

Introduction

Scenario

A couple originally from France residing and working in a small Dutch city called Wageningen. However, at some point, they were thought to move back to their home city in France, Lyon. Wageningen is a relatively small city in comparison to Lyon. Most of the amenities such as library, hospital, markets, are located near to the city center. On the other hand, Lyon has a huge infrastructure and sometimes it is hard to find a good neighborhood that satisfies all needs of old age people. For example, this French couple is looking forward to having the following facilities in their nearby neighborhood

- Local library
- Health center
- Grocery store
- Social center
- Performing Arts Venue

In order to meet their requirement these couple is looking for a company that can assist in their relocation.

Business case

A fictitious company called RELOCATE ME facilitate retired people to relocate in their preferred city and in return company earn revenue. The company proposes the best relocation package considering the specific requirement such as social engagement, partial jobs, medical visits, etc., for retired people. Often, finding such recommendations are not easy and require a detailed analysis of the particular city and neighbourhood.

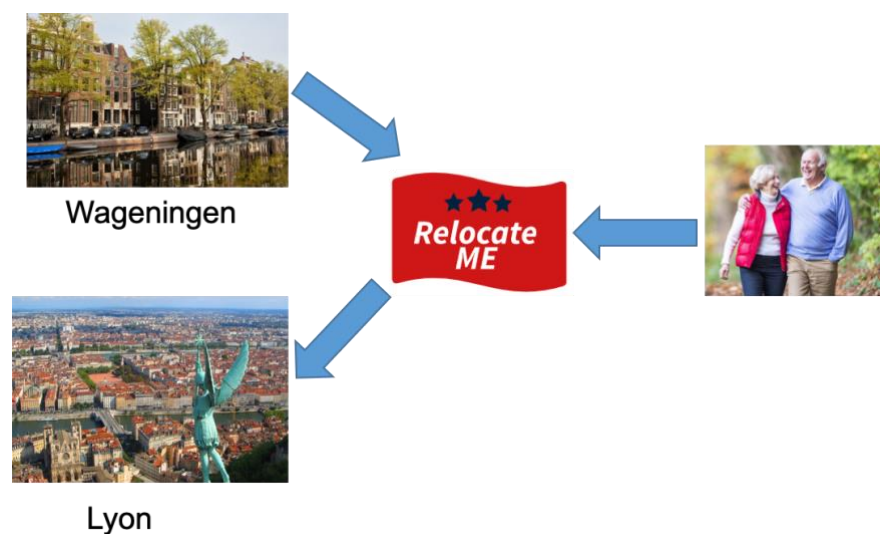


Figure 1: RELOCATE ME business case

Role of data science

RELOCATE ME uses the power of data science to explore cities, taking into account the various needs of retired or old age people. RELOCATE ME uses data from different public sources to find, the better the recommendations for their client.

Data used for problem solving

The following data sets are used to in this case study:

- Foursquare data to find and compare locations
- Public data set about the city of Lyon in France (Click [here](#))

Methodology

In order to facilitate their client, RELOCATE ME uses the exploratory analysis of the current and requested city of relocation. Moreover, it follows the following methodology to advise better location for elderly people.

- Find the specific requirements such as the Health center, Social center, etc. from the clients.
- Further, it analyzes their current city of living to understand available services and facilities.
- Based-on previous analysis, company start analyzing their requested city based-on their demand
- Further, the company perform categorical analysis from the Foursquare database
- The city divided into the different cluster and each cluster is analyzed taking into account different category.
- Finally, the company advises the best district considering the client's requirements.

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City Wageningen in Netherlands

Following analysis represents the visualization of Wageningen City focusing on following details

- Local library
- Health centre
- Grocery store
- Social centre
- Performing Arts Venue



	name	categories	lat	lng
0	Bblthk	Library	51.967630	5.665581
1	Medisch Centrum De Poort	Medical Center	51.968372	5.665033
2	Toko Indrani	Grocery Store	51.967019	5.663356
3	Egyptian Foodies	Grocery Store	51.965870	5.660700
4	ALDI	Supermarket	51.973753	5.673201
5	Verpleeghuis Rumah Kita, Zinzia Zorggroep	Medical Center	51.970776	5.657255
6	Vilente Costerweg	Hospital	51.967107	5.656565
7	M-Visio	Medical Center	51.967362	5.655505
8	Theater Junushoff	Theater	51.966883	5.661508
9	Fysiotherapie Ingrid Marcusse Wageningen	Physical Therapist	51.975620	5.659310
10	De Wilde Wereld	Theater	51.965150	5.664340
11	Kwadrant Mondzorg	Dentist's Office	51.967171	5.674291
12	MG Dance	Dance Studio	51.963706	5.657567
13	Tandartspraktijk Lawicksepoort	Dentist's Office	51.967575	5.655795
14	Centrum voor Mondzorg Wageningen	Dentist's Office	51.967670	5.655710
15	Bonoort Orthodontist	Dentist's Office	51.967688	5.654775
16	De Dierenarts	Veterinarian	51.972132	5.664228

Figure 2: Venues returned by Foursquare query

Comments:

Wageningen is a very small town, so far Foursquare query return only a few venues. Most of the venues are easily assessable by an elderly couple. In this way, the company understood the currently available facilities in the vicinity of the client.

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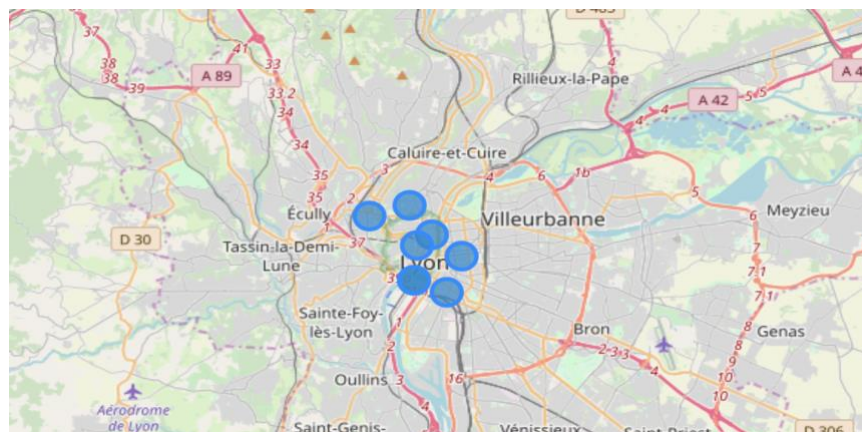
City Lyon in France

Lyon is relatively big city and has five district (Arrondissement). A Wikipedia page (<https://fr.wikipedia.org/wiki/Lyon>) provides succinct details about the different districts in Lyon.

	Arrondissement	quartier		Code Postal	Arrondissement
0	1er arrondissement	Les Terreaux, les pentes de la Croix-Rousse, q...	0	69001	1er arrondissement
1	3e arrondissement	Moncey, la Part-Dieu, la Vilette, Montchat, l...	1	69002	2e arrondissement
2	5e arrondissement	le Vieux Lyon (Saint-Jean, Saint-Paul, Saint-G...	2	69003	3e arrondissement
3	7e arrondissement	La Mouche, la Guillotière-Sud, Jean Macé, Gerl...	3	69004	4e arrondissement
4	9e arrondissement	Vaise, Industrie, Champvert-Nord, Gorge de Lou...	4	69005	5e arrondissement
5	2e arrondissement	Les Cordeliers, les Jacobins, la Presqu'île, A...	5	69006	6e arrondissement
6	4e arrondissement	La Croix-Rousse, Serin-Saint-Charles, le Clos ...	6	69007	7e arrondissement
7	6e arrondissement	Les Brotteaux, Bellecombe, la Tête d'or, Massé...	7	69008	8e arrondissement
8	8e arrondissement	Monplaisir, le Bachut, Mermoz, Les États-Unis,...	8	69009	9e arrondissement

Figure 3: Lyon city data preparation

Further, a set of data is obtained from a public website about Lyon (Click [here](#)) and a separate .csv file is prepared to find post code of each district. Based on, geographical coordinated the following map is obtained.



City Lyon analysis:

In order to find best district in the terms of requested category (Local library, Health center, Grocery store, Social center, Performing Arts Venue). Different districts are analysed as a cluster. However, Foursquare query returns following table as venues name and category. In next analysis we will find the best district considering all requested venues.

82 venues were returned by Foursquare.

	name	categories	lat	lng
0	Simply Market	Grocery Store	45.771040	4.850028
1	Marché Presqu'île	Grocery Store	45.766142	4.831958
2	Monoprix	Department Store	45.763414	4.851751
3	Monop'daily	Grocery Store	45.760523	4.859357
4	Super U	Grocery Store	45.760131	4.837677

Figure 4: Foursquare query

Figure 5, shows the frequency analysis of most visited venues. In this context, district 4 and 5 represents the best suitable frequency in the terms of requested facilities.

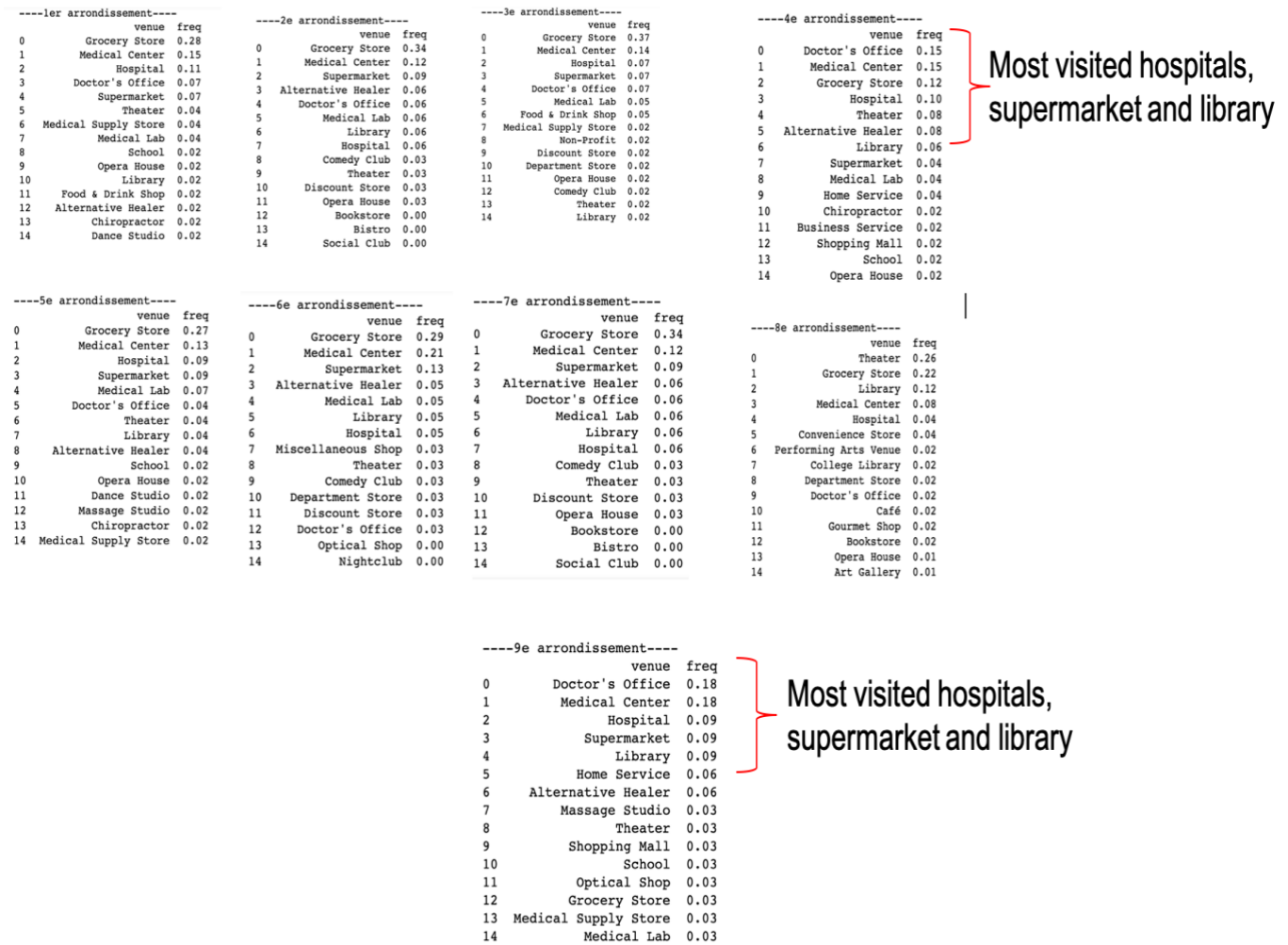


Figure 5: Frequency analysis of most visited sites

Clustering:

Considering the variability in data, total 7 cluster are assigned and top 10 most visited venues in the terms of primary client query is analyzed. The following table shows the top most visited sites.

	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	1er arrondissement	Grocery Store	Medical Center	Hospital	Doctor's Office	Supermarket	Medical Lab	Theater	Medical Supply Store	Opera House	Comedy Club
1	2e arrondissement	Grocery Store	Medical Center	Supermarket	Alternative Healer	Medical Lab	Hospital	Library	Doctor's Office	Opera House	Theater
2	3e arrondissement	Grocery Store	Medical Center	Doctor's Office	Supermarket	Hospital	Food & Drink Shop	Medical Lab	Discount Store	Department Store	Theater
3	4e arrondissement	Doctor's Office	Medical Center	Grocery Store	Hospital	Alternative Healer	Theater	Library	Medical Lab	Home Service	Supermarket
4	5e arrondissement	Grocery Store	Medical Center	Supermarket	Hospital	Medical Lab	Alternative Healer	Theater	Library	Doctor's Office	Chiropractor
5	6e arrondissement	Grocery Store	Medical Center	Supermarket	Alternative Healer	Medical Lab	Hospital	Library	Discount Store	Theater	Department Store
6	7e arrondissement	Grocery Store	Medical Center	Supermarket	Alternative Healer	Medical Lab	Hospital	Library	Doctor's Office	Opera House	Theater
7	8e arrondissement	Theater	Grocery Store	Library	Medical Center	Convenience Store	Hospital	Doctor's Office	Bookstore	Performing Arts Venue	Gourmet Shop
8	9e arrondissement	Medical Center	Doctor's Office	Supermarket	Hospital	Library	Home Service	Alternative Healer	Optical Shop	Medical Lab	Grocery Store

Clusters are explained below:

```
kclusters = 7

Lyon_district_grouped_clustering = Lyon_district_grouped.drop('Neighborhood', 1)
kmeans = KMeans(n_clusters=kclusters, random_state=1).fit(Lyon_district_grouped_clustering)
kmeans.labels_[0:10]
```

Cluster 0:

This cluster has grocery store as most visited sites flowed by medical and library.

	Borough	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	10th Most Common Venue
5	6e arrondissement	0	Grocery Store	Medical Center	Supermarket	Alternative Healer	Medical Lab	Hospital	Library	Discount Store	Theater	Department Store

Cluster 1:

This cluster has most visited medical center, doctor's office followed by supermarket, hospital and library.

	Borough	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	10th Most Common Venue
8	9e arrondissement	1	Medical Center	Doctor's Office	Supermarket	Hospital	Library	Home Service	Alternative Healer	Optical Shop	Medical Lab	Grocery Store

Cluster 2:

This cluster has most visited theater followed by grocery store and library.

	Borough	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	10th Most Common Venue
7	8e arrondissement	2	Theater	Grocery Store	Library	Medical Center	Convenience Store	Hospital	Doctor's Office	Bookstore	Performing Arts Venue	Gourmet Shop

Cluster 3:

This cluster has most visited grocery store followed by medical center and supermarket.

	Borough	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	10th Most Common Venue
1	2e arrondissement	3	Grocery Store	Medical Center	Supermarket	Alternative Healer	Medical Lab	Hospital	Library	Doctor's Office	Opera House	Theater
6	7e arrondissement	3	Grocery Store	Medical Center	Supermarket	Alternative Healer	Medical Lab	Hospital	Library	Doctor's Office	Opera House	Theater

Cluster 4:

This cluster has most visited grocery store followed by medical center and theater.

	Borough	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	10th Most Common Venue
0	1er arrondissement	4	Grocery Store	Medical Center	Hospital	Doctor's Office	Supermarket	Medical Lab	Theater	Medical Supply Store	Opera House	Comedy Club
4	5e arrondissement	4	Grocery Store	Medical Center	Supermarket	Hospital	Medical Lab	Alternative Healer	Theater	Library	Doctor's Office	Chiropractor

Cluster 5:

This cluster has most visited doctor's office followed by grocery store and hospital.

	Borough	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	10th Most Common Venue
3	4e arrondissement	5	Doctor's Office	Medical Center	Grocery Store	Hospital	Alternative Healer	Theater	Library	Medical Lab	Home Service	Supermarket

Cluster 6:

This cluster has most visited grocery store followed by medical center and doctor's office.

	Borough	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	10th Most Common Venue
2	3e arrondissement	6	Grocery Store	Medical Center	Doctor's Office	Supermarket	Hospital	Food & Drink Shop	Medical Lab	Discount Store	Department Store	Theater

Conclusion:

Based-on analysis of different cluster the company RELOCATE ME found that district 9e arrondissement and 4e arrondissement have most visited Health center, Grocery store, Library along with social center, Performing Arts Venue. These two options could be the best match for their clients. Moreover, it also meets the client's basic requirement, defined at the beginning of the problem.

Thanks for choosing us, happy to help

