

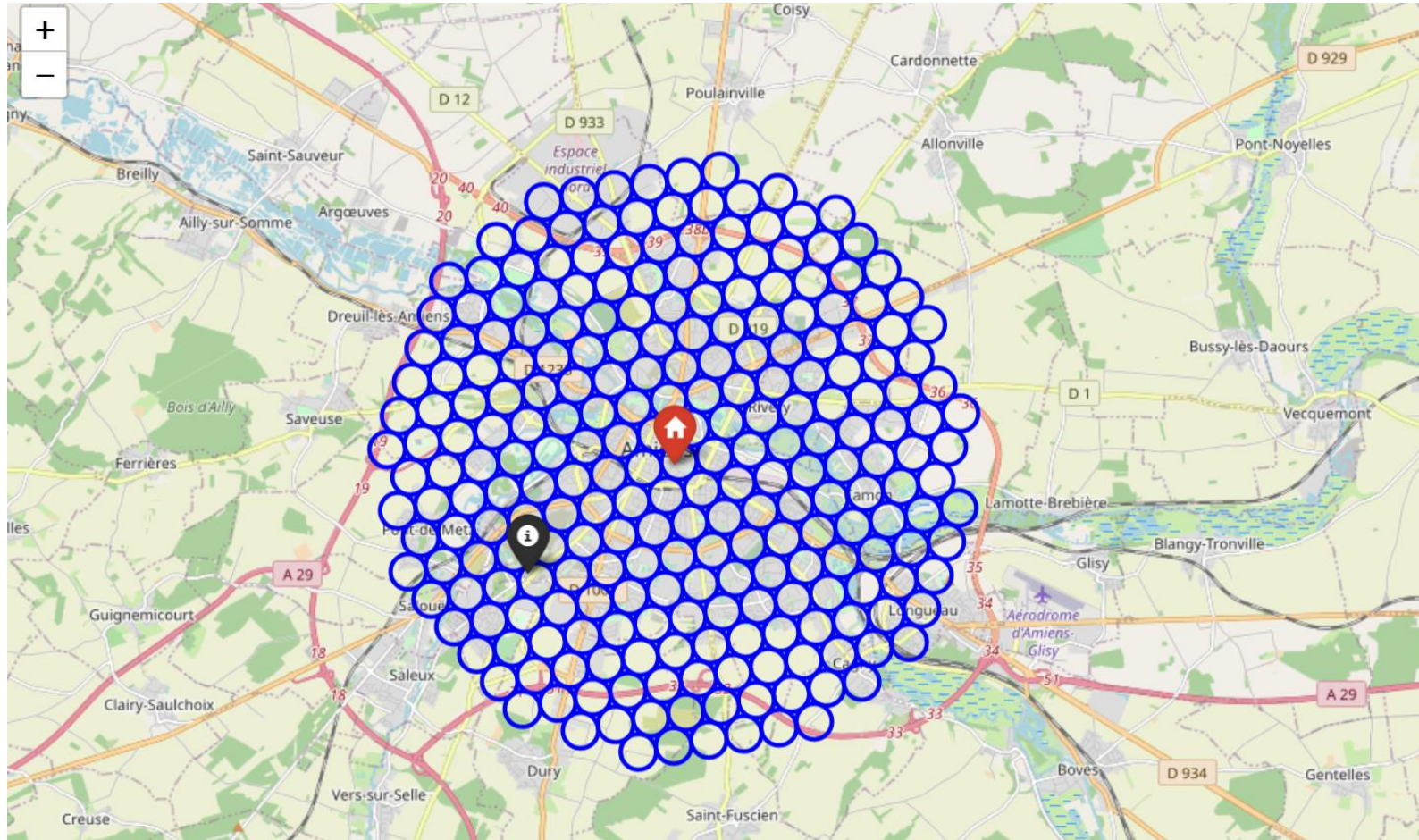
# Finding an optimal housing location for a student in Amiens

- ▶ Housing is one of the most important things to consider when you make a decision to study abroad.
- ▶ Studying in a European Youth Capital winner can be very appealing to students who are not sure about where they want to study.
- ▶ Amiens is Europe's Youth Capital of 2020.
- ▶ There are a lot of things a student should consider when searching for an optimal housing location. Factor that should be considered are:
  - ▶ Number of venues around each location
  - ▶ Distance to the University and City Center
- ▶ It is obvious that students would be very interested in an automated search engine that helps them decide where to stay in a city they want to study in.

# Data acquisition and cleaning

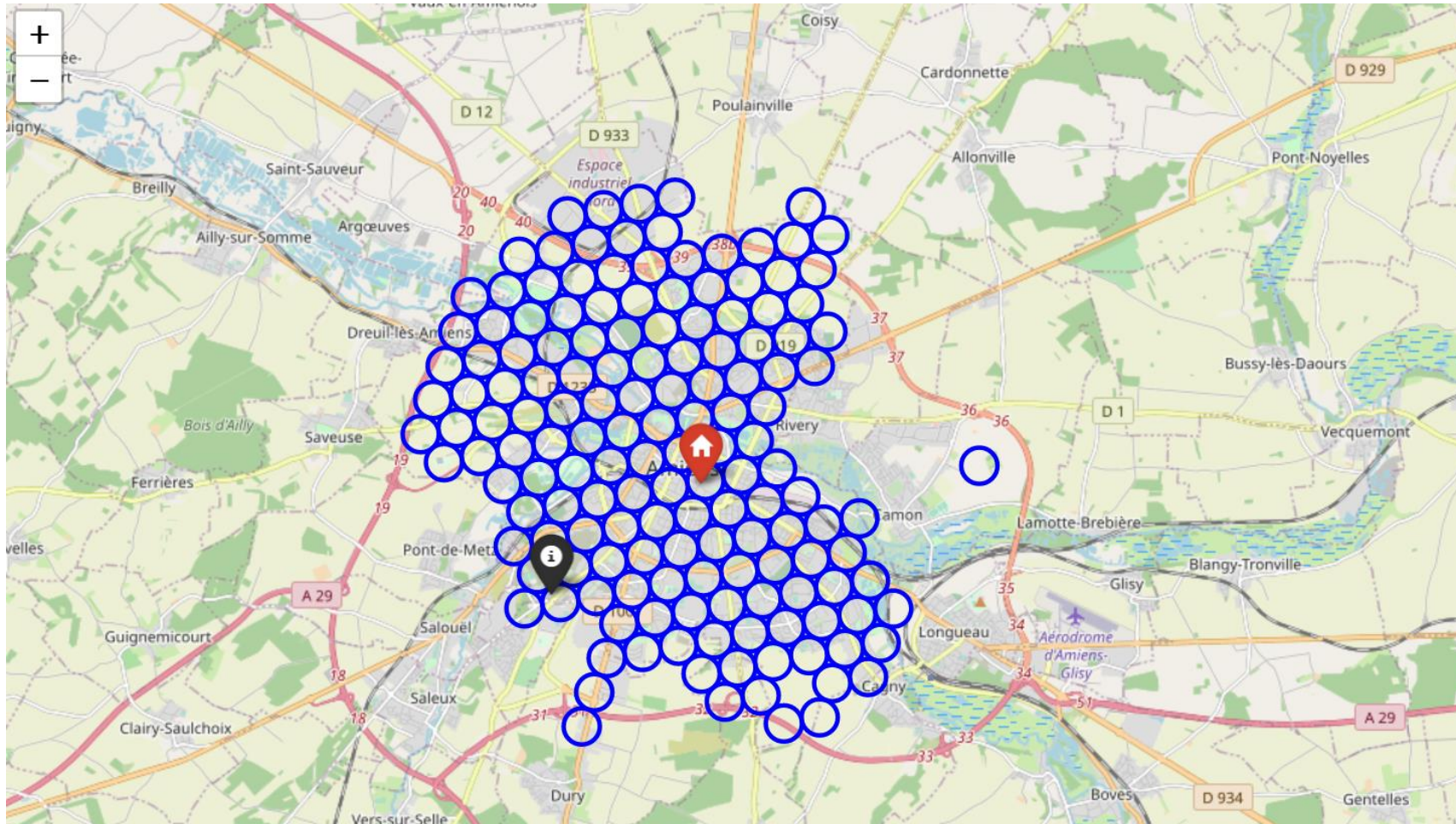
- ▶ Our main data requirements are the addresses of every neighborhood in Amiens and the coordinates of our two reference points (University Campus and City Centre).
- ▶ We are also going to need the venues that exist in each neighborhood.
- ▶ 2 APIs are used in order to get the data we need.
  - ▶ Google Geocoding API
  - ▶ Foursquare Places API
- ▶ 2261 Candidate neighborhoods were generated.
- ▶ Dropped any row that didn't fulfill each student's needs.

# Candidate neighborhoods around City Center





# Candidate neighborhoods left after removing Addresses without the word Amiens.



# Dataframe of candidate neighborhood addresses and distances

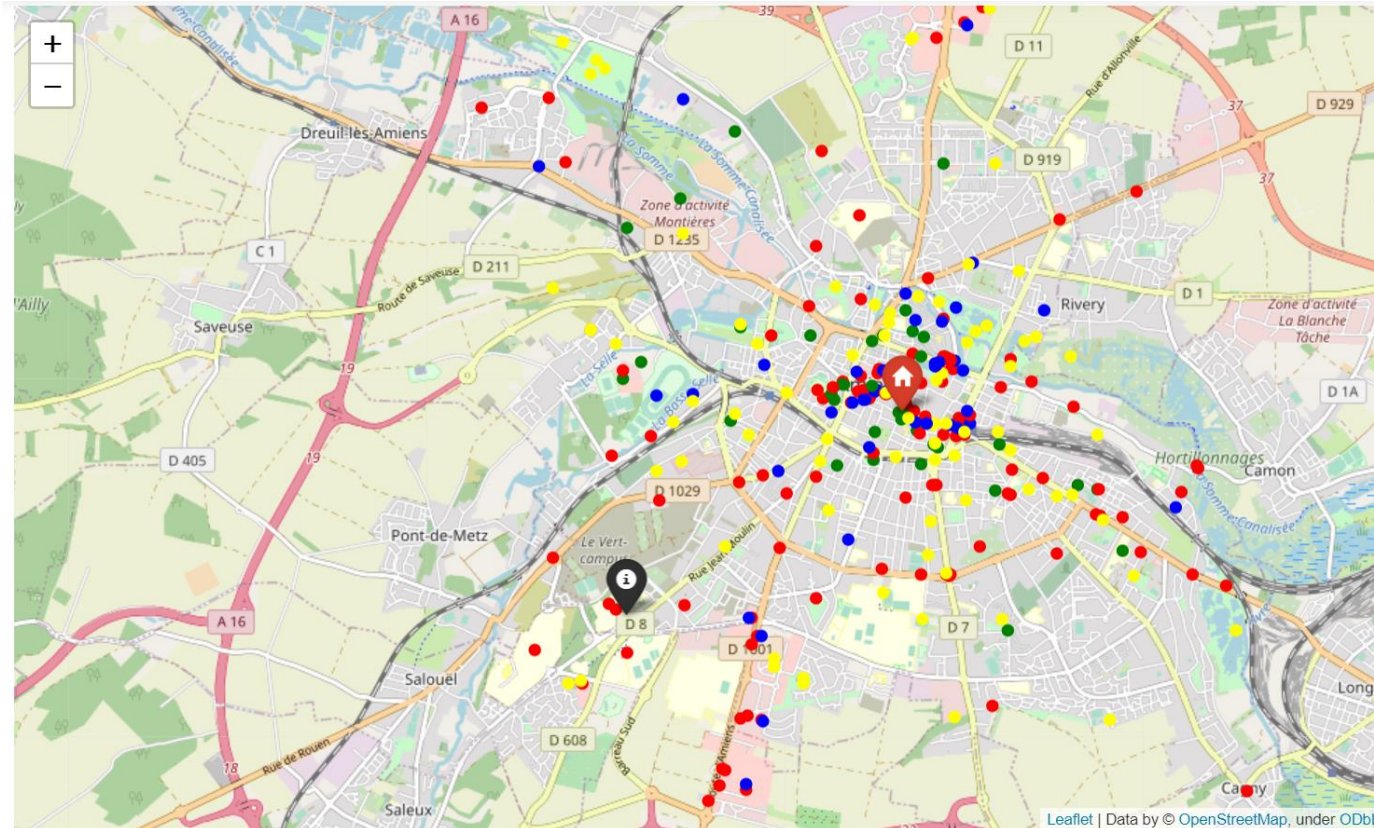
	Address	Latitude	Longitude	X	Y	Distance from center	Distance from University
0	A29, 80090 Amiens	49.856752	2.318649	-410227.17343	5.600288e+06	4215.447782	4429.634107
1	Rue Wasse, 80090 Amiens	49.857657	2.326792	-409627.17343	5.600288e+06	4355.456348	4909.000315
2	31A Route d'Amiens, 80480 Dury	49.856321	2.272649	-413527.17343	5.600808e+06	4471.017781	2286.465879
3	Le montjoie, Rue Saint-Fuscien, 80090 Amiens	49.859952	2.305220	-411127.17343	5.600808e+06	3642.801120	3407.994908
4	D7, 80680 Amiens	49.860858	2.313363	-410527.17343	5.600808e+06	3659.234893	3874.410286
5	40 Rue Wasse, 80090 Amiens	49.862669	2.329652	-409327.17343	5.600808e+06	3973.663297	4895.335188
6	9 Rue de Montréal, 80090 Amiens	49.863574	2.337797	-408727.17343	5.600808e+06	4250.882261	5433.316885
7	91 Route d'Amiens, 80480 Dury	49.861334	2.275503	-413227.17343	5.601328e+06	3874.274126	1814.923891
8	23 Clos des Châtaigniers, 80090 Amiens	49.864058	2.299933	-411427.17343	5.601328e+06	3157.530681	2843.207000
9	3 Allée du Montjoie, 80090 Amiens	49.864964	2.308077	-410827.17343	5.601328e+06	3119.294792	3334.734144



# Different categories of venues around the neighborhoods of Amiens.

Four main categories of venues were used:

- ▶ Arts & Entertainment
- ▶ Food
- ▶ Nightlife Spot
- ▶ Outdoors & Recreation

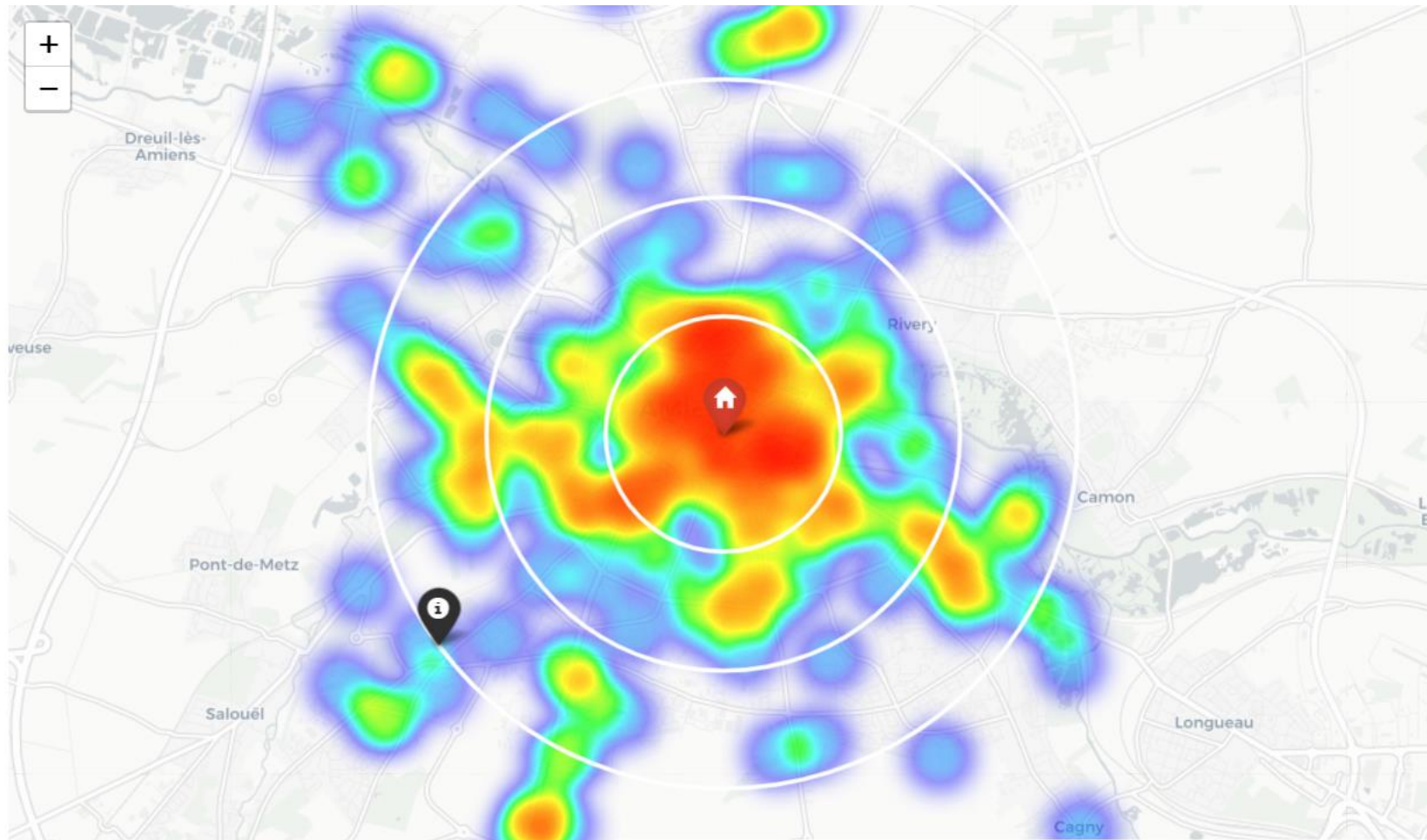


# Dataframe along with number of venues for each category.

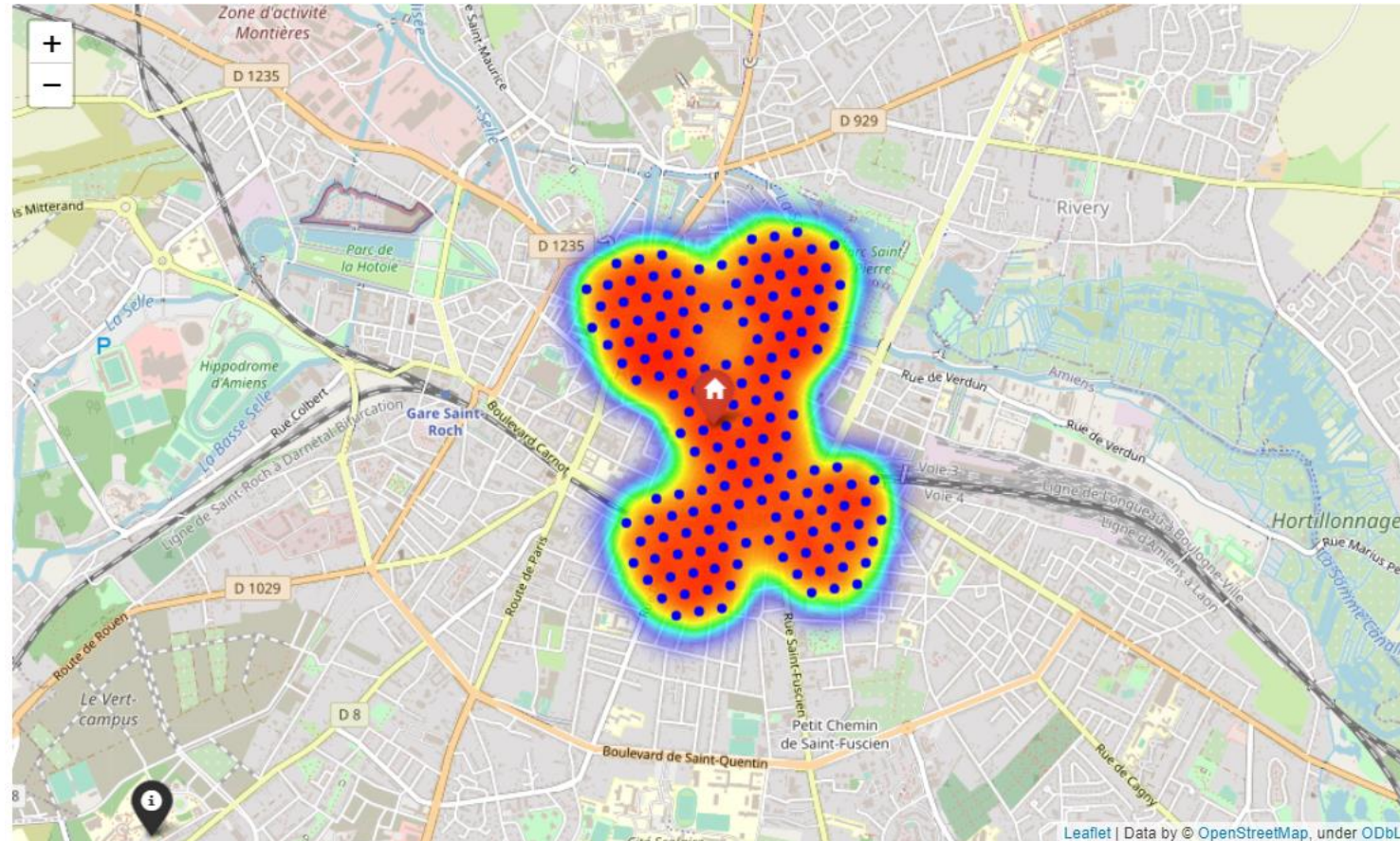
	Address	Latitude	Longitude	X	Y	Distance from center	Distance from University	Food Places in Area	Arts & Entertainment in Area	Nightlife Spots in Area	Outdoors & Recreation in Area
10	Espace mistral, 13 Rue de Redon, 80090 Amiens	49.865871	2.316222	-410227.17343	5.601328e+06	3195.309062	3857.081485	0	0	0	0
11	6 Rue Soufflot, 80090 Amiens	49.866776	2.324367	-409627.17343	5.601328e+06	3377.869151	4399.284414	0	0	0	1
12	722 Rue de Cagny, 80090 Amiens	49.867681	2.332512	-409027.17343	5.601328e+06	3651.027253	4954.828869	0	0	0	0
13	105 Marais de Cagny, 80090 Amiens	49.868586	2.340658	-408427.17343	5.601328e+06	3996.248241	5519.687935	0	0	0	0
14	116 Route d'Amiens, 80480 Dury	49.866347	2.278357	-412927.17343	5.601847e+06	3278.719262	1442.210543	4	0	1	0



Heatmap based on the amount of venues around each location.

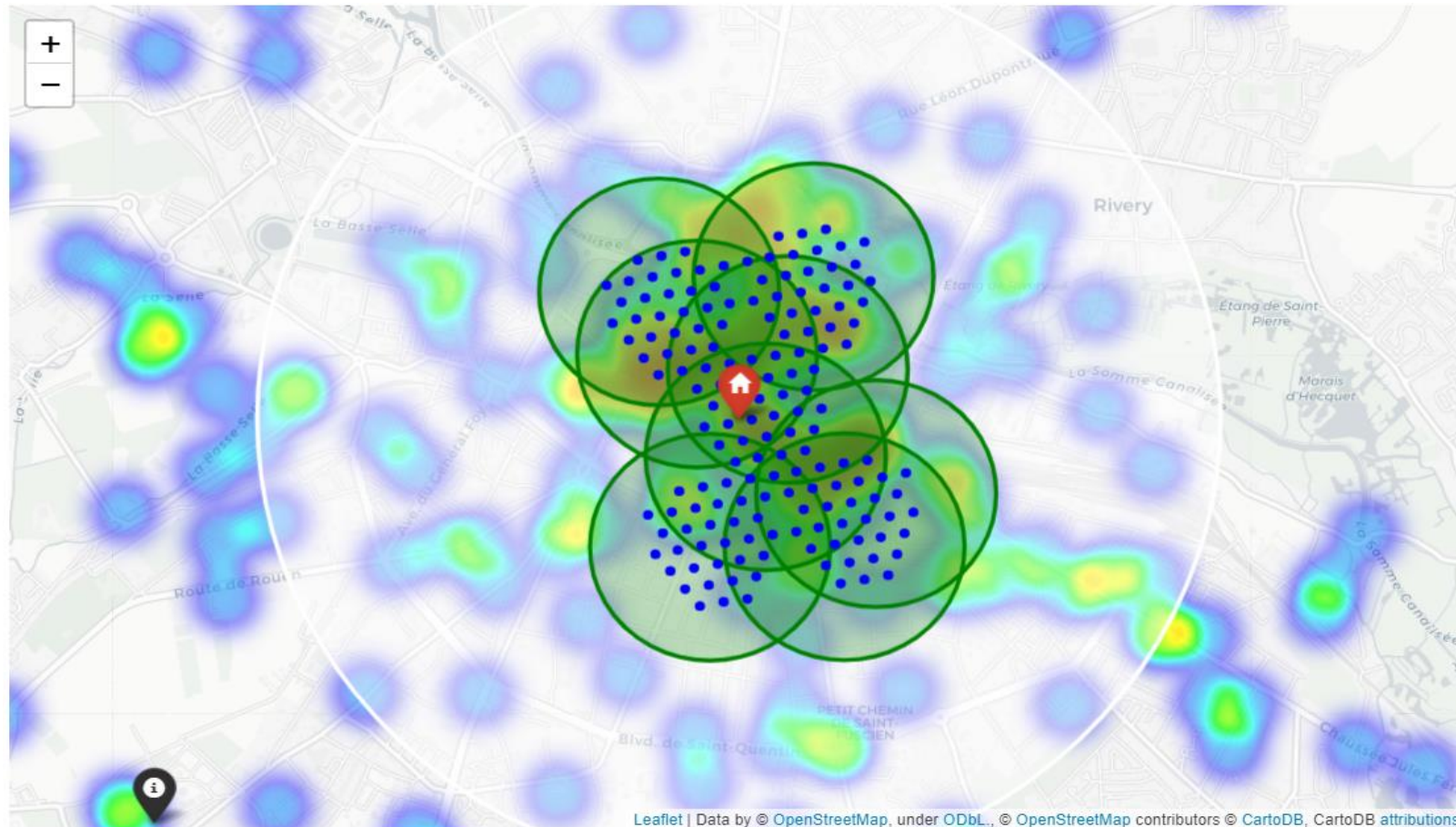


Areas with more than one of each venue  
nearby portrait with a heatmap.

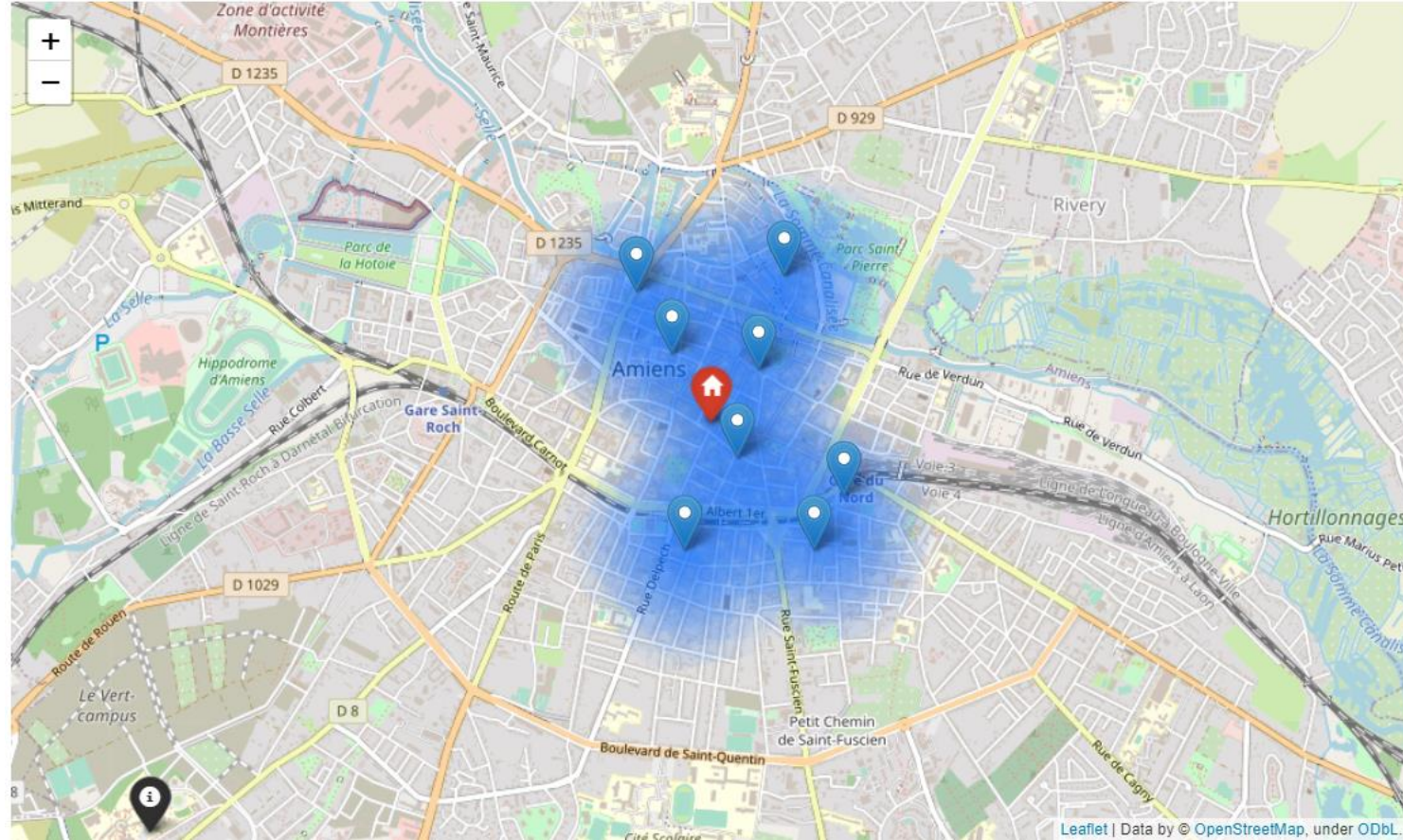




# Clusters around each neighborhoods portrait with a heatmap.



# Optimal housing locations from Model 1





We wanted to personalize the locations to each student's needs so we added:

- ▶ Weights for the importance of each category
- ▶ The option to choose any number of each category of venues nearby
- ▶ The option to choose max distance from any of our 2 reference points

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Selecting number of venues and distances according to personal needs

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Food:  3

Arts:  0

Nightlife:  2

Outdoors:  0

Uni Dist:  3000

Center Dist:  3500

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Selecting weights according to personal needs

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Food:  3.0

Arts:  0.5

Nightlife:  2.1

Outdoors:  0.3

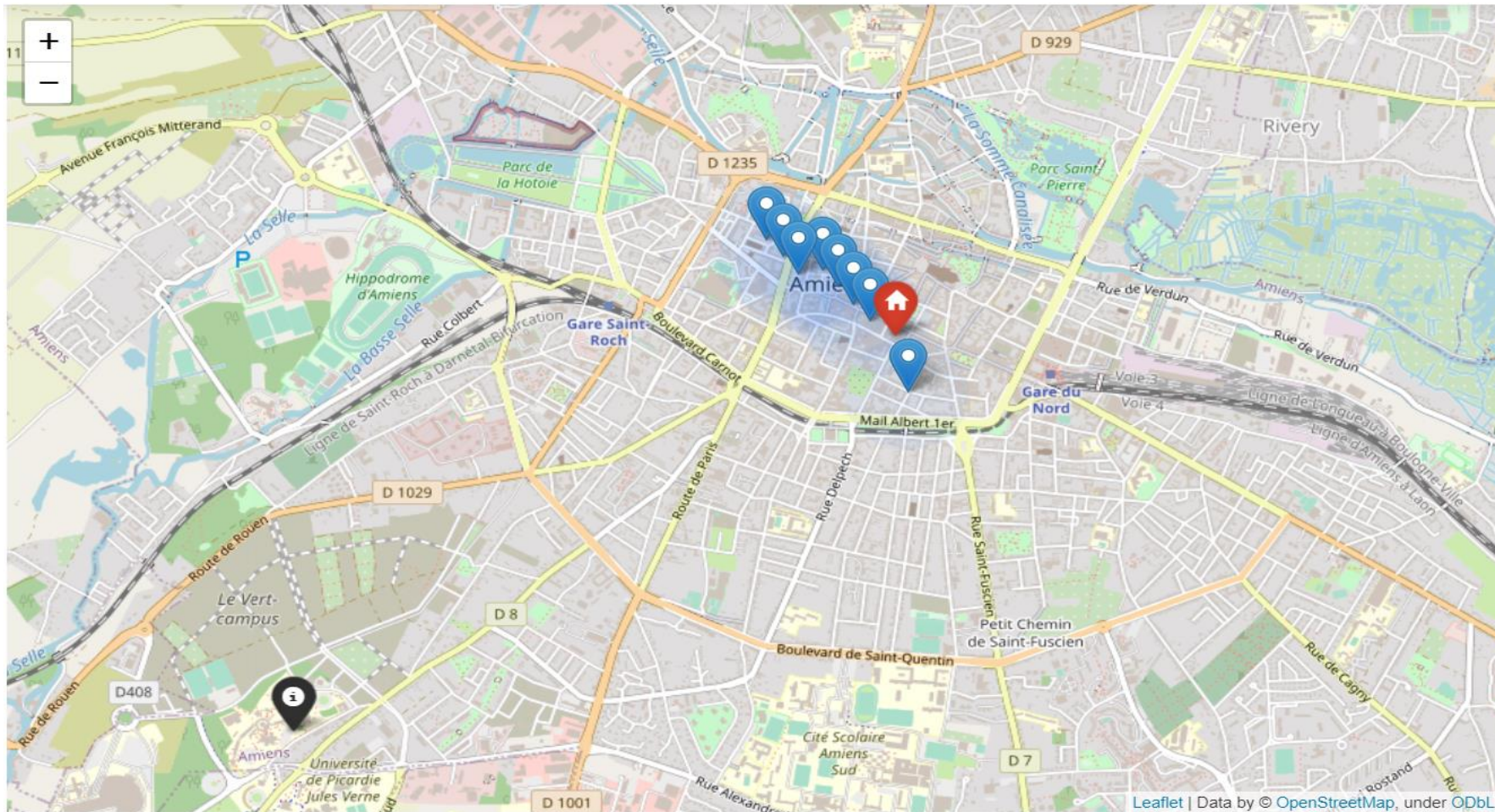
Uni Dist:  3.7

Center Dist:  1.0

# Dataframe sorted by weighted sums

	Latitude	Longitude	X	Y	Food Venues nearby	Arts venues nearby	Nightlife venues nearby	Outdoor & Recreation venues nearby	Distance to the University	Distance to the Center	Weighted Sums
0	49.895903	2.292136	-411377.17343	5.604949e+06	3	3	2	1	2941.526055	675.161612	11573.808017
1	49.894686	2.295258	-411177.17343	5.604775e+06	3	3	2	1	2998.531011	414.106084	11523.670826
2	49.895219	2.293018	-411327.17343	5.604862e+06	3	3	2	1	2927.256349	577.636153	11423.484644
3	49.894002	2.296140	-411127.17343	5.604689e+06	3	3	2	1	2992.898666	315.125644	11403.850708
4	49.893318	2.297022	-411077.17343	5.604602e+06	15	5	6	3	2990.601381	217.081770	11343.306881
5	49.894535	2.293900	-411277.17343	5.604775e+06	3	3	2	1	2916.347704	481.127684	11286.614189
6	49.892634	2.297904	-411027.17343	5.604516e+06	15	5	6	3	2991.646841	122.248999	11252.342311
7	49.889746	2.300073	-410927.17343	5.604169e+06	15	5	6	3	2935.790067	276.090764	11199.514013
8	49.891950	2.298785	-410977.17343	5.604429e+06	15	5	6	3	2996.031545	52.584605	11198.901323
9	49.893851	2.294782	-411227.17343	5.604689e+06	3	3	2	1	2908.837935	386.398980	11164.099338

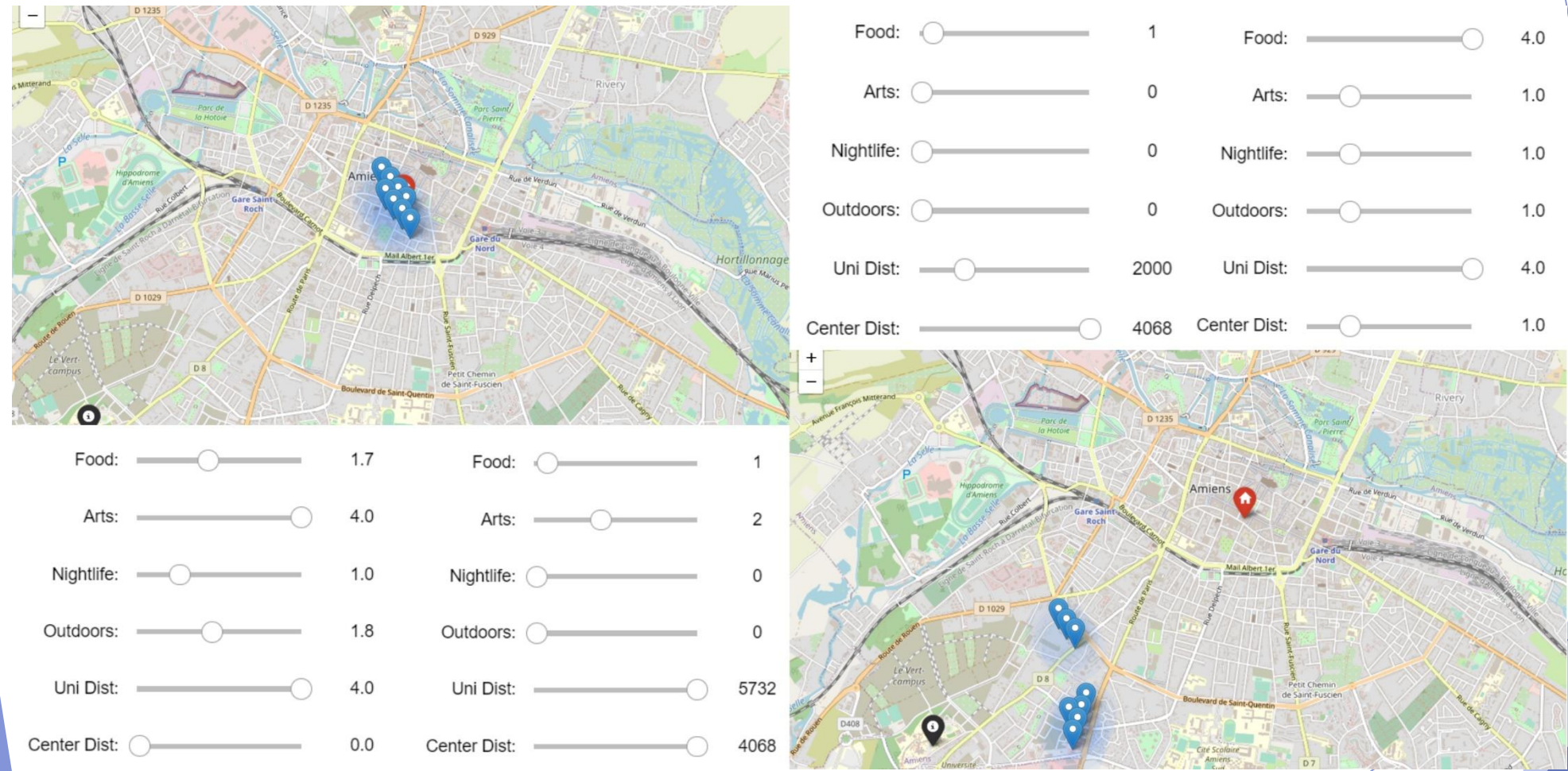
# Final optimal housing locations generated by the second model.





(Left Map Bottom Sliders): Results of second model while interested mainly in Art and Outdoor venues and not interested in distances.

(Right Map Top Sliders): Optimal Areas under 2km from the university interested mainly in food venues.





# Conclusion and future directions

- ▶ We were able to achieve interesting results with both clustering and normalized weight values.
- ▶ However, there is a huge variance in things that may fulfil a student's needs.
- ▶ For example, one of the biggest factor in our opinion that was not taken into account is the student's budget.
- ▶ We can deepen the models even more by taking into consideration each student's hobbies or activities.
- ▶ We can also use metadata using Google Forms so as to adapt very specific needs in our models.