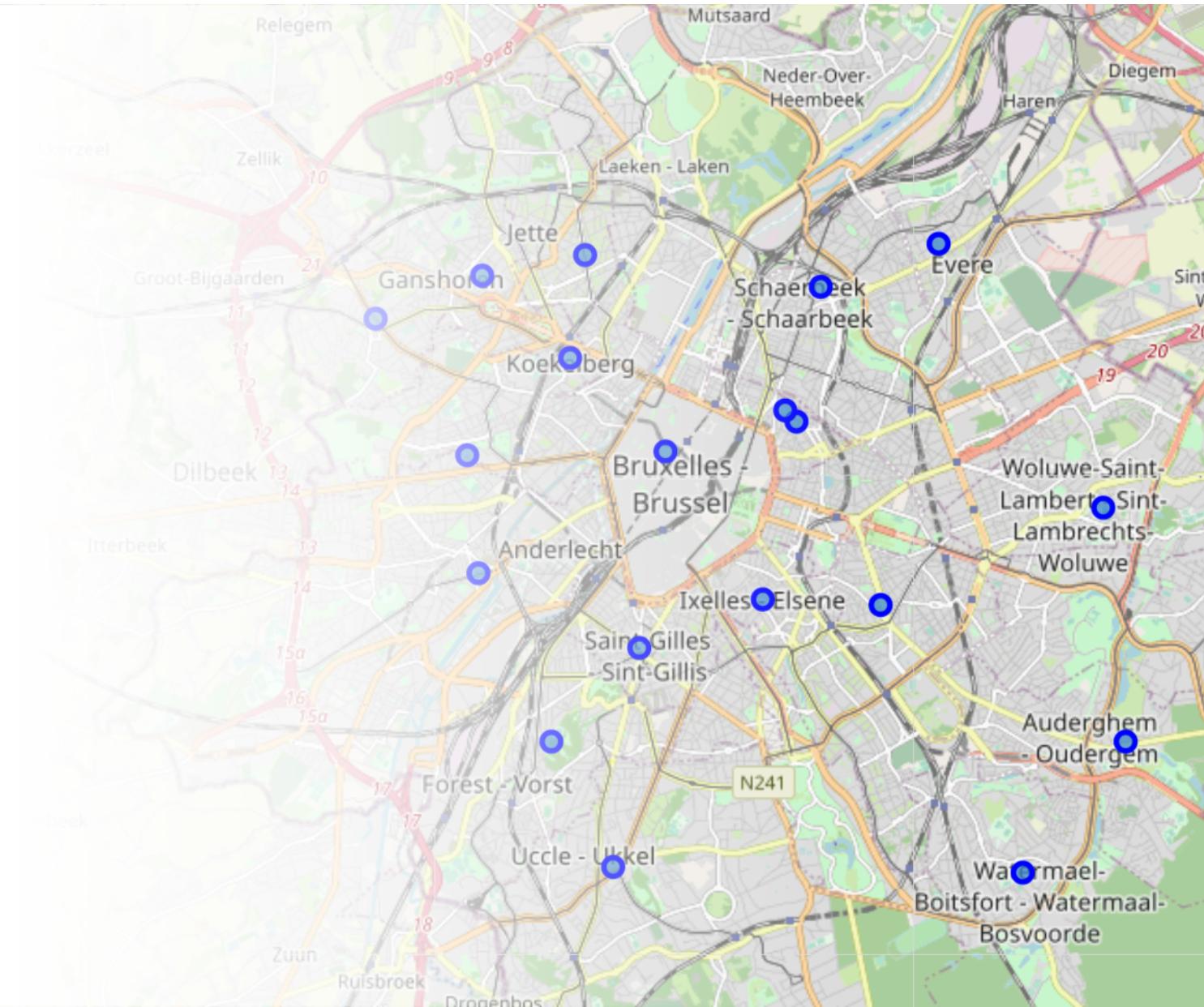


# Analysis of Brussels' Neighborhoods

Daniel Bejarano

# Introduction

- 19 Municipalities
- Capital of the European Union
- HQ of NATO
- Multiple UNESCO World Heritage sites



# Objectives



1

Determine the most common venues per neighborhood

2

Rank neighborhoods according to how well they fit my personal interests

3

Cluster the neighborhoods to provide alternatives to the ranking

# Methods and data

- BeautifulSoup – Wikipedia
  - French name
  - Postal Codes
- Pgeocode – Extracting geographical coordinates per postal code
- Foursquare API – Pulling venue data using geographical coordinates

◆	French name	Dutch name	◆	Flag	CoA	post code	Population (1/1/2017)	Area	◆	Population density (km²)	Ref.
1	Anderlecht	Anderlecht				1070	118,241	17.7 km² (6.8 sq mi)		6,680	[7]
2	Auderghem	Oudergem				1160	33,313	9.0 km² (3.5 sq mi)		3,701	[8]
3	Berchem-Sainte-Agathe	Sint-Agatha-Berchem				1082	24,701	2.9 km² (1.1 sq mi)		8,518	[9]
4	Bruxelles-Ville*	Stad Brussel*				1000 1020 1120 1130	176,545	32.6 km² (12.6 sq mi)		5,415	[10]
5	Etterbeek	Etterbeek				1040	47,414	3.1 km² (1.2 sq mi)		15,295	[11]
6	Evere	Evere				1140	40,394	5.0 km² (1.9 sq mi)		8,079	[12]
7	Forest	Vorst				1190	55,746	6.2 km² (2.4 sq mi)		8,991	[13]
8	Ganshoren	Ganshoren				1083	24,596	2.5 km² (1.0 sq mi)		9,838	[14]
9	Ixelles	Elsene				1050	86,244	6.3 km² (2.4 sq mi)		13,690	[15]
10	Jette	Jette				1090	51,933	5.0 km² (1.9 sq mi)		10,387	[16]
11	Koekelberg	Koekelberg				1081	21,609	1.2 km² (0.5 sq mi)		18,008	[17]
12	Molenbeek-Saint-Jean	Sint-Jans-Molenbeek				1080	96,629	5.9 km² (2.3 sq mi)		16,378	[18]
13	Saint-Gilles	Sint-Gillis				1060	50,471	2.5 km² (1.0 sq mi)		20,188	[19]
14	Saint-Josse-ten-Noode	Sint-Joost-ten-Noode				1210	27,115	1.1 km² (0.4 sq mi)		24,650	[20]
15	Schaerbeek	Schaarbeek				1030	133,042	8.1 km² (3.1 sq mi)		16,425	[21]
16	Uccle	Ukkel				1180	82,307	22.9 km² (8.8 sq mi)		3,594	[22]
17	Watermael-Boitsfort	Watermaal-Bosvoorde				1170	24,871	12.9 km² (5.0 sq mi)		1,928	[23]
18	Woluwe-Saint-Lambert	Sint-Lambrechts-Woluwe				1200	55,216	7.2 km² (2.8 sq mi)		7,669	[24]
19	Woluwe-Saint-Pierre	Sint-Pieters-Woluwe				1150	41,217	8.9 km² (3.4 sq mi)		4,631	[25]

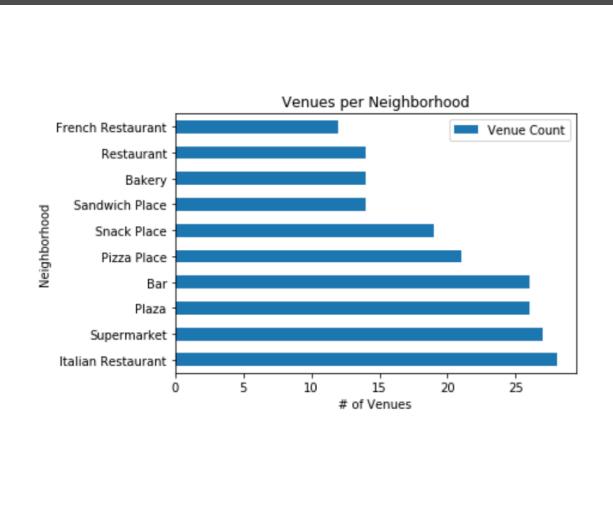
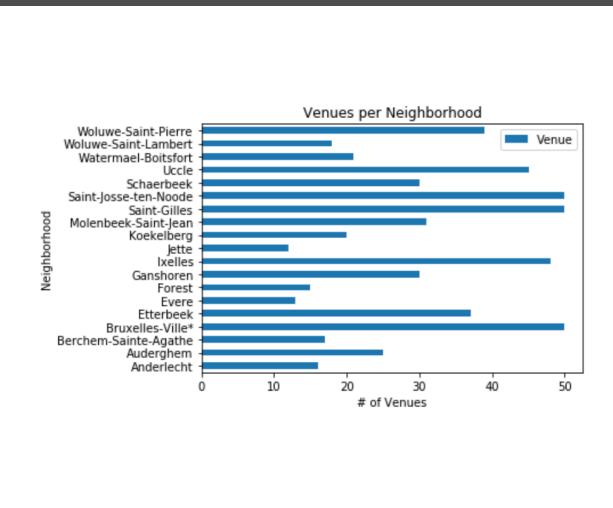
# Exploratory Analysis

(567, 7)

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Anderlecht	50.8362	4.3145	Friture René	50.835846	4.311632	Belgian Restaurant
1	Anderlecht	50.8362	4.3145	Le Chapeau Blanc	50.835034	4.307790	Restaurant
2	Anderlecht	50.8362	4.3145	Snack Mirvan	50.835176	4.308543	Snack Place
3	Anderlecht	50.8362	4.3145	Erasmushuis / Maison d'Erasme (Erasmushuis)	50.836507	4.307860	History Museum
4	Anderlecht	50.8362	4.3145	Le Nil	50.836718	4.313628	Middle Eastern Restaurant
5	Anderlecht	50.8362	4.3145	Iberico	50.832146	4.311816	Gourmet Shop
6	Anderlecht	50.8362	4.3145	Proxy Delhaize	50.835256	4.310246	Grocery Store
7	Anderlecht	50.8362	4.3145	Carrefour Express	50.835387	4.310213	Convenience Store
8	Anderlecht	50.8362	4.3145	Panos	50.835544	4.310776	Sandwich Place

	Municipalities	Postal Codes	Latitude	Longitude
0	Anderlecht	1070	50.8362	4.3145
1	Auderghem	1160	50.8167	4.4333
2	Berchem-Sainte-Agathe	1082	50.8657	4.2956
3	Bruxelles-Ville*	1000	50.8504	4.3488
4	Etterbeek	1040	50.8327	4.3884
5	Evere	1140	50.8744	4.3990
6	Forest	1190	50.8168	4.3278
7	Ganshoren	1083	50.8707	4.3153
8	Ixelles	1050	50.8333	4.3667
9	Jette	1090	50.8731	4.3342
10	Koekelberg	1081	50.8612	4.3314
11	Molenbeek-Saint-Jean	1080	50.8499	4.3125
12	Saint-Gilles	1060	50.8276	4.3439
13	Saint-Josse-ten-Noode	1210	50.8538	4.3728
14	Schaerbeek	1030	50.8694	4.3774
15	Uccle	1180	50.8022	4.3394
16	Watermael-Boitsfort	1170	50.8015	4.4144
17	Woluwe-Saint-Lambert	1200	50.8439	4.4291
18	Woluwe-Saint-Pierre	1150	50.8551	4.3707

The Foursquare API pulled a total of 567 venues for the 19 municipalities



Venue	Neighborhood
Anderlecht	16
Auderghem	25
Berchem-Sainte-Agathe	17
Bruxelles-Ville*	50
Etterbeek	37
Evere	13
Forest	15
Ganshoren	30
Ixelles	48
Jette	12
Koekelberg	20
Molenbeek-Saint-Jean	31
Saint-Gilles	50
Saint-Josse-ten-Noode	50
Schaerbeek	30
Uccle	45
Watermael-Boitsfort	21
Woluwe-Saint-Lambert	18
Woluwe-Saint-Pierre	39

Venues per neighborhood

Venue Count	
<b>Italian Restaurant</b>	28
<b>Supermarket</b>	27
<b>Plaza</b>	26
<b>Bar</b>	26
<b>Pizza Place</b>	21
<b>Snack Place</b>	19
<b>Sandwich Place</b>	14
<b>Bakery</b>	14
<b>Restaurant</b>	14
<b>French Restaurant</b>	12

Most common venue categories

borhood	African Restaurant	Art Gallery	Art Museum	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	Automotive Shop	BBQ Joint	Bagel Shop	Bakery	Bar	Beer Bar	Beer Store
nderlecht	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
derghem	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.040000	0.040000	0.000000	0.000000
erchem- e-Agathe	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.058824	0.000000	0.000000
iles-Ville*	0.000000	0.000000	0.000000	0.02	0.02	0.000000	0.000000	0.020000	0.000000	0.020000	0.160000	0.000000	0.000000
Etterbeek	0.000000	0.000000	0.000000	0.00	0.00	0.027027	0.000000	0.000000	0.000000	0.000000	0.081081	0.000000	0.000000
Evere	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.076923	0.000000	0.000000	0.000000
Forest	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.066667	0.000000	0.000000
anshoren	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.066667	0.100000	0.000000	0.000000
Ixelles	0.020833	0.020833	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.041667	0.062500	0.020833	0.020833
Jette	0.000000	0.000000	0.083333	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ekelberg	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
lenbeek- aint-Jean	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.032258	0.000000	0.032258	0.000000	0.000000	0.000000
int-Gilles	0.020000	0.000000	0.000000	0.00	0.00	0.020000	0.000000	0.020000	0.020000	0.020000	0.060000	0.020000	0.000000
nt-Josse- n-Noode	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.020000	0.000000	0.000000
naerbeek	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.033333	0.000000	0.000000	0.033333	0.000000	0.000000	0.000000
Uccle	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.022222	0.044444	0.044444	0.000000	0.000000
termael- Boitsfort	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.000000	0.047619	0.000000	0.000000	0.000000
ve-Saint- Lambert	0.000000	0.000000	0.000000	0.00	0.00	0.055556	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ve-Saint- Pierre	0.000000	0.000000	0.000000	0.00	0.00	0.000000	0.000000	0.000000	0.025641	0.000000	0.000000	0.000000	0.000000

Mean  
occurrence of  
venue  
categories per  
Neighborhood

# Exploratory Analysis

	Neighborhood	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	Anderlecht	History Museum	Discount Store	Fish Market	Snack Place	Supermarket	Business Center	Sandwich Place	Belgian Restaurant	Theater	Middle Eastern Restaurant
1	Auderghem	Italian Restaurant	Sushi Restaurant	French Restaurant	Convenience Store	Middle Eastern Restaurant	Snack Place	Fast Food Restaurant	Salad Place	Restaurant	Cultural Center
2	Berchem-Sainte-Agathe	Greek Restaurant	Tennis Court	Sports Club	Bar	Burger Joint	Supermarket	Restaurant	Tailor Shop	Café	French Restaurant
3	Bruxelles-Ville*	Bar	Plaza	Seafood Restaurant	Fish & Chips Shop	Belgian Restaurant	Yoga Studio	Comfort Food Restaurant	Sandwich Place	Restaurant	Pub
4	Etterbeek	Snack Place	Plaza	Bar	Pizza Place	Supermarket	Sandwich Place	Cosmetics Shop	Kebab Restaurant	Diner	Department Store

Sorting the mean occurrences of the venue categories yields the most popular venues for each neighborhood

# Ranking neighborhoods

1. Determining my preferred venue categories and ranking them on a scale from 1 – 10
2. Multiply the ratings times the mean occurrences of these venues
3. Assigning the grand totals to a new dataframe

Neighborhood	Anderlecht	Auderghem	Berchem-Sainte-Agathe	Bruxelles-Ville*	Etterbeek	Evere	Forest	Ganshoren
Supermarket	0.0625	0.04	0.0588235	0	0.0540541	0	0.0666667	0.0666667
Gym	0	0	0.0588235	0	0.027027	0	0	0
Metro Station	0.0625	0	0	0	0	0	0	0
Bar	0	0.04	0.0588235	0.16	0.0810811	0	0.0666667	0.1
Breakfast Spot	0	0	0	0.02	0	0	0	0
Tram Station	0	0.04	0	0	0	0	0.133333	0
Sushi Restaurant	0	0.08	0	0.02	0	0	0	0
Snack Place	0.0625	0.04	0.0588235	0	0.0810811	0.0769231	0	0
Pharmacy	0	0	0	0	0	0	0	0.0333333
Grocery Store	0.0625	0.04	0	0	0	0	0	0

	venue	rating
0	Supermarket	10.0
1	Gym	10.0
2	Metro Station	8.0
3	Bar	6.5
4	Breakfast Spot	6.5
5	Tram Station	8.0
6	Sushi Restaurant	8.0
7	Snack Place	7.0
8	Pharmacy	8.0
9	Grocery Store	10.0

# Total scores per neighborhood

venue	Supermarket	Gym	Metro Station	Bar	Breakfast Spot	Tram Station	Sushi Restaurant	Snack Place	Pharmacy	Grocery Store	Total score
Neighborhood											
<b>Molenbeek-Saint-Jean</b>	0.967742	0.645161	0.00	0.000000	0.000000	0.258065	0.000000	0.677419	0.258065	0.322581	3.129032
<b>Schaerbeek</b>	1.666667	0.000000	0.00	0.000000	0.000000	0.533333	0.000000	0.233333	0.266667	0.000000	2.700000
<b>Jette</b>	2.500000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	2.500000
<b>Auderghem</b>	0.400000	0.000000	0.00	0.260000	0.000000	0.320000	0.640000	0.280000	0.000000	0.400000	2.300000
<b>Anderlecht</b>	0.625000	0.000000	0.50	0.000000	0.000000	0.000000	0.000000	0.437500	0.000000	0.625000	2.187500
<b>Forest</b>	0.666667	0.000000	0.00	0.433333	0.000000	1.066667	0.000000	0.000000	0.000000	0.000000	2.166667
<b>Woluwe-Saint-Lambert</b>	1.111111	0.000000	0.00	0.000000	0.000000	0.000000	0.444444	0.000000	0.444444	0.000000	2.000000
<b>Berchem-Sainte-Agathe</b>	0.588235	0.588235	0.00	0.382353	0.000000	0.000000	0.000000	0.411765	0.000000	0.000000	1.970588
<b>Etterbeek</b>	0.540541	0.270270	0.00	0.527027	0.000000	0.000000	0.000000	0.567568	0.000000	0.000000	1.905405
<b>Ganshoren</b>	0.666667	0.000000	0.00	0.650000	0.000000	0.000000	0.000000	0.000000	0.266667	0.000000	1.583333
<b>Koekelberg</b>	0.000000	1.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.350000	0.000000	0.000000	1.350000
<b>Bruxelles-Ville*</b>	0.000000	0.000000	0.00	1.040000	0.130000	0.000000	0.160000	0.000000	0.000000	0.000000	1.330000
<b>Uccle</b>	0.666667	0.000000	0.00	0.288889	0.144444	0.177778	0.000000	0.000000	0.000000	0.000000	1.277778
<b>Saint-Josse-ten-Noode</b>	0.400000	0.000000	0.16	0.130000	0.000000	0.000000	0.000000	0.560000	0.000000	0.000000	1.250000
<b>Ixelles</b>	0.000000	0.000000	0.00	0.406250	0.135417	0.000000	0.166667	0.000000	0.000000	0.208333	0.916667
<b>Woluwe-Saint-Pierre</b>	0.256410	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.538462	0.000000	0.000000	0.794872
<b>Evere</b>	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.538462	0.000000	0.000000	0.538462
<b>Saint-Gilles</b>	0.000000	0.000000	0.00	0.390000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.390000
<b>Watermael-Boitsfort</b>	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

We can see that Molenbeek-Saint-Jean is the top scored neighborhood

# Clustering neighborhoods

- Alternatives for the neighborhood ranking
- Second layer for the analysis, in case the top ranking neighborhoods are not convenient

