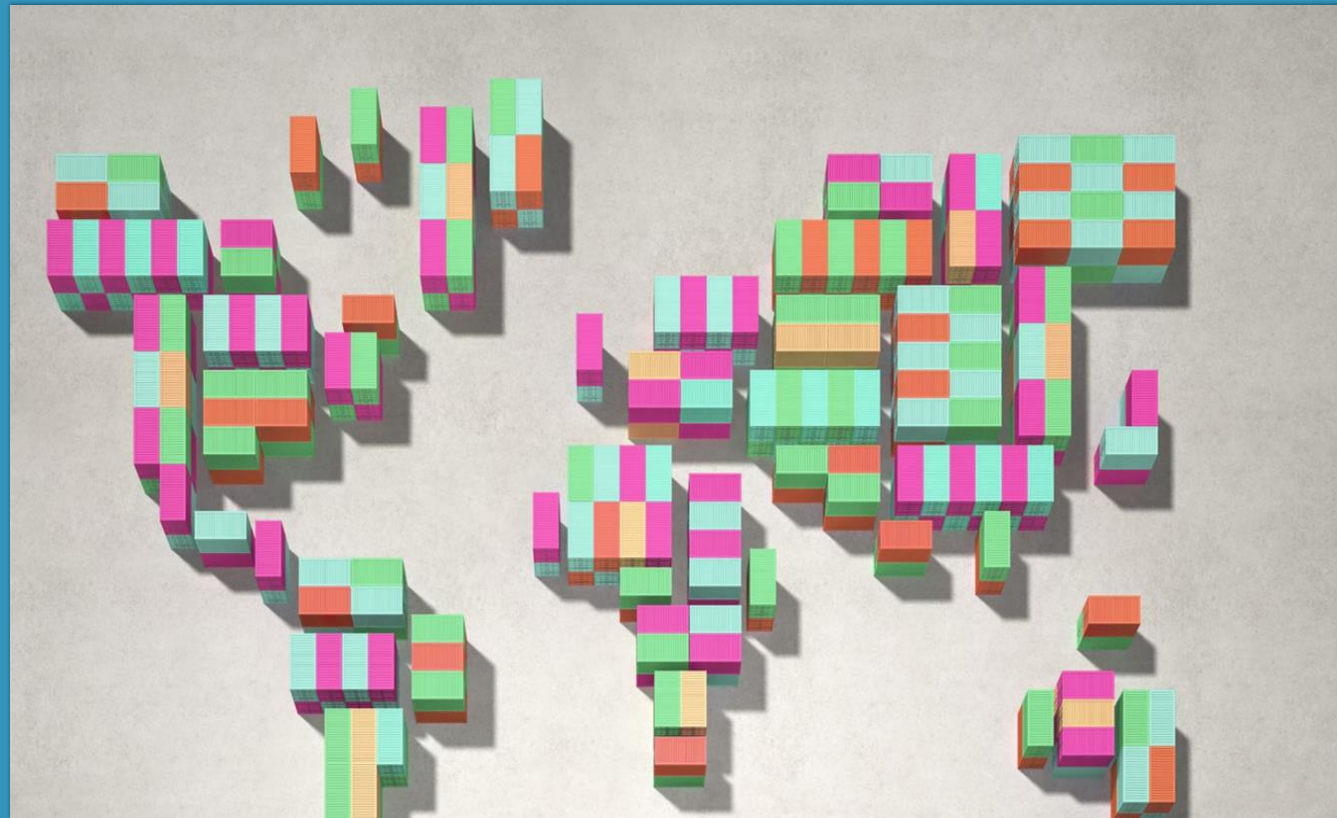# Leonidas Place

Recommendation

System

Predicting the right place for a restaurant

Restaurants is a very demanding business and especially in Brussels where the population is so diverse many factors need to be considered. Since it is the first shop of the "Leonidas place" we need everything so to succeed. We get data of popular restaurants and cluster the locations also we will take in mind the population of the neighbor as we need to be close to many people.

- People are from various countries religions etc
- Many people visit Brussels for business so internet presence is a must
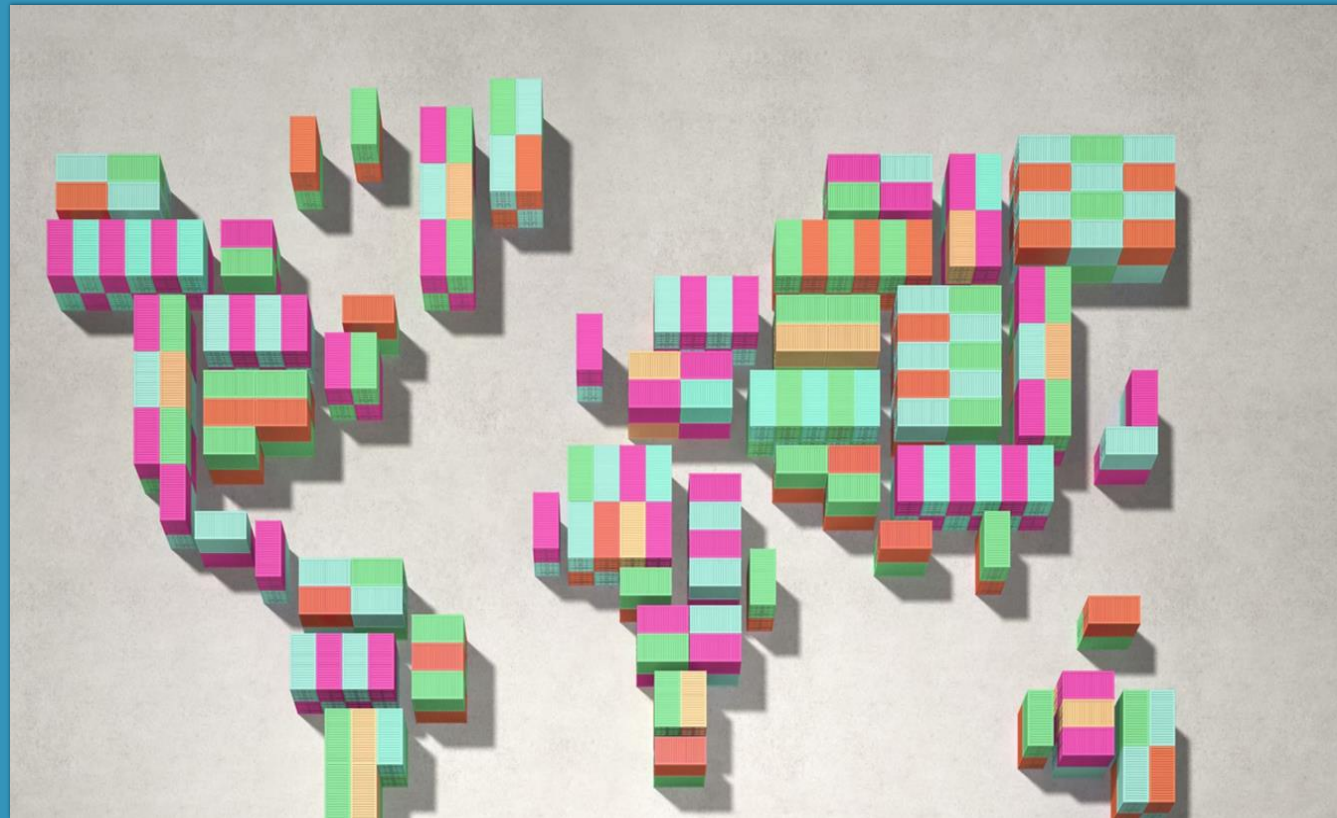- There is strong Greek community

Data Acquisition

Only the city of Brussels will be analyzed in the project.

The population data for the city of Brussels can be fould : Brussels population

Top 5 butcher shops in Brussels: 5 best bushers

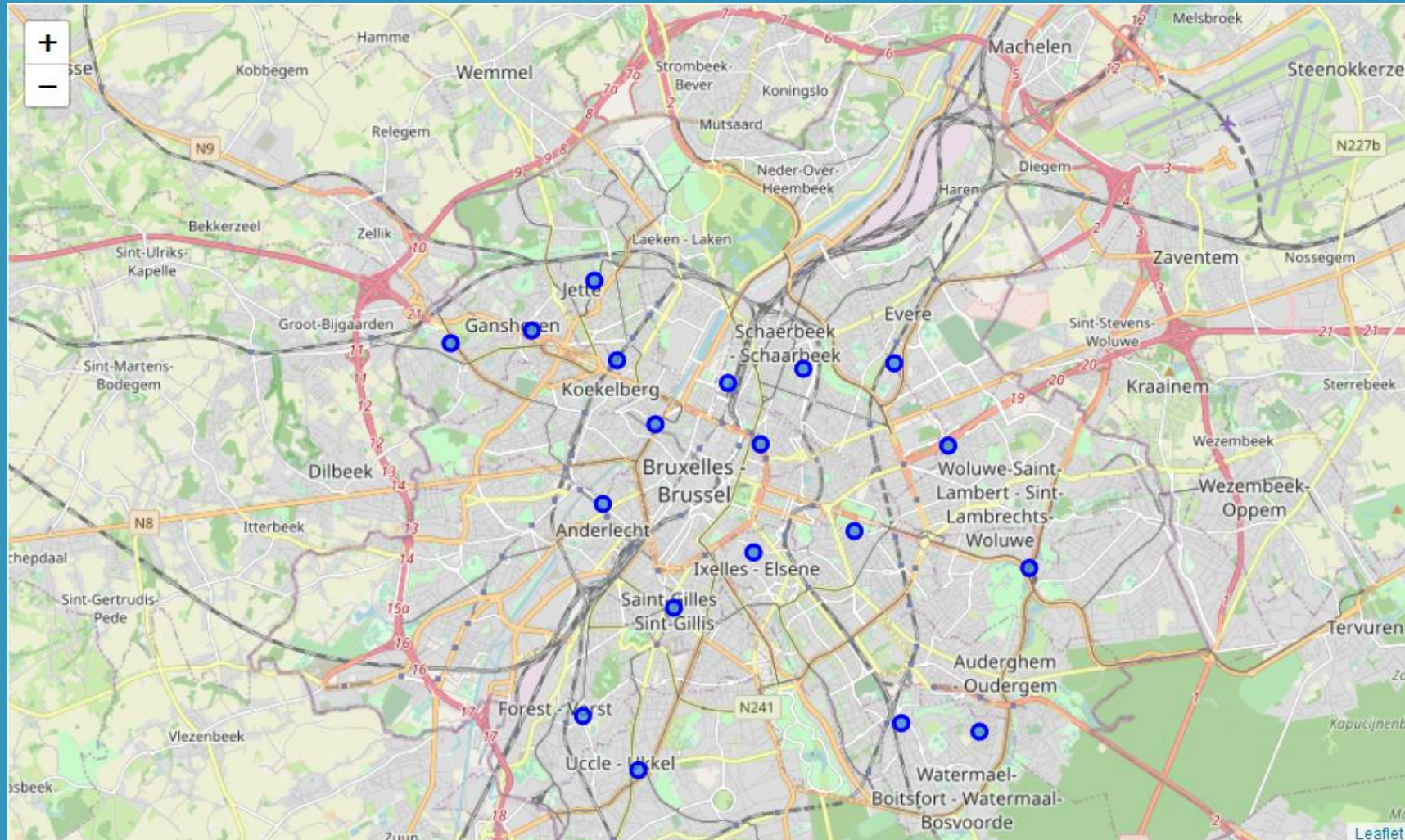Location data from foursquare api category Restaurants (4d4b7105d754a06374d81259)

Population of Brussels by neighborhood

	A	B	C	D	E	F	G
1	Name	Population Estimate 2005-01-01	Population Estimate 2010-01-01	Population Estimate 2015-01-01	Population Estimate 2019-01-01	Latitude	Longitude
2	Anderlecht	93808	104647	116332	119714	50.842989	4.329696
3	Auderghem (Oudergem)	29265	30811	32835	34013	50.8083686	4.4206754
4	Berchem-Sainte-Agathe (Sint-Agatha-Berchem)	19968	22185	23927	25179	50.867495	4.292965
5	Bruxelles (Brussel) [Brussels]	142853	157673	175534	181726	50.86135	4.359934
6	Etterbeek	41097	44352	46773	48367	50.838881	4.390485
7	Evere	33069	35803	38448	41763	50.864549	4.400135
8	Forest (Vorst)	47555	50258	55012	56289	50.810635	4.32491
9	Ganshoren	20609	22589	24066	24902	50.869363	4.312332
10	Ixelles (Elsene)	77729	80183	84754	86876	50.835549	4.366051
11	Jette	42250	46818	50724	52536	50.877103	4.327729
12	Koekelberg	17721	19812	21525	21990	50.864891	4.333086
13	Molenbeek-Saint-Jean (Sint-Jans-Molenbeek)	78520	88181	95576	97462	50.85518	4.342221
14	Saint-Gilles (Sint-Gillis)	43733	46981	50472	50267	50.82724	4.346762
15	Saint-Josse-ten-Noode (Sint-Joost-ten-Node)	23142	26338	27332	27457	50.852112	4.367682
16	Schaerbeek (Schaarbeek)	110375	121232	131030	133309	50.863715	4.378198
17	Uccle (Ukkel)	74976	77589	81280	83024	50.802483	4.338319
18	Watermael-Boitsfort (Watermaal-Bosvoorde)	24314	24260	24454	25184	50.809617	4.401701
19	Woluwe-Saint-Lambert (Sint-Lambrechts-Woluwe)	47845	50749	54022	56660	50.851874	4.413006
20	Woluwe-Saint-Pierre (Sint-Pieters-Woluwe)	37920	39077	41077	41824	50.833303	4.432686

Above there are the neighborhoods of Brussels, their estimated population and next we are going to plot them on the map
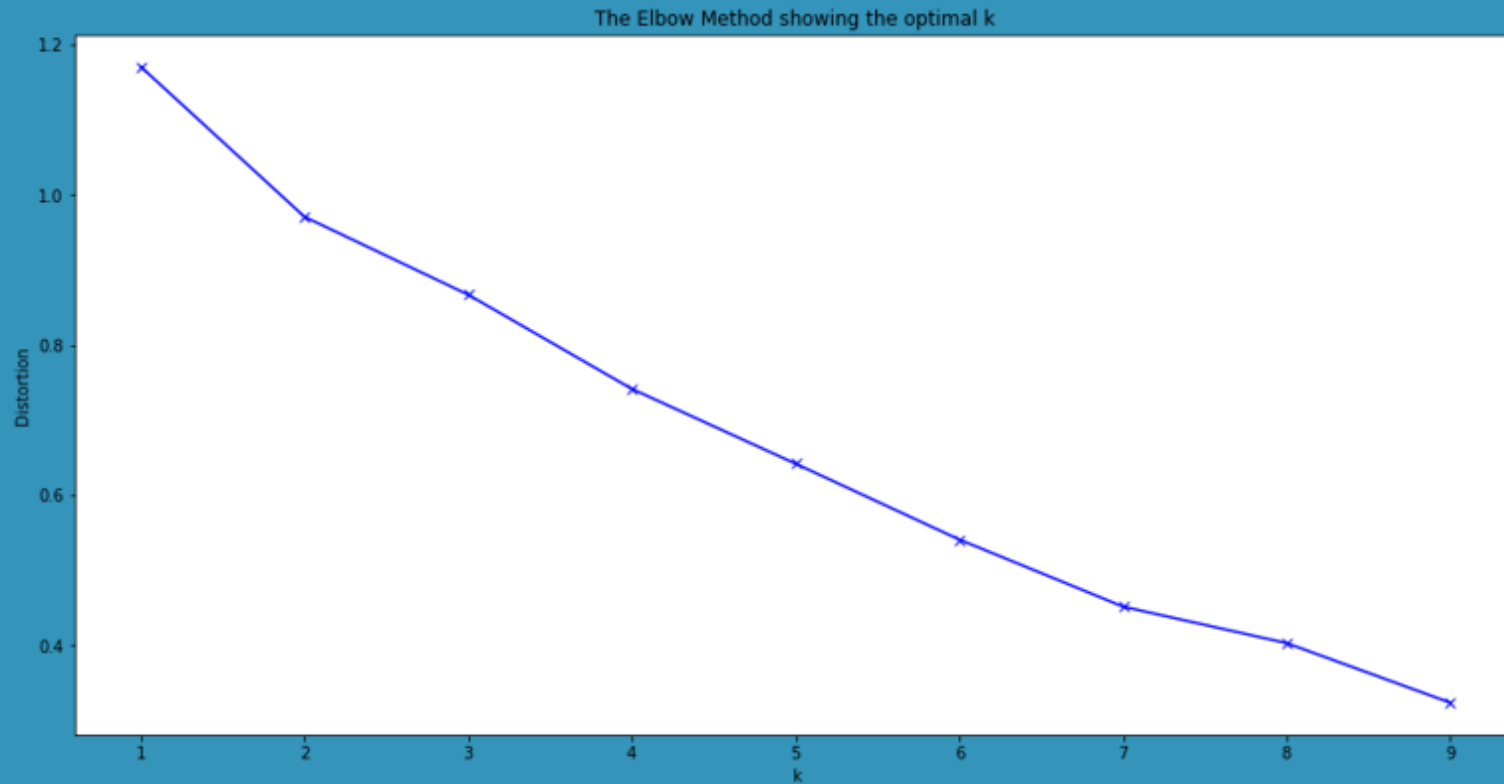
Neighborhoods of Brussels
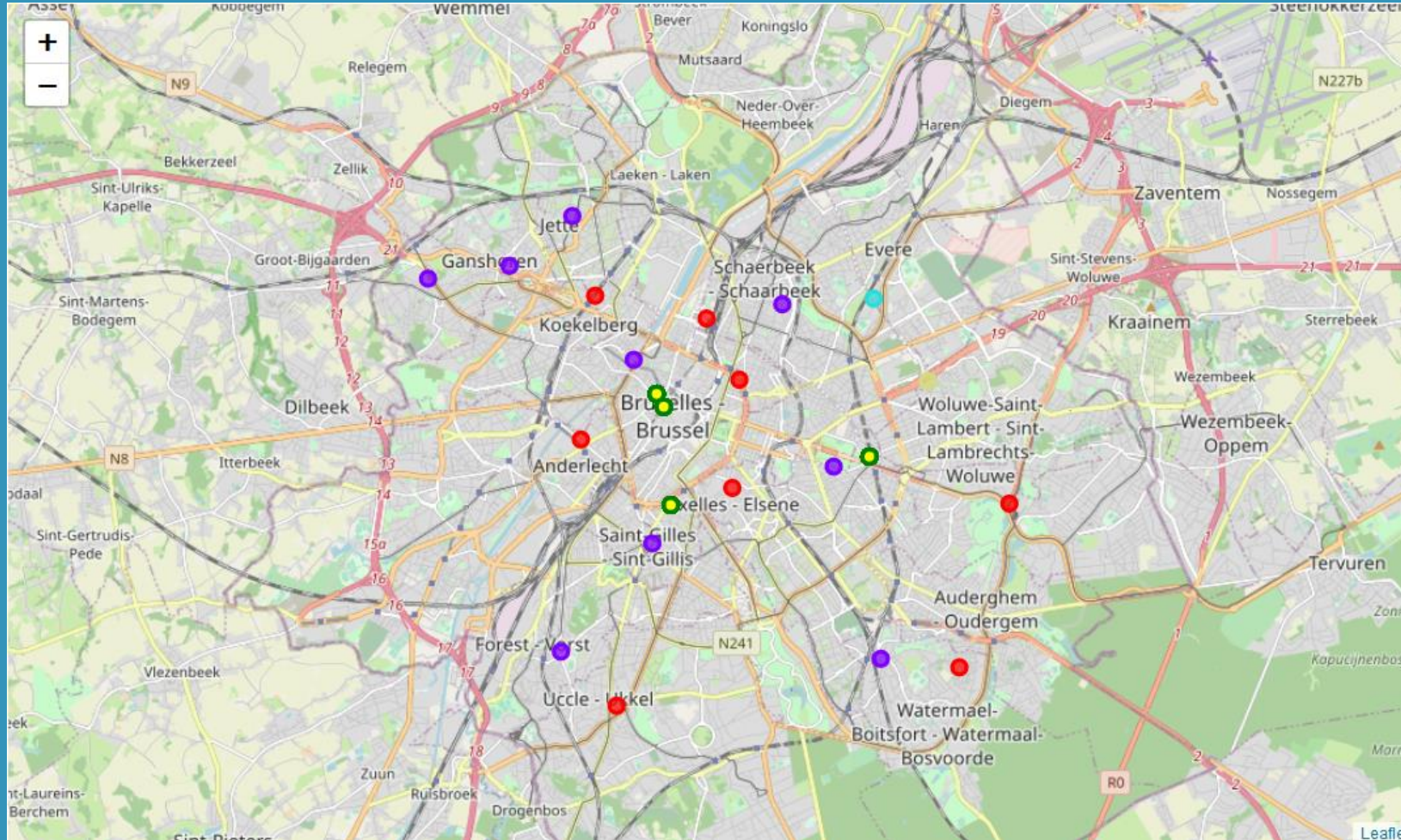
Top 10 restaurants by neighborhood

	Name	Population2019	Latitude	Longitude	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
0	Anderlecht	119714	50.842989	4.329696	0	Food Court	Lebanese Restaurant	Indian Restaurant	Steakhouse	Restaurant	Sandwich Place	Snack Place	Deli / Bodega	Ita Restau
1	Auderghem (Oudergem)	34013	50.808369	4.420675	0	Italian Restaurant	Bakery	Sandwich Place	Bistro	Snack Place	Wings Joint	Fast Food Restaurant	Doner Restaurant	Eas Europ Restau
2	Berchem-Sainte-Agathe (Sint-Agatha-Berchem)	25179	50.867495	4.292965	1	Snack Place	Greek Restaurant	Bakery	Sandwich Place	Buffet	Fast Food Restaurant	Diner	Deli / Bodega	Pi Pl
3	Bruxelles (Brussel) [Brussels]	181726	50.861350	4.359934	0	Sandwich Place	Snack Place	Italian Restaurant	Bakery	Thai Restaurant	Doner Restaurant	Kebab Restaurant	Gastropub	Egyp Restau
4	Etterbeek	48367	50.838881	4.390485	1	Pizza Place	Greek Restaurant	Italian Restaurant	Bakery	Brasserie	Sandwich Place	Japanese Restaurant	Kebab Restaurant	Eas Europ Restau

K-means number of clusters

The Elbow Method showing the optimal k

Using the elbow method to find the appropriate K for the K-means function we can see that the optional K is 2. After analysis and as it doesn't change our result I decided to use K = 4 for demonstration perpuse.

Cluster of Brussels neighborhoods

We can see the clusters of the neighborhoods as well as the best butcher shops in Brussels (Green – yellow marks)

Cluster 1

	Name	Population2019	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
2	Berchem-Sainte-Agathe (Sint-Agatha-Berchem)	25179	Snack Place	Greek Restaurant	Bakery	Sandwich Place	Buffet	Fast Food Restaurant	Diner	Deli / Bodega	Pizza Place	Restaurant
4	Etterbeek	48367	Pizza Place	Greek Restaurant	Italian Restaurant	Bakery	Brasserie	Sandwich Place	Japanese Restaurant	Kebab Restaurant	Eastern European Restaurant	Diner
6	Forest (Vorst)	56289	Pizza Place	Chinese Restaurant	Steakhouse	Halal Restaurant	French Restaurant	Middle Eastern Restaurant	Sandwich Place	Friterie	Bistro	Brasserie
7	Ganshoren	24902	Burger Joint	Pizza Place	Snack Place	Italian Restaurant	Friterie	Bakery	Sandwich Place	Chinese Restaurant	Café	Restaurant
9	Jette	52536	Snack Place	Bakery	Pizza Place	Gastropub	Italian Restaurant	Belgian Restaurant	Deli / Bodega	Chinese Restaurant	Burger Joint	Restaurant
11	Molenbeek-Saint-Jean (Sint-Jans-Molenbeek)	97462	Pizza Place	French Restaurant	Italian Restaurant	Burger Joint	Sandwich Place	Seafood Restaurant	Japanese Restaurant	Moroccan Restaurant	Breakfast Spot	Snack Place
12	Saint-Gilles (Sint-Gillis)	50267	Pizza Place	Brasserie	Moroccan Restaurant	Italian Restaurant	French Restaurant	Portuguese Restaurant	Friterie	Latin American Restaurant	Bakery	Belgian Restaurant
14	Schaerbeek (Schaarbeek)	133309	Snack Place	Turkish Restaurant	French Restaurant	Pizza Place	Gastropub	Spanish Restaurant	Vegetarian / Vegan Restaurant	Restaurant	Italian Restaurant	Falafel Restaurant
16	Watermael-Boitsfort (Watermaal-Bosvoorde)	25184	French Restaurant	Indian Restaurant	Belgian Restaurant	Fast Food Restaurant	Salad Place	Brasserie	Restaurant	Bakery	Asian Restaurant	Bistro

After examining our data we conclude that the new "Leonidas place" shop should be located in Molenbeek. It is highly populated, there isn't a great greek restaurant and it's close to a butcher shop

Thank you

Leonidas
Giannoulis