaurant	Ethiopian Restaurant
41	BONNE NOUVELLE	Vietnamese Restaurant	Bistro	Mediterranean Restaurant	Pizza Place	Poke Place	Burger Joint	Seafood Restaurant	Indian Restaurant	Turkish Restaurant	Bagel Shop

In this cluster, there are no specific venue category. Different cuisines are presented in this cluster, however some pattern for eastern and African restaurants can be noticed.

# Clusters

Cluster 2: Total number – 12



```
cluster2['2nd Most Common Venue'].value_counts()
```

Café	4
Vietnamese Restaurant	2
Restaurant	1
Italian Restaurant	1
Bistro	1
French Restaurant	1
Japanese Restaurant	1
Bakery	1

Name: 2nd Most Common Venue, dtype: int64

```
cluster2['3rd Most Common Venue'].value_counts()
```

Vietnamese Restaurant	5
Corsican Restaurant	2
Sandwich Place	1
Falafel Restaurant	1
Snack Place	1
Italian Restaurant	1
Breakfast Spot	1

Name: 3rd Most Common Venue, dtype: int64

Here we can see that French restaurants are common in this cluster as in cluster 0.

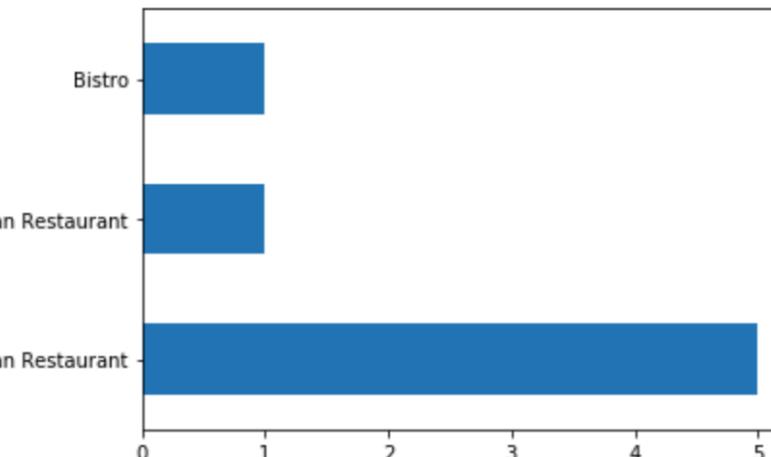
So, to get better understanding of difference, cluster 2 was deeper examined.

Counting 2<sup>nd</sup> and 3<sup>rd</sup> most common venues demonstrated that along with French restaurants, Vietnamese restaurants are also popular in this cluster.

# Clusters

Cluster 3: Total number – 7

1st Most Common Venues



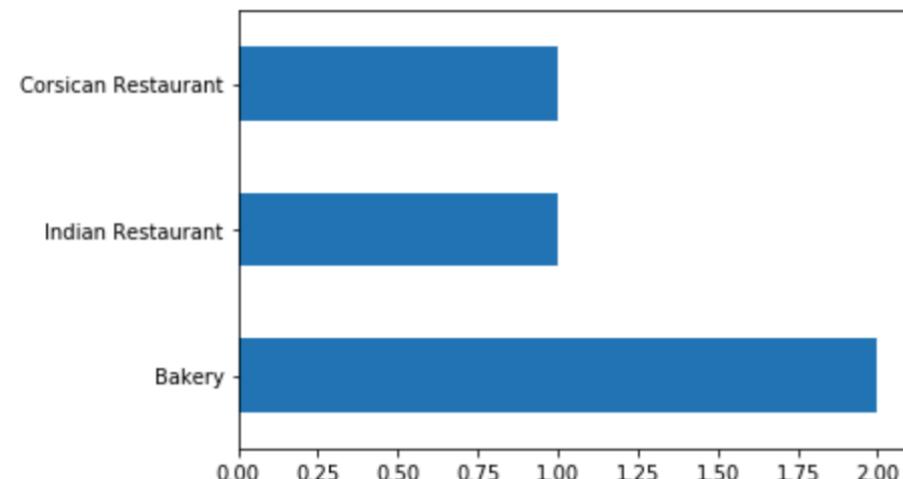
	Station	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
28	BASFROI	Bistro	Italian Restaurant	Café	Ethiopian Restaurant	Falafel Restaurant	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant	Vietnamese Restaurant
39	BLANCHE	Italian Restaurant	Bistro	Steakhouse	Indian Restaurant	Donut Shop	Pizza Place	Bagel Shop	Creperie	Fondue Restaurant	Fast Food Restaurant
82	CHATEAU LANDON	Italian Restaurant	Restaurant	Snack Place	Japanese Restaurant	Fast Food Restaurant	Burger Joint	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop
95	CITE DE LA MODE ET DU DESIGN	Russian Restaurant	Italian Restaurant	Ethiopian Restaurant	Creperie	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant	Vietnamese Restaurant
123	ETIENNE MARCEL - MONTMARTRE	Italian Restaurant	Bakery	Ramen Restaurant	Souvlaki Shop	Peruvian Restaurant	Café	French Restaurant	Restaurant	Seafood Restaurant	Noodle House

Cluster 3 is place where Italian restaurants are densely concentrated. As shown on the table and figure above stations in this cluster, mostly have 1<sup>st</sup> most common venue – Italian Restaurant. Even only two exceptions have Italian restaurants as 2<sup>nd</sup> most common venue.

# Clusters

## Cluster 4: Total number – 4

### 1st Most Common Venues



	Station	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
63	CARDINAL LEMOINE	Bakery	Japanese Restaurant	Burger Joint	Seafood Restaurant	Mexican Restaurant	Vietnamese Restaurant	Ethiopian Restaurant	Dim Sum Restaurant	Diner	Donut Shop
70	CENTRE GEORGES POMPIDOU	Bakery	Falafel Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant	Ethiopian Restaurant	Vietnamese Restaurant	Corsican Restaurant
139	GARE D'AUSTERLITZ	Corsican Restaurant	Korean Restaurant	Indian Restaurant	American Restaurant	Deli / Bodega	Greek Restaurant	Gastropub	French Restaurant	Alsatian Restaurant	Food Truck
149	GARE DU NORD	Indian Restaurant	Bakery	Greek Restaurant	Gastropub	French Restaurant	Food Truck	Fondue Restaurant	Fast Food Restaurant	Corsican Restaurant	Falafel Restaurant

Table 9 better describes the profile of this cluster.

Cluster 4 is a mix of Bakeries and eastern cuisines (Japanese, Chinese and Indian).

# Conclusion

- Choose location in cluster 3, if it is close to italian district.
- Other than cluster 3, south-west part of the city where no clusters of Italian restaurants.