

The Battle Of Neighbourhoods – **Brussels**

Presentation

Katja Szalay
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1 Introduction – Background and Problem

This project primarily helps people who have to move to Brussels, Belgium for professional reasons to find a suitable neighbourhood to live in. The analysis is intended to help future expats to find a suitable area more easily and to find a similar neighbourhood as they were used to before. For this purpose, a comparison is made between the different neighbourhoods in Brussels.

Introduction Background

Background

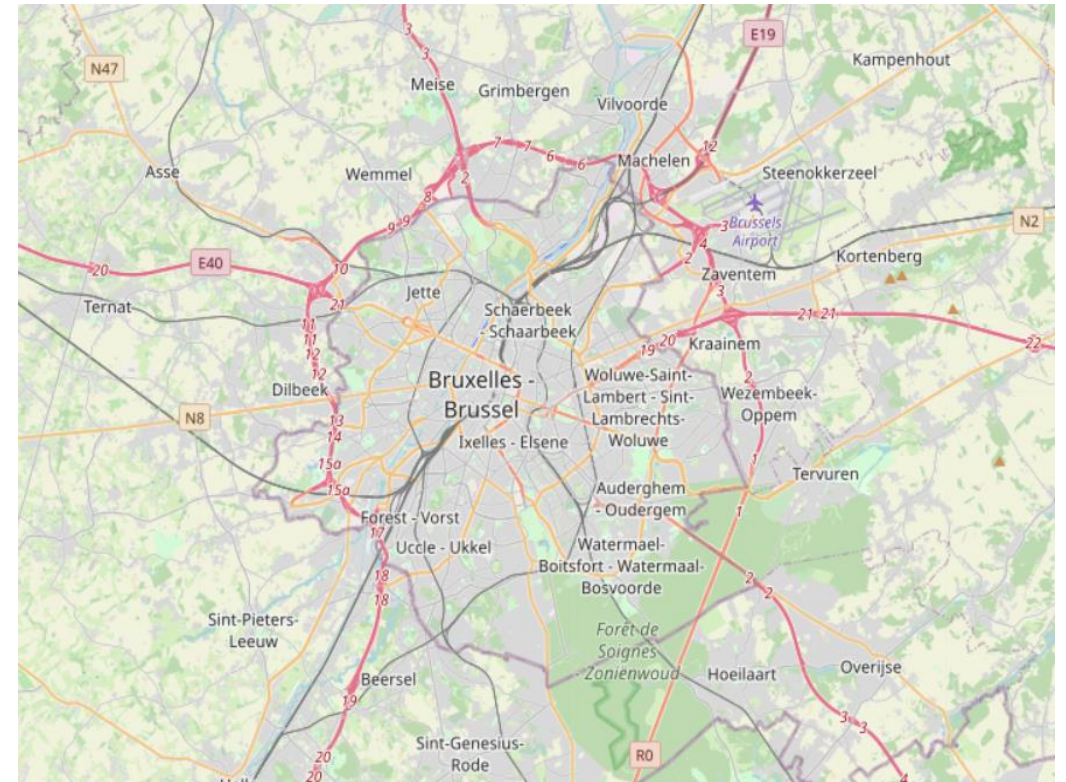
Brussels grew from a small rural settlement on the river Senne to become an important city-region in Europe. Since the end of the Second World War, it has been a major centre for international politics and home to numerous international organisations, politicians, diplomats and civil servants. Brussels is the de facto capital of the European Union, as it hosts a number of principal EU institutions. Its name is sometimes used metonymically to describe the EU and its institutions. The secretariat of the Benelux and headquarters of NATO are also located in Brussels. As the economic capital of Belgium and one of the top financial centres of Western Europe with Euronext Brussels, it is classified as an Alpha global city.



Introduction Problem

Problem

This circumstance includes the fact that a large number of employees, also called expats, who come from all countries in Europe and worldwide, have to find accommodation in Brussels on a temporary, but also on a longer-term basis and look for suitable residential areas to feel at home. The analysis of neighbourhoods in Brussels is intended to help future expats find a suitable area to live in more easily and to help people moving from Brussels to Berlin and vice versa to find a similar neighbourhood as they were used to before. Berlin is one of the capitals with the highest number of established diplomatic representations. Relocations between these cities take place frequently.



2 Data

In this project, three different datasets will be used to solve the problem – Monitoring of the Neighbourhoods in Brussels, Brussels Recorded Crime and Foursquare API. After scraping them from original and reliable sources, they will be wrangled and cleansed for further analysis into more useful forms.

Data Overview

Three different datasets will be used to solve the problem:

- Neighbourhood Monitoring Brussels (monitoringdesquartiers.brussels) - to identify the basics of the surroundings
- Brussels Recorded Crime (stat.policefederale.be) – to identify the security
- Foursquare API – to identify the atmosphere

Neighbourhood Monitoring Brussels

Neighbourhood Monitoring Brussels (monitoringdesquartiers.brussels)

The dataset includes a list of all neighbourhoods in the Brussels-Capital Region and the related and required data:

- Municipality and Postal Code
- Population data like population density
- Building structure like share of high-rise buildings, office density
- Income structure
- Resident structure like family share, single person share
- Environment like access to green spaces
- Mobility like access to public transport

Neighbourhood	Postal Code	Population	Rent	Mobility	Tax	Singles	Families	European	Sky
Grand Place	1000	8887	947	119	18275	90	7	37	
Dansaert	1000	17105	711	101	18277	79	14	24	
guinage - Dixmude	1000	17973	826	103	18856	78	15	23	
Martyrs	1000	7075	663	109	19626	87	9	26	
Dame-aux-Neiges	1000	8855	663	123	20667	84	10	31	

Brussels Recorded Crime

Brussels Recorded Crime (stat.policefederale.be)

The second data set contains the crime statistics of the individual municipalities of Brussels. The crime statistics will be transferred to the individual neighbourhoods.

The crime statistics are transferred to the individual neighbourhoods. For further analysis, crimes are not differentiated by category and are calculated by proportion of the population in the municipality. An average of the last years will be calculated.

Nombre total des délits	2000	2012	2013	2014	2015	2016	2017	2018
▼ National	1.002.087	1.040.232	997.802	977.506	921.805	893.873	883.834	891.805
▼ Région de Bruxelles-Capitale	158.064	178.347	167.119	159.975	146.937	142.463	145.917	149.805
▼ Bruxelles-Capitale	158.064	178.347	167.119	159.975	146.937	142.463	145.917	149.805
▼ Bruxelles (Bruxelles-Capitale)	158.064	178.347	167.119	159.975	146.937	142.463	145.917	149.805
▶ BRUXELLES CAPITALE IXLLES	60.567	71.975	67.054	64.372	55.702	52.609	55.535	59.805
▶ BRUXELLES-OUEST	19.339	20.378	19.584	19.364	19.504	20.051	18.727	18.805
Pas de ZP attribuée - Eurostar	1.976	821	265	0	0	0	1	0
▶ ZP POLBRUNO	21.821	21.496	21.576	20.454	19.659	19.179	19.423	20.805
▶ UCCLE/W-B/AUDERGHEM	13.481	14.644	13.470	13.225	11.402	11.067	11.101	11.805
▶ ZONE MONTGOMERY	12.372	12.836	12.498	12.387	11.452	11.422	11.666	10.805
▶ ZONE MIDI	28.508	36.197	32.672	30.173	29.218	28.135	29.464	29.805

Foursquare API

Foursquare API

Finally, Foursquare API will be used to call the top 10 popular venues in each neighbourhood. This will be done by the “explore” function of requesting URL. The data will be looking like the following section of the dataset.

Code	Commune	Neighbourhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
1	Bruxelles	Grand Place	50.846714	4.352514	3	Chocolate Shop	Concert Hall	Toy / Game Store
2	Bruxelles	Dansaert	50.850453	4.346755	3	Plaza	Bakery	French Restaurant
3	Bruxelles	Béguinage - Dixmude	50.855666	4.350933	3	Yoga Studio	Restaurant	Bookstore
4	Bruxelles	Martyrs	50.851834	4.356594	3	Department Store	Clothing Store	Bookstore
5	Bruxelles	Notre-Dame-aux-Neiges	50.850006	4.363218	3	Ice Cream Shop	Bar	Gastropub

3 Methodology

Three data sets were used in this project, with monitoring_data and foursquare_data used for cluster analysis.

Methodology Neighbourhood Monitoring Brussels

Descriptive Statistics

	Population	Rent	Mobility	Tax	Singles	Families	European	Skyscrapers	Apartments	Houses	GreenSpace	Metro
count	118.000000	118.000000	118.000000	118.000000	118.000000	118.000000	118.000000	118.000000	118.000000	118.000000	118.000000	118.000000
mean	12429.644068	769.322034	78.898305	20881.940678	72.194915	24.364407	23.474576	5.983051	68.601695	30.635593	81.983051	45.415254
std	7013.398339	118.591656	15.431896	3588.173914	9.924724	7.355056	10.426554	6.359572	17.137523	17.158221	18.095182	37.513605
min	458.000000	593.000000	49.000000	15104.000000	47.000000	7.000000	8.000000	0.000000	19.000000	4.000000	19.000000	0.000000
25%	6814.500000	673.500000	70.000000	18369.750000	65.000000	19.250000	15.000000	2.000000	62.000000	18.250000	72.000000	2.250000
50%	11759.500000	744.500000	76.500000	20434.500000	73.000000	26.000000	21.500000	4.000000	72.000000	27.000000	87.000000	46.500000
75%	17420.250000	840.750000	86.750000	23169.500000	79.750000	29.750000	29.750000	8.000000	80.750000	37.000000	96.750000	82.750000
max	37531.000000	1113.000000	124.000000	30879.000000	93.000000	45.000000	58.000000	35.000000	95.000000	80.000000	100.000000	100.000000

The dataframe includes the following variables:

- Population = Number of inhabitants per neighborhood,
- Rent = Average value of the rents in €,
- Mobility = Frequency of residential moves (abs.),
- Tax = average taxable salary in €,
- Singles = Households without children,
- Families = Households with children,
- European = Proportion of other European residents (except Belgium),
- Skyscrapers = Proportion of buildings with 5 or more floors,
- Apartments = Percentage of apartments (not houses),
- Houses = Percentage of houses (not apartments),
- GreenSpace = Percentage of the population near a publicly accessible green space,
- Metro = Percentage of the population near a metro or a Tram stop.

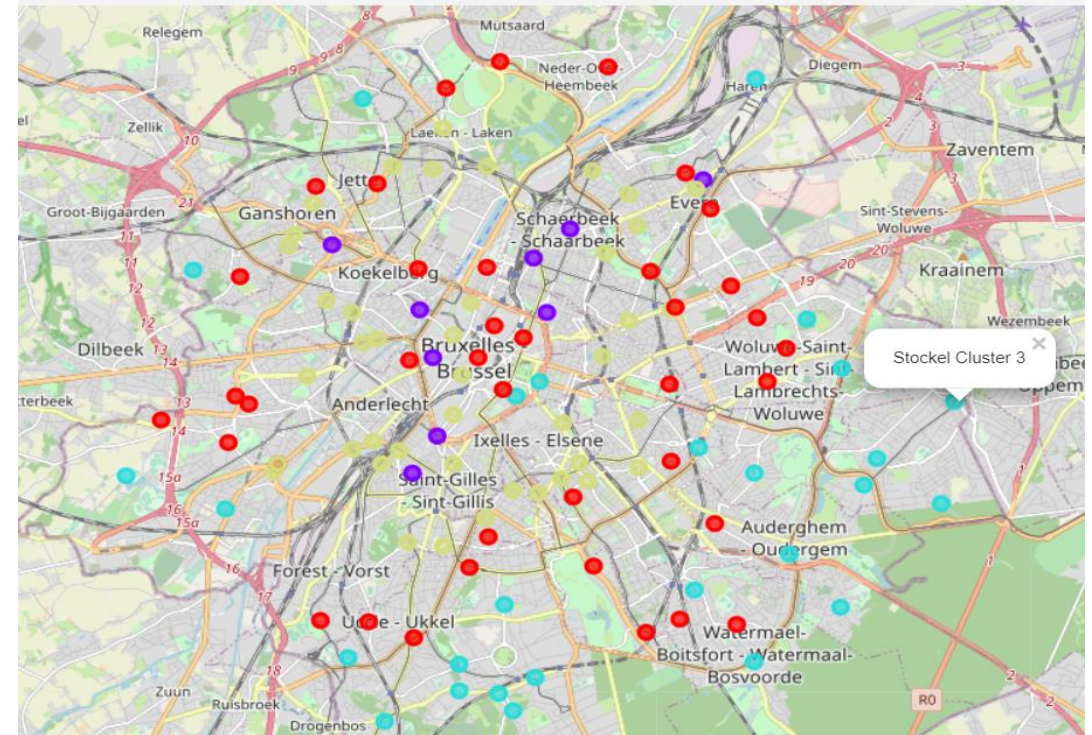
Methodology Neighbourhood Monitoring Brussels

K-means Clustering

k-means clustering was conducted in order to group the neighbourhoods according to the variables

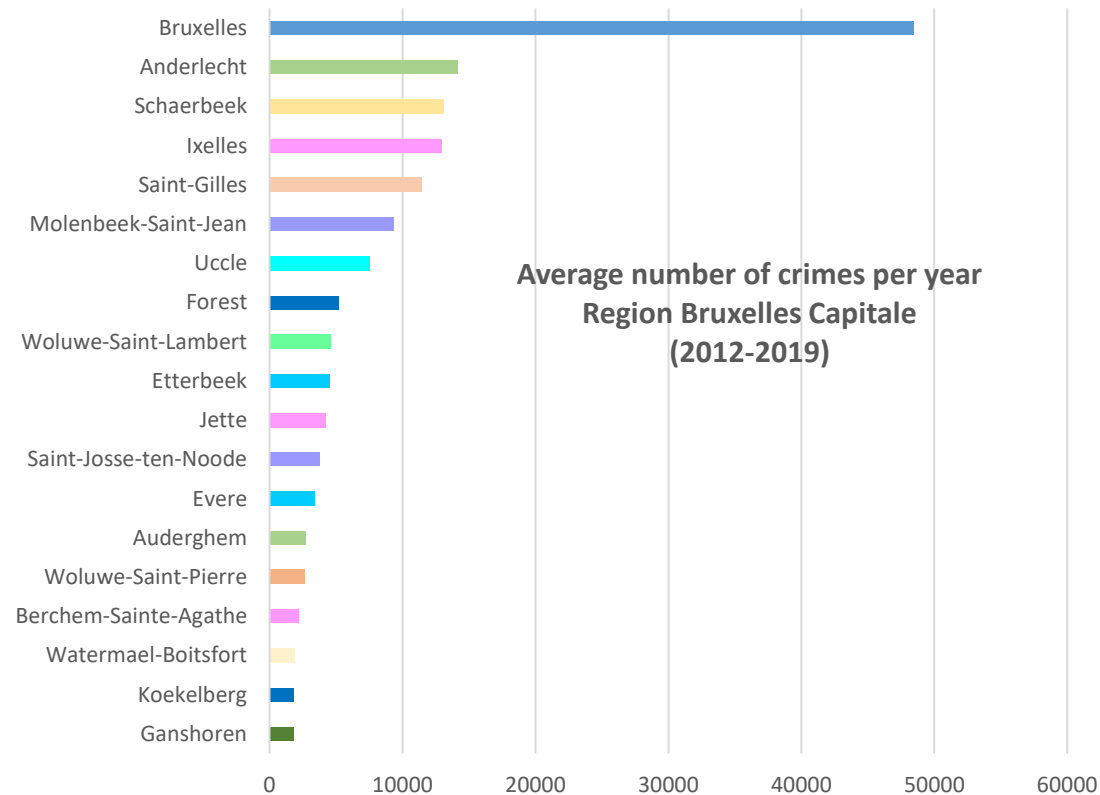
Each cluster is given a name that refers to the main character of the environment:

- **Cluster 0** – yellow = "Below average price and high population area"
- **Cluster 1** – red = "Higher-priced and well-situated area"
- **Cluster 2** – violet = "Affordable and very densely populated area"
- **Cluster 3** – green = "High-priced and upscale area"



Methodology Brussels Recorded Crime

Descriptive Statistics



- data has been processed: the crimes of the last eight years (2012-2019) have been averaged and divided by the number of inhabitants of each municipality, giving a value that indicates the average crimes per 1000 per month
- the number of crimes was then sorted according to their level - in five levels from very high to very low.

Methodology Foursquare API

K-means Clustering

Finally, Foursquare was used to call the top 50 popular venues in each neighbourhood. This was done using the 'explore' function of requesting URL. As the first step, one hot encoding was conducted to give binary variables to each venue category.

Code	Commune	Neighbourhood	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
1	Bruxelles	Grand Place	50.846714	4.352514	3	Chocolate Shop	Concert Hall	Toy / Game Store	Dessert Shop	Plaza	Cheese Shop	Shopping Mall	Hotel	Art Dealership
2	Bruxelles	Dansaert	50.850453	4.346755	3	Plaza	Bakery	French Restaurant	Sushi Restaurant	Fish & Chips Shop	Bookstore	Bar	Seafood Restaurant	Moroccan Restaurant
3	Bruxelles	Béguinage - DIXMUDÉ	50.855666	4.350933	3	Yoga Studio	Restaurant	Bookstore	Butcher	Cultural Center	Ethiopian Restaurant	Grocery Store	Organic Grocery	Plaza
4	Bruxelles	Martyrs	50.851834	4.356594	3	Department Store	Clothing Store	Bookstore	Cosmetics Shop	Coffee Shop	Sporting Goods Shop	Seafood Restaurant	Event Service	Fish Market
5	Bruxelles	Notre-Dame-aux-Neiges	50.850006	4.363218	3	Ice Cream Shop	Bar	Gastropub	Deli / Bodega	Concert Hall	Coffee Shop	Sandwich Place	Smoke Shop	Thai Restaurant

The data was grouped by borough names to find out how many venues of each category exist in the boroughs within the top 50. Based on the frequency, a list has been created, as shown in the figure above. The first till 10th common venue of each neighbourhood is presented.

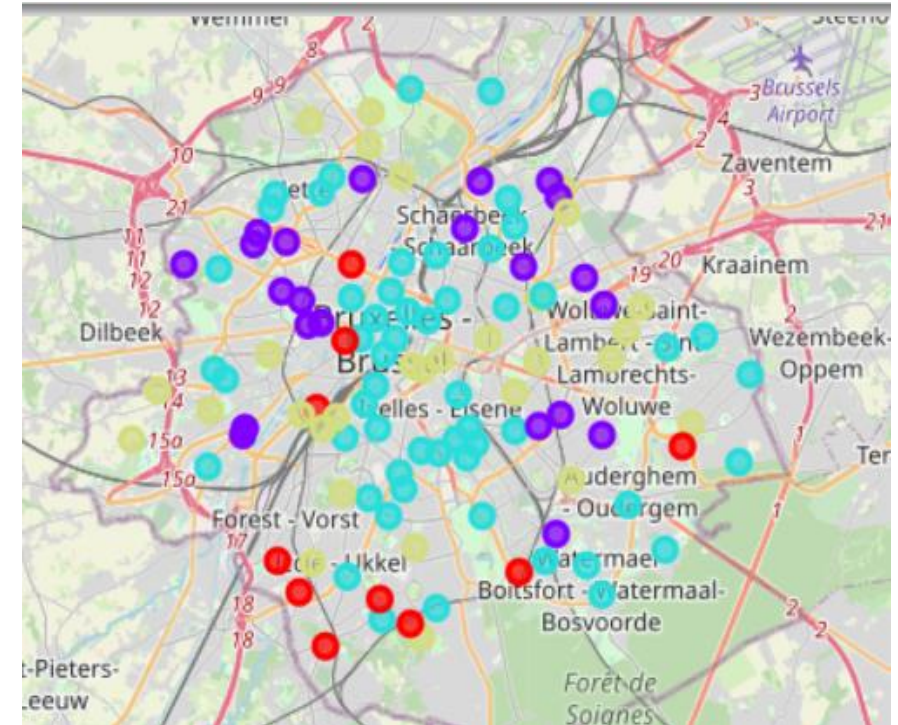
Methodology Foursquare API

K-means Clustering

The neighbourhoods were clustered in four groups, based on the frequency of similarity of the venues

Each cluster is given a name according to the characteristics that can be derived from the popular venues:

- **Cluster 0 = yellow = "Busy and touristic"** - everything is nearby(Restaurants, Pubs, Supermarkets, Sports, Culture - these are the most hectic areas,
- **Cluster 1 = red = "Green and Sports"** - the main focus is on a green environment as well as the possibility to do sports,
- **Cluster 2 = violet = "Foods and Quiet"** - Restaurants, Take aways, Convenient Shops, but not too busy,
- **Cluster 3 = green = "Lively"** - everything is nearby, but it is not too busy and less touristic.



4 Results and Recommendations

Results Overview

In a final step, the Foursquare data was merged with the monitoring-and-crime data to create a concise table containing all neighbourhoods.

Code	Latitude	Longitude	Commune	Neighbourhood	Postal Code	monitoring level	Crime level	foursquare level
18	50.861169	4.338667	Molenbeek-Saint-Jean	Quartier Maritime	1080	2 - Higher-priced and well-situated area	ok	Green and Sports
30	50.842452	4.397510	Etterbeek	Porte Tervueren	1040	2 - Higher-priced and well-situated area	ok	Lively
31	50.831890	4.404529	Etterbeek	Saint-Michel	1040	1 - High-priced and upscale area	ok	Foods and Quiet
65	50.829735	4.398131	Molenbeek-Saint-Jean	Korenbeek	1080	2 - Higher-priced and well-situated area	ok	Foods and Quiet
66	50.861080	4.285760	Berchem-Sainte-Agathe	Potaarde	1082	1 - High-priced and upscale area	good	Foods and Quiet

From this table, all unnecessary neighbourhoods can be removed, so that a table is created that contains only the relevant, filtered neighbourhoods (final results).

Results Monitoring Level

a) Monitoring Level The monitoring level describes neighborhoods based on facts such as population density, rent levels, housing characteristics, metro and green space access.

1 - High-priced and upscale area

2 - Higher-priced and well-situated area

~~3 - Below average price and high population area~~

~~4 - Affordable and very densely populated area~~



For further analysis, only **Levels 1 and 2** are relevant, as these areas have higher rents but lower population density, are family-oriented, well connected, and offer access to green space.

1 - High-priced and upscale area
2 - Higher-priced and well-situated area

Results Crime Level

b) Crime Level The Crime Level describes the crimes of the last eight years (2012-2019), averaged and divided by the number of inhabitants of each municipality, giving a value that indicates **the average crimes per 1000 habitants per month**. The crime level ranges from "Very high" to "best", where "best" represent the least crimes:

- very high
- high
- relatively high
- ok
- good
- best



For further analysis, only the **crime levels ok, good and best** are relevant. These are areas where less than 10 crimes per 1000 habitants per month occurs.

crime levels ok, good and best

Results Foursquare

c) Foursquare Level The Foursquare Level based on the top 10 venues nearby every neighbourhood. Every cluster represents another main focus and characteristic of the neighbourhood:

- **"Busy and touristic"** - everything is nearby (Restaurants, Pubs, Supermarkets, Sports, Culture - these are the most hectic areas)
- **"Green and Sports"** - the main focus is on a green environment as well as the possibility to do sports
- **"Foods and Quiet"** - Restaurants, Take aways, Convenient Shops, but not too busy
- **"Lively"** - everything is nearby, but it is not too busy and less touristic



For further analysis, only three levels are relevant - **"Green and Sports"**, **"Foods and Quiet"** and **"Lively"**. The "Busy and touristic" area will be excluded for subjective reason.

**"Green and Sports",
"Foods and Quiet" and "Lively".**

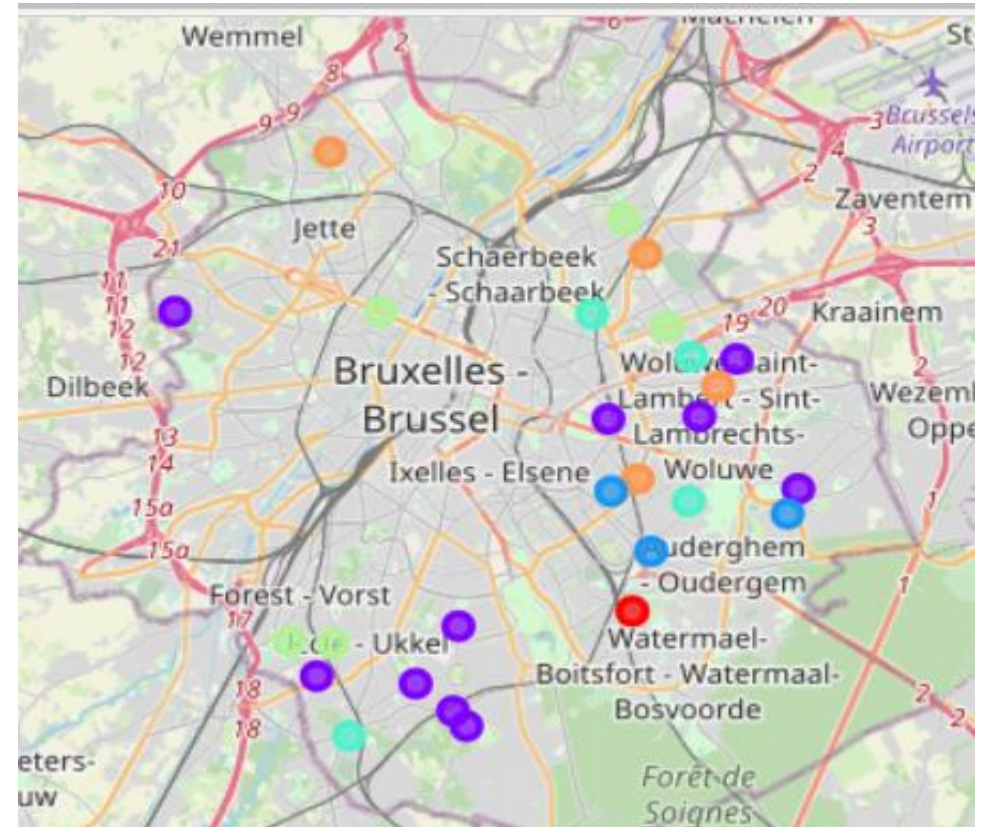
5 Conclusion

Conclusion Overall

A total of 27 suitable neighborhoods have been identified.

There are six different clusters regarding a suitable neighbourhood in Brussels:

- Red: High-priced and upscale area - Foods and Quiet,
- Violet: High-priced and upscale area - Green and Sports,
- Blue: High-priced and upscale area - Lively,
- Green: Higher-priced and well-situated area - Foods and Quiet,
- Light Green: Higher-priced and well-situated area - Green and Sports,
- Orange: Higher-priced and well-situated area - Lively.



Conclusion Discussion

Due to the analysis, 27 neighborhoods have been identified that are suitable for future expats to live in. These 27 neighborhoods can be divided into six different groups, each with a different focus. For example, the first group contains neighborhoods that are very expensive, upscale, safe, and rather quiet, while still having plenty of dining options.

- More explicitly delineate and demarcate neighbourhoods. They are very close to each other. There can be overlaps and distortions.
- Decisions have been made subjectively. This should be taken into account.
- Simplified presentation due to the scope.
- Discriminatory power of the clusters not always given.
- It was a lot of fun to delve into this project!