

Ancient and rare books store relocation

Guillaume Borquet

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1 - Introduction

For this assignment, I have created an imaginary situation where the owner of a bookstore that sells ancient and rare books wants to relocate his store in a new city. To ensure his business is successful after relocation, he needs to find a place where potential customer base is at least as important as the one he currently has and is composed of the same type of customers. His current store is situated Paris city center, near the Louvres museum. He considers installing his new “Antique and rare books” store in 6 possible locations : Munich, Berlin, Oslo, Trondheim, Budapest, and Barcelona. We know that his customers are older, highly educated people, interested in culture and history and that they usually come and browse his shop after a visit at a nearby museum or cultural touristic venue. The business in his current book store in Paris is satisfying, so he should try to install his new book store in a place that is similar to the current location. His store is situated in a “cultural” area of Paris, with museums and other book stores.

To relocate him in a place that is beneficial to his business, we need to compare city centers and find which is the most similar to where he is at the moment. As his bookstore is in a cultural neighborhood in Paris and we know his customers are attracted by cultural sites, we need to find for him a city that offers the most cultural venues around the city center. It is also possible that not all cultural places are equal just from the raw number of cultural venues they offer, but that what category of cultural venue they offer, so we will cluster the cities according to what type of cultural venues they have, and see if one is similar to Paris, where the original bookshop is situated. I will use data science and machine learning to provide answers as to the best business location. The methods that will be developed will not only be useful to the “Antique and rare book” store owner, but to any business that might profit from being located in a “cultural” area.

2 - Data

I used Foursquare API to extract all venues in a 2km radius around each city center of the possible listed cities (Figure 2). Based on our study problem, the venues of interest are cultural places such as museums and other book store. Here we see all the categories of venues that have been fetched, we have to decide what are the one that are important for our book store location. We chose from our business knowledge the venues that will attract potential costumers for our bookshop.

	City	Lat	long
0	Munich, GERMANY	48.137108	11.575382
1	Barcelona, SPAIN	41.382894	2.177432
2	Budapest, HUNGARY	47.498382	19.040471
3	Berlin, GERMANY	52.517037	13.388860
4	Paris, FRANCE	48.856697	2.351462
5	Oslo, NORWAY	59.913330	10.738970
6	Trondheim, NORWAY	63.430566	10.395193

Figure 1: Cities chosen by the client and their coordinates

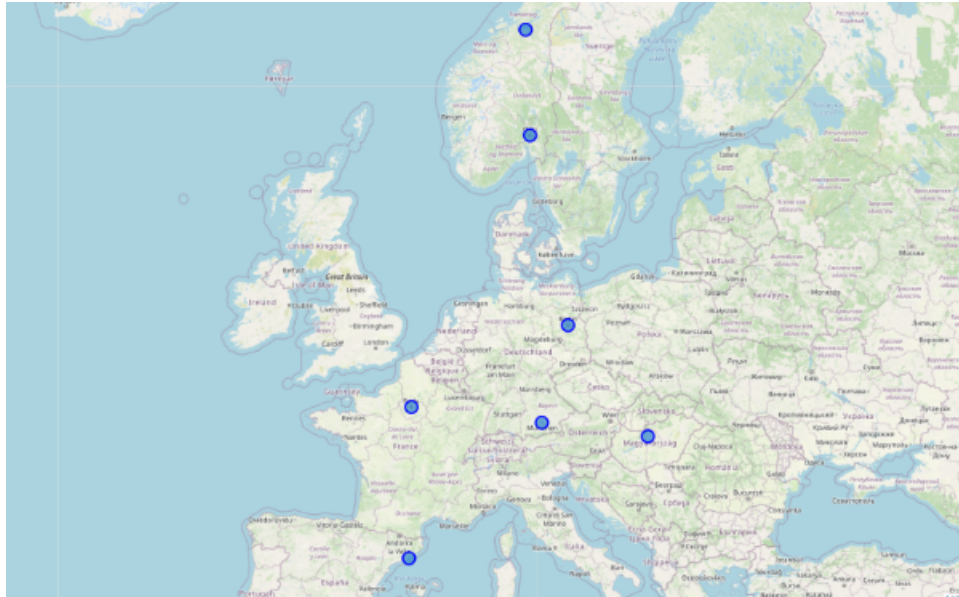


Figure 2: Map of the cities of choice where the new “Antique and rare books” store could be installed

3 - Methods

We want to select for the new bookshop the place that has the most cultural places in a 2km radius from the city center and that is the most similar to Paris. I have summarized the number of cultural venues and of bookstores in each cities, and calculated a proportion of bookstores per cultural venue per city. To measure similarity or dissimilarity between cities in terms of cultural venue category, I created clusters of similar cities using the K-means method. Because of the small number of cities in the data, I used $k=2$. to differentiate cities that are similar to Paris or not. I used Folium to map the cities and the clusters. All analysis was done in Jupyter Notebook using Python.

4 - Results

4.1 - Number of cultural venues and proportion of bookstores

We see that the city with the most cultural venues around its center is Berlin, followed by Budapest and Barcelona (Figure 3). Berlin, Paris and Oslo have 2 book stores in the radius, and Munich has one (Figure 3). We see that although Berlin has the highest number of Cultural Venues, it also has the highest proportion of bookstores in the area compared to total venues (Figure 3). Budapest has no bookstores, and is at the second place in the number of cultural venues. Paris is number four, after Barcelona, which has the same number of Cultural venues but no bookstores in the area (Figure 3).

	City	Cultural Venues	Bookstores	proportion	Cluster Labels
0	Berlin, GERMANY	17	2.0	8.5	0
1	Budapest, HUNGARY	11	0.0	0.0	1
2	Barcelona, SPAIN	9	0.0	0.0	0
3	Paris, FRANCE	9	2.0	4.5	1
4	Munich, GERMANY	7	1.0	7.0	1
5	Oslo, NORWAY	5	2.0	2.5	1
6	Trondheim, NORWAY	2	0.0	0.0	1

Figure 3: Cultural Environment of the cities. This table displays the number of cultural venues and bookstores per cities, the proportion of bookstores compared to cultural venues, and the clusters in which cities were assigned.

4.2 - Similarities between cities (Clustering)

Berlin and Barcelona are placed together in a separate cluster from the other cities (Figure 3 and Figure 4). It seems to be because they both have Monument/Landmark and Concert Halls and Opera House in the area of the potential book shop (Figure 5). The city with the most Cultural Venues that is the most similar to Paris is Budapest (Figure 3).

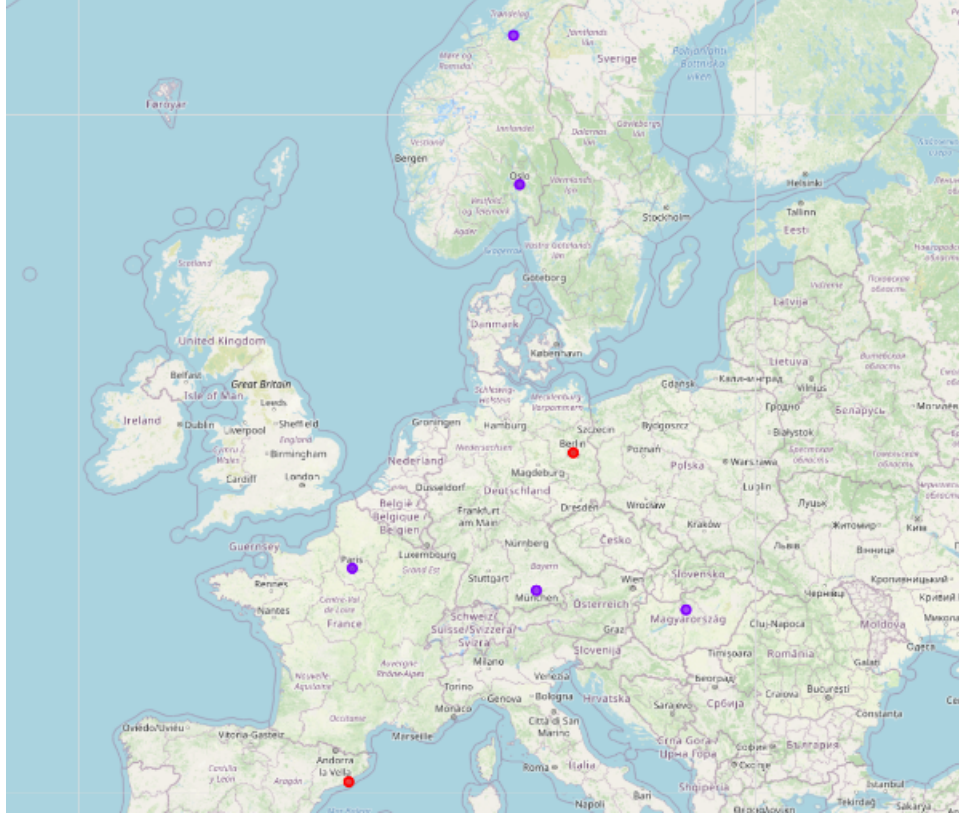


Figure 4: Map of the clustered cities. Berlin and Barcelona are part of a same cluster.

	City	Lat	Long	Cluster Labels	Art Gallery	Art Museum	Bookstore	Bridge	Castle	Church	Concert Hall	Fountain	Historic Site	History Museum	Monument / Landmark	Museum	Opera House	Outdoor Sculpture	Pedestrian Plaza	Plaza	Tea Room	Theater	Wine Bar	Wine Shop
0	Munich, GERMANY	48.137108	11.575382	1	0	1	1	0	0	1	0	1	0	0	0	0	2	0	0	1	0	0	0	0
1	Barcelona, SPAIN	41.382894	2.177432	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	4	0	0	1	0
2	Budapest, HUNGARY	47.498382	19.040471	1	0	1	0	0	1	0	0	0	2	0	0	0	0	1	0	2	1	0	2	1
3	Berlin, GERMANY	52.517037	13.388860	0	1	0	2	0	0	0	2	0	1	2	2	1	1	0	0	2	0	2	1	0
4	Paris, FRANCE	48.856697	2.351462	1	0	2	2	0	0	1	0	0	0	0	0	0	0	0	1	2	0	1	0	0
5	Oslo, NORWAY	59.913330	10.738970	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
6	Trondheim, NORWAY	63.430566	10.395193	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1

Figure 5: Similarities between cities. Berlin and Barcelona are more similar to each others than other cities. It seems to be due to their musical cultural venues:

5 - Discussion

We found out that there are 3 cities that have more cultural venues than Paris (where the current shop is) in the vicinity of the potential new book shop. They are Berlin, Budapest and Barcelona. Berlin has the most cultural venues in the area, but it also has the highest proportion of bookshop. We also found out that Berlin and Barcelona are clustered together separately from the other cities, because they both have Concert Hall and Opera House while the other cities don't. In this respect, the city with more cultural venues than Paris, that is the most similar to Paris in terms of the cultural venues category is Budapest. However, this result should be interpreted with caution because of the small sample size and the fact that I created only

two clusters. In addition to being similar to Paris in term of cultural venues category, Budapest have no bookshop in the area of the potential new bookshop. It could either be beneficial or negative, depending if the potential customers like to visit bookshops one after the other and browse, or if they come specifically to the bookshop to get a special book item. It is also possible that installing a bookstore in areas rich with music cultural venues like Berlin and Barcelona could be beneficial for the business instead of installing the new bookshop in the area that is the most similar to Paris. To assess the best area possible for the new book store, two question should be addressed in a new study : 1/ Are customers more likely to buy items in the bookshop when the browse different bookshops during the day, or when there is only one bookshop in the area, and 2/ Does the presence of music cultural venues such as Opera House and Concert Hall increase the flow of potential customers for “rare and antique” books.

6 - Conclusion

In conclusion, because our client specifically asked for the location that is the most similar to Paris in venue category but has more cultural venues around, we would recommend Budapest as a first choice, with the warning that further research on consumer habits and best neighbors venues category could be beneficial to potentially increase sales. Because Budapest is similar to Paris in term of cultural venues category and has no bookshops in the area, it appears to be a safe place to implement a new bookstore.