

# Moving from West Bridgford (UK) to Zurich (Switzerland)

## Applied Data Science Capstone by IBM/Coursera

### 0. Table of Contents

1. [Introduction: Business Problem](#)
2. [Data](#)
3. [Methodology](#)
4. [Results and Discussion](#)
5. [Conclusion](#)
6. [References](#)

### 1. Introduction: Business Problem

#### 1.1. Background

West Bridgford is a town in the Rushcliffe borough of Nottinghamshire, England, immediately south of the city of Nottingham, from which it is divided by the River Trent.

We have lived in West Bridgford for 3 years. Our house was near the River Trent and Bridgford Park. There were several coffee shops, good restaurants, grocery markets and pharmacies nearby. House sale or rent prices were not as high as the city center of Nottingham, and it was possible to find everything that we need and want in the neighborhood.

Long story short, we loved the town that we lived in the UK, but one day we decided to move to Zurich for a work-related reason.

The canton of Zurich is a Swiss canton in the north-eastern part of the country. Zurich is the largest city in Switzerland and the capital of the canton of Zürich. In 2019 Zürich was ranked among the ten most livable cities in the world by Mercer [1]. But it is known that, it can also be listed in most expensive cities, among the house renting or buying prices, in the world.

#### 1.2. Business Problem

In this project, we decided to find a city in Zurich Canton to live in, which is similar to West Bridgford. Specifically, this report will be targeted to stakeholders who will move from one city to another and want to compare the advantages and disadvantages while deciding on the city to move in.

There are 3 main criteria while choosing the city to live in:

1. It needs to be close to the city center.
2. It needs to be similar to West Bridgford.
3. It needs to be affordable in terms of housing prices

To solve this business problem, we are going to merge the data of Zurich neighborhoods with West Bridgford. In order to find similar neighborhoods, we will use the k-means clustering algorithm and we will examine the cluster which also includes West Bridgford.

## 2. Data

Based on definition of our problem, factors that will influence our decision are:

- distance of neighborhood from city center
- renting prices
- similarities and dissimilarities when it's compared to West Bridgford in terms of venues

Following data sources will be needed to extract/generate the required information:

- latitudes and longitudes of the neighborhoods will be used to calculate the distance from the city center (max distance will be considered as 12 km from the city center). This data is obtained using **Zurich - postal codes** [2].
- average renting prices will be used to eliminate the places which have higher renting prices. This data is obtained using the **Real Estate Market** [3].
- venues in the neighborhoods will be used to cluster the neighborhoods according to their similarities/dissimilarities. This data is obtained using **Foursquare API** [4].

## 3. Methodology

In this project, we will direct our efforts on finding similar places to West Bridgford, which are also close to the city center of Zurich and have affordable renting prices.

Methodology section consists of two sub-sections:

### 1. Data Preparation

In the first step, we collected the data which includes the latitudes and longitudes of all the cities in Zurich Canton and also West Bridgford. Then, we eliminated the ones in Zurich Canton which have longer distance than 12 km to Zurich city center, since our area of interest was 12x12 km around Zurich city center. This way, our number of candidates have been decreased to 51 from 172.

Then, we collected the data which includes the average annual renting prices per m2 in all our 51 places. After collecting this data, we made some assumptions as we have decided to rent an apartment which is at least 80 m2 and which costs at most CHF 2,000 per month. Accordingly, we calculated the monthly average renting prices per a 80 m2 house in each place and eliminated the ones which cost more than CHF 2,000. This way, our number of candidates have been decreased to 37 from 51.

After creating a data frame with all the latitude and longitude values for these 37 places (total of 38 places including West Bridgford), we have collected the data of nearby venues using **Foursquare Api** [4]. We had 256 venues and 94 unique venue categories.

## 2. Clustering

After we had our data prepared, we used a clustering algorithm in order to divide our places into clusters. The aim was finding that one cluster which also includes West Bridgford. We can claim that all the other places in this cluster are similar to West Bridgford and all the places in other clusters are dissimilar to West Bridgford. In order to decide on similarity/dissimilarity, we looked at the venues in the candidate places. With finding our cluster, we decreased our candidate places to 16.

### 3.1. Data Preparation

In this section, we collected the data which includes the latitudes and longitudes of all the cities in Zurich Canton and also West Bridgford. Then, we eliminated the ones in Zurich Canton which have longer distance than 12 km to Zurich city center, since our area of interest is 12x12 km around Zurich city center. This way, our number of candidates have been decreased to 51 from 172.

#### 3.1.1. Latitudes and Longitudes

We downloaded our data to create a data frame which contains the latitude & longitudes of our candidate neighborhoods. First 5 rows from the data frame are listed in the following table.

	Place	Latitude	Longitude
0	Zürich	47.367	8.55
1	Regensdorf	47.434	8.469
2	Adliswil	47.31	8.525
3	Glattbrugg	47.431	8.563
4	Rümlang	47.45	8.53

Then, we added the distance values of all the places from Zurich city center. As it's shown in the table below, the distance values are between 0, which is Zurich itself, to 36.7 kilometers.

	Place	Latitude	Longitude	Distance
0	Zürich	47.367	8.550	0.000000
1	Zollikon	47.340	8.574	3.506956
2	Gockhausen	47.381	8.600	4.084388
3	Zollikerberg	47.345	8.601	4.563794
4	Kilchberg ZH	47.324	8.545	4.795543
...	...	...	...	...
167	Benken ZH	47.653	8.654	32.748569
168	Dachsen	47.665	8.618	33.525453
169	Uhwiesen	47.671	8.635	34.399956
170	Flurlingen	47.684	8.630	35.755601
171	Feuerthalen	47.691	8.644	36.711545

172 rows × 4 columns

Our area of interest is approximately 12x12 kilometers centered around Zurich city center. So, we selected only the places which are in our area of interest (radius of 12 km.). Last 5 rows of our sorted data frame (sorted by Distance in ascending order), which has 51 rows in total, is shown below.

	Place	Latitude	Longitude	Distance
46	Dällikon	47.440	8.440	11.610745
47	Oberhasli	47.466	8.499	11.660172
48	Tagelswangen	47.431	8.673	11.697900
49	Nürens Dorf	47.448	8.649	11.701752
50	Dietikon	47.402	8.400	11.976090

### 3.1.2. Average Rent Prices

In this section, we collected the data which includes the average annual renting prices per m<sup>2</sup> in all our 51 places. After collecting this data, we made some assumptions as we have decided to rent an apartment which is at least 80 m<sup>2</sup> and which costs at most CHF 2,000 per month. Accordingly, we calculated the monthly average renting prices per 80 m<sup>2</sup> and eliminated the ones which cost more than CHF 2,000. This way, our number of candidates have been decreased to 37 from 51.

It was difficult to find the average renting prices for all of our candidate places. So instead of reading them from just one website, we used more than one website to generate a csv file. We used this

csv file to calculate average monthly rent prices and eliminate the ones which are higher than CHF 2,000 for a minimum of 80 m<sup>2</sup> house.

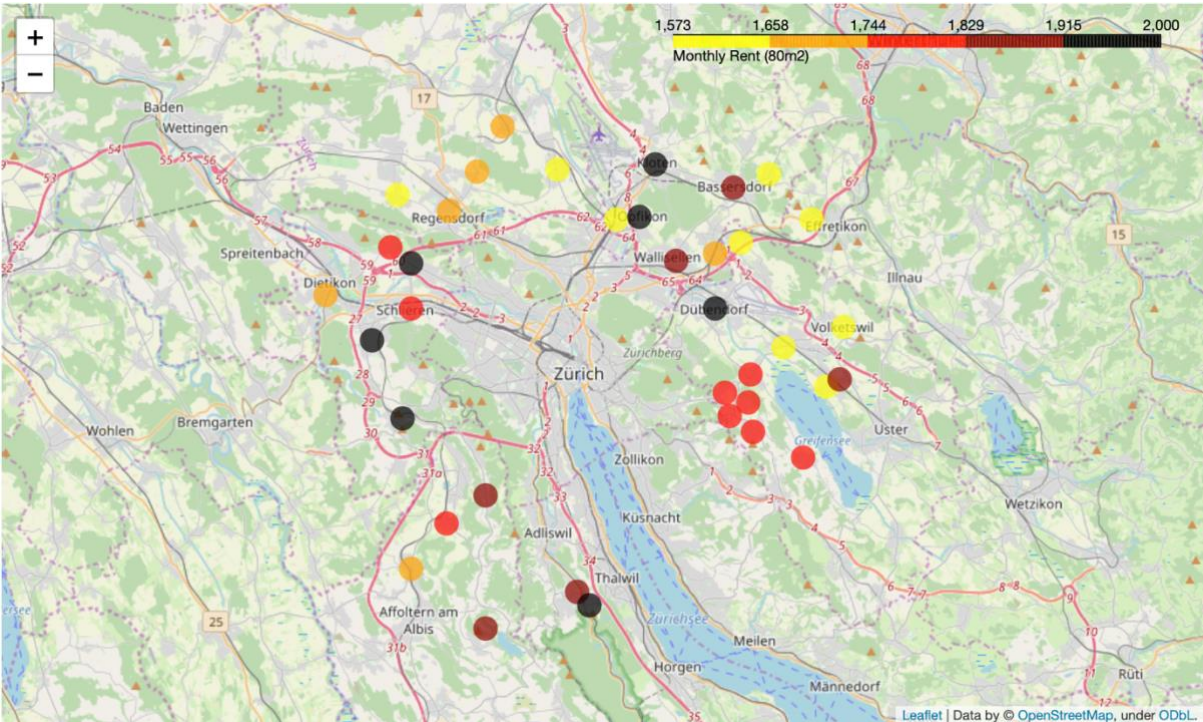
If we list the renting prices for an 80 m<sup>2</sup> house for all the candidate places and if we eliminate the ones which have a monthly rent higher than CHF 2,000, we obtain the following table (sorted by Monthly Rent in ascending order).

	Place	Rent/m <sup>2</sup>	Monthly Rent (80m <sup>2</sup> )
0	Glattbrugg	236.0	1573.333333
1	Tagelswangen	238.0	1586.666667
2	Dällikon	245.0	1633.333333
3	Volketswil	246.0	1640.000000
4	Nürensdorf	248.0	1653.333333
5	Greifensee	251.0	1673.333333
6	Brüttisellen	256.0	1706.666667
...	...	...	...
30	Urdorf	281.0	1873.333333
31	Unterengstringen	283.0	1886.666667
32	Opfikon	286.0	1906.666667
33	Kloten	287.0	1913.333333
34	Birmensdorf ZH	288.0	1920.000000
35	Dübendorf	293.0	1953.333333
36	Gattikon	300.0	2000.000000

We used these average rent values just to eliminate the non-affordable places to move in. Then, we selected the latitude and longitude values of these places and we showed these places in a Folium Map. All the places pinned in the following map are within 12 km distance to the Zurich city center and have the average renting price not higher than CHF 2,000 for a minimum of 80 m<sup>2</sup> house.



The colored rent map is illustrated below. The average monthly rent values for a minimum of 80 m2 house in our data frame are between CHF 1,573 to CHF 2,000. We divided our data into 5 tiles with different colors.



### 3.1.3. Nearby Venues

In this section, using the data frame with all the latitude and longitude values from the previous section, we have also added West Bridgford as a new place into our data frame, then we have collected the data of nearby venues using **Foursquare Api** [4].

We had 256 unique venues and 94 unique venue categories. Using this data, we created a new data frame which stores the number of venues in each venue category for every candidate place.

	Place	Place Latitude	Place Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regensdorf	47.43400	8.46900	Thai Playa	47.434900	8.471354	Thai Restaurant
1	Regensdorf	47.43400	8.46900	Mövenpick Hotel Zürich-Regensdorf	47.431334	8.467797	Hotel
2	Regensdorf	47.43400	8.46900	Fitnesspark Regensdorf	47.430683	8.469147	Gym / Fitness Center
3	Regensdorf	47.43400	8.46900	Coop	47.430948	8.467511	Supermarket
4	Regensdorf	47.43400	8.46900	Zentrum Regensdorf	47.431084	8.469701	Shopping Mall
...	...	...	...	...	...	...	...
283	West Bridgford	52.92979	-1.12537	The Fruit Basket	52.930582	-1.125506	Health Food Store
284	West Bridgford	52.92979	-1.12537	Vision Express Opticians - Nottingham - West B...	52.931550	-1.126504	Optical Shop
285	West Bridgford	52.92979	-1.12537	Cured	52.931648	-1.126285	Deli / Bodega
286	West Bridgford	52.92979	-1.12537	West End Restuarant & Cabaret	52.932263	-1.127252	Music Venue
287	West Bridgford	52.92979	-1.12537	PizzaExpress	52.932947	-1.128048	Pizza Place

288 rows × 7 columns

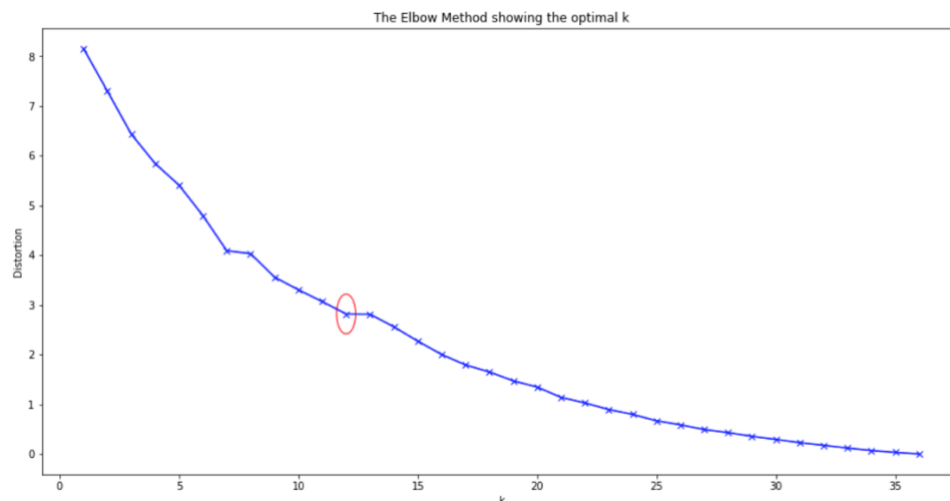
In order to display the top 10 venues in each place, we created a data frame as shown below.



	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
Place										
Aeugst am Albis	Mountain	Zoo Exhibit	Flower Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store	Drugstore	Electronics Store
Bassersdorf	Pizza Place	Shopping Mall	Convenience Store	Cosmetics Shop	Italian Restaurant	Swiss Restaurant	Supermarket	Cupcake Shop	Deli / Bodega	Department Store
Benglen	Bus Station	Grocery Store	Zoo Exhibit	Flower Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store	Drugstore
Binz	IT Services	Garden Center	Swiss Restaurant	Zoo Exhibit	Flower Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store
Birmensdorf ZH	Pizza Place	Swiss Restaurant	Diner	Bus Station	Bakery	Food & Drink Shop	Garden Center	Electronics Store	Cupcake Shop	Deli / Bodega
Bonstetten	Plaza	Restaurant	Bakery	Zoo Exhibit	Flower Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store
Brüttisellen	IT Services	Discount Store	Italian Restaurant	Swiss Restaurant	Bakery	Bus Station	Cosmetics Shop	Shopping Mall	Zoo Exhibit	Flower Shop
Dietikon	Supermarket	Swiss Restaurant	Fast Food Restaurant	Bus Stop	Drugstore	Playground	Bakery	Italian Restaurant	Steakhouse	Burrito Place
Dietikon	Bus Station	Hobby Shop	Sporting Goods Shop	Gas Station	Italian Restaurant	Food & Drink Shop	Fast Food Restaurant	Electronics Store	Men's Store	Bakery
...	...	...	...	...	...	...	...	...	...	...
Schlieren	Italian Restaurant	Supermarket	Hotel	Bus Stop	Café	Pizza Place	Restaurant	Tennis Stadium	Park	Train Station
Schwerzenbach	Train Station	Food & Drink Shop	Italian Restaurant	Food	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store	Drugstore
Stallikon	Italian Restaurant	Zoo Exhibit	Food	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store	Drugstore	Electronics Store
Tagelswangen	Construction & Landscaping	Gym	Auto Dealership	Automotive Shop	Shopping Mall	Flower Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner
Unterengstringen	Hobby Shop	Chinese Restaurant	Bus Stop	River	Fast Food Restaurant	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store
Urdorf	Grocery Store	Zoo Exhibit	Italian Restaurant	Swiss Restaurant	Post Office	Kebab Restaurant	Bus Stop	Fast Food Restaurant	Cupcake Shop	Deli / Bodega
Volketswil	Gym	Hotel	Swiss Restaurant	Zoo Exhibit	Flower Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store
Wallisellen	Supermarket	Shopping Mall	Train Station	Wine Bar	Pool	Platform	Bakery	Italian Restaurant	Zoo Exhibit	Diner
Weiningen ZH	Restaurant	Swiss Restaurant	Zoo Exhibit	Flower Shop	Cosmetics Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner	Discount Store
West Bridgford	Grocery Store	Coffee Shop	Italian Restaurant	Deli / Bodega	Pharmacy	Optical Shop	Park	Cocktail Bar	Pizza Place	Café

## 3.2. Clustering

In this section, we use K-Means Clustering on our data. We use the elbow method in order to find the correct k-value.



We picked  $k=12$  for our clustering algorithm and created 12 different clusters. We added the Cluster Labels into the data frame as shown below.

	Place	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Regensdorf	47.43400	8.46900	8.0	Restaurant	Supermarket	Shopping Mall	Asian Restaurant	Pizza Place
1	Glattbrugg	47.43100	8.56300	8.0	Italian Restaurant	Chinese Restaurant	Train Station	Supermarket	Hotel
2	Rümlang	47.45000	8.53000	3.0	Pizza Place	Train Station	Airport Terminal	American Restaurant	Convenience Store
3	Kloten	47.45200	8.58500	8.0	Hotel	Swiss Restaurant	Restaurant	Italian Restaurant	Bus Station
4	Bassersdorf	47.44300	8.62900	8.0	Pizza Place	Shopping Mall	Convenience Store	Cosmetics Shop	Italian Restaurant
5	Wallisellen	47.41500	8.59700	7.0	Supermarket	Shopping Mall	Train Station	Wine Bar	Pool
6	Dietlikon	47.41800	8.61900	8.0	Bus Station	Hobby Shop	Sporting Goods Shop	Gas Station	Italian Restaurant
...	...	...	...	...	...	...	...	...	...
28	Fällanden	47.37200	8.63900	8.0	Speakeasy	Market	Grocery Store	Café	Discount Store
29	Benglen	47.36100	8.63700	1.0	Bus Station	Grocery Store	Zoo Exhibit	Flower Shop	Cupcake Shop
30	Gattikon	47.28400	8.54800	8.0	Bakery	Swiss Restaurant	Supermarket	Flower Shop	Light Rail Station
31	Stallikon	47.32600	8.49000	2.0	Italian Restaurant	Zoo Exhibit	Food	Cupcake Shop	Deli / Bodega
32	Oberhasli	47.46600	8.49900	1.0	Flower Shop	Grocery Store	Bus Station	Swiss Restaurant	Zoo Exhibit
33	Birmensdorf ZH	47.35500	8.44300	8.0	Pizza Place	Swiss Restaurant	Diner	Bus Station	Bakery
34	Aeugst am Albis	47.27500	8.49000	5.0	Mountain	Zoo Exhibit	Flower Shop	Cupcake Shop	Deli / Bodega
35	West Bridgford	52.92979	-1.12537	8.0	Grocery Store	Coffee Shop	Italian Restaurant	Deli / Bodega	Pharmacy

## 4. Results and Discussion

In this section, we analyzed our outputs of the clustering algorithm. According to our clustering results, we see that our ex-house (West Bridgford) is in Cluster 8. Thus, we will first create a subset which includes the places in Cluster 8. We will see that there are 16 places which are in the same cluster with West Bridgford. These are the places that we will search for our new home, but we first want to order these places by using a recommender system. This way, we can know where to start with to search our new home.

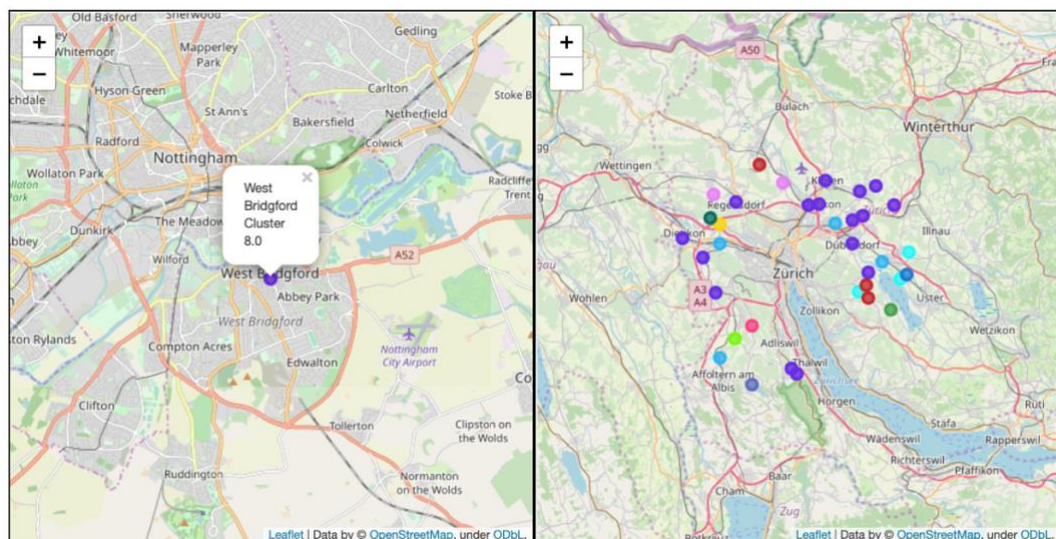
If we list all the places in Cluster 8, we obtain the following table.



	Place	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	Regensdorf	Restaurant	Supermarket	Shopping Mall	Asian Restaurant	Pizza Place	Sporting Goods Shop	Electronics Store	Hotel	Thai Restaurant	Train Station
1	Glattbrugg	Italian Restaurant	Chinese Restaurant	Train Station	Supermarket	Hotel	Mexican Restaurant	Café	Bus Stop	Kebab Restaurant	Japanese Restaurant
3	Kloten	Hotel	Swiss Restaurant	Restaurant	Italian Restaurant	Bus Station	Supermarket	Pizza Place	Asian Restaurant	Discount Store	Indian Restaurant
4	Bassersdorf	Pizza Place	Shopping Mall	Convenience Store	Cosmetics Shop	Italian Restaurant	Swiss Restaurant	Supermarket	Cupcake Shop	Deli / Bodega	Department Store
6	Dietlikon	Bus Station	Hobby Shop	Sporting Goods Shop	Gas Station	Italian Restaurant	Food & Drink Shop	Fast Food Restaurant	Electronics Store	Men's Store	Bakery
7	Dübendorf	Supermarket	Swiss Restaurant	Gym	Diner	Chinese Restaurant	Cable Car	Food	Italian Restaurant	Bar	Cupcake Shop
10	Urdorf	Grocery Store	Zoo Exhibit	Italian Restaurant	Swiss Restaurant	Post Office	Kebab Restaurant	Bus Stop	Fast Food Restaurant	Cupcake Shop	Deli / Bodega
12	Dietikon	Supermarket	Swiss Restaurant	Fast Food Restaurant	Bus Stop	Drugstore	Playground	Bakery	Italian Restaurant	Steakhouse	Burrito Place
18	Langnau am Albis	Swiss Restaurant	Tennis Stadium	Flower Shop	Bakery	Indian Restaurant	Supermarket	Light Rail Station	Office	Train Station	Gas Station
19	Opfikon	Swiss Restaurant	Grocery Store	Pool	Bus Station	Zoo Exhibit	Fast Food Restaurant	Cupcake Shop	Deli / Bodega	Department Store	Diner
20	Brüttisellen	IT Services	Discount Store	Italian Restaurant	Swiss Restaurant	Bakery	Bus Station	Cosmetics Shop	Shopping Mall	Zoo Exhibit	Flower Shop
21	Nürensdorf	Swiss Restaurant	BBQ Joint	Bakery	Brewery	Soccer Field	Zoo Exhibit	Food	Deli / Bodega	Department Store	Diner
22	Tagelswangen	Construction & Landscaping	Gym	Auto Dealership	Automotive Shop	Shopping Mall	Flower Shop	Cupcake Shop	Deli / Bodega	Department Store	Diner
28	Fällanden	Speakeasy	Market	Grocery Store	Café	Discount Store	Food & Drink Shop	Supermarket	Kebab Restaurant	Bus Station	Deli / Bodega
30	Gattikon	Bakery	Swiss Restaurant	Supermarket	Flower Shop	Light Rail Station	Food	Cupcake Shop	Deli / Bodega	Department Store	Diner
33	Birmensdorf ZH	Pizza Place	Swiss Restaurant	Diner	Bus Station	Bakery	Food & Drink Shop	Garden Center	Electronics Store	Cupcake Shop	Deli / Bodega
35	West Bridgford	Grocery Store	Coffee Shop	Italian Restaurant	Deli / Bodega	Pharmacy	Optical Shop	Park	Cocktail Bar	Pizza Place	Café

## 4.1. Data Visualization

In this section, we visualize our clusters with a folium map as shown below. The map on the left shows the UK map, as zoomed in to West Bridgford, and the one on the right shows the Switzerland map, as zoomed in to Zurich. As it's seen from the map on the left-hand side, West Bridgford is in Cluster 8, which is denoted with purple point marker on the map. All the purple points on the right-hand side map are also in Cluster 8. All different colors on the map represent different clusters.



## 4.2. Recommender System

In this section, we used a content-based filtering method to generate a recommendation list. We first displayed the venues in West Bridgford. Then, we manually gave ratings to the venues that we knew in our old neighborhood. We calculated the average rating for each venue category in West Bridgford. Finally, using these ratings, we generated a recommendation list of similar places in Zurich Canton.

We first retrieved the venues and venue categories of West Bridgford, then we gave ratings manually for all venues in West Bridgford as shown below. We gave 'NaN' value for the unknown venues.

	Venue	Venue Category	Rating		Venue	Venue Category	Rating
0	Yumacha	Asian Restaurant	9.0	14	Caffè Nero	Coffee Shop	10.0
1	M&S Foodhall	Grocery Store	9.0	15	Test Match	Pub	NaN
2	Escabeche	Tapas Restaurant	9.0	16	Carluccio's	Italian Restaurant	NaN
3	Côte Brasserie	French Restaurant	7.0	17	The Parlour	Cocktail Bar	10.0
4	Copper	Wine Bar	NaN	18	Iceland	Grocery Store	0.0
5	Taste	Breakfast Spot	5.0	19	Co-op Food	Grocery Store	10.0
6	Portello Lounge	Lounge	NaN	20	Costa Coffee	Coffee Shop	10.0
7	Philos	Café	NaN	21	Costa Coffee	Coffee Shop	10.0
8	Gusto	Italian Restaurant	9.0	22	The Fruit Basket	Health Food Store	8.0
9	Tiffin	Tea Room	7.0	23	Vision Express Opticians	Optical Shop	8.0
10	Bridgford Park	Park	10.0	24	Cured	Deli / Bodega	NaN
11	Boots	Pharmacy	10.0	25	West End Restuarant & Cabaret	Music Venue	NaN
12	George's Tradition	Fast Food Restaurant	8.0	26	PizzaExpress	Pizza Place	10.0
13	No. 8 Delicatessen	Deli / Bodega	8.0				

Then, we calculated the average rating value for each Venue Category as shown below.

	Venue Category	Rating
0	Asian Restaurant	9.000000
1	Breakfast Spot	5.000000
2	Café	NaN
3	Cocktail Bar	10.000000
4	Coffee Shop	10.000000
5	Deli / Bodega	8.000000
6	Fast Food Restaurant	8.000000
7	French Restaurant	7.000000
8	Grocery Store	6.333333
9	Health Food Store	8.000000
10	Italian Restaurant	9.000000
11	Lounge	NaN
12	Music Venue	NaN
13	Optical Shop	8.000000
14	Park	10.000000
15	Pharmacy	10.000000
16	Pizza Place	10.000000
17	Pub	NaN
18	Tapas Restaurant	9.000000
19	Tea Room	7.000000
20	Wine Bar	NaN

According to these rating values, we generated a recommendation list calculating the weighted averages from the venue categories in all candidate places. Top 10 recommendations list is shown below.

	Place	Rating
0	Bassersdorf	0.020206
1	Urdorf	0.020161
2	Dietikon	0.013400
3	Kloten	0.012807
4	Dietlikon	0.012407
5	Birmensdorf ZH	0.012407
6	Regensdorf	0.010103
7	Opfikon	0.009429
8	Glattbrugg	0.009136
9	Brüttisellen	0.008375

## 5. Conclusion

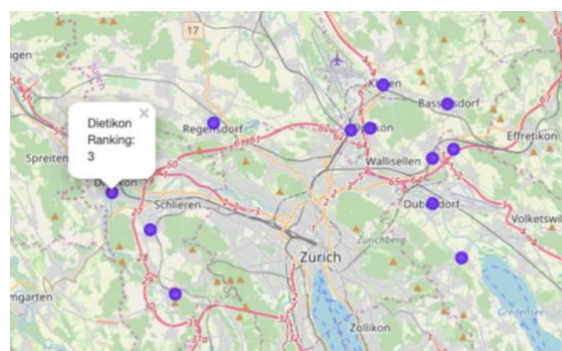
We started this project to find our new home. We have lived in West Bridgford, Nottingham, UK for 3 years and we loved to live there. When we decided to move to Zurich for work-related reasons, we decided to analyze all neighborhoods to find the most similar ones to West Bridgford.

When we started our journey from UK to Switzerland, we knew that Zurich is an expensive city. So, our first step was learning the rent prices in all Canton Zurich. We wanted to rent a relatively cheap apartment than an average apartment in the city center, but we also wanted to live as close as possible to the city center. And, last but not least, we wanted to find a similar neighborhood to West Bridgford.

In this project, we used 3 different datasets: average house renting prices, latitude and longitudes of places and finally the venues in the places. We first used average house renting prices and latitude-longitudes of places to eliminate some of our candidates. At the beginning, we had 172 places in Canton Zurich. But we decreased this number to 51 by eliminating the ones which have longer distance than 12 km to Zurich city center, since our area of interest was 12x12 km around Zurich city center. Then, we decreased this number to 37 by eliminating the ones which costs more than CHF 2,000 per month, since this was the maximum amount of rent that we could pay. Finally, using the latitude-longitude values, we collected the data of nearby venues using **Foursquare Api** [4].

We used a clustering algorithm in order to find one cluster which have the similar places with West Bridgford. In order to decide on similarity/dissimilarity, we looked at the venues in the places. With finding our cluster, we decreased our candidate places to 16. This number was showing that we still need to search houses from 16 different neighborhoods. So, we decided to find a place to start with and use a content-based filtering algorithm in order to rank our candidates. In this manner, we first gave ratings to the venues that we know and like or dislike in West Bridgford. Then, we used these ratings to create a recommendation list.

At the end, we had an ordered list, so we started to search our new home. After viewing some apartments from the places in our list, we found our new apartment in Dietikon, which was the 3<sup>rd</sup> place in our recommendation list. This is a nice neighborhood near a stunning river, it is not as expensive as the city center, but it is only 17 minutes away from the city center by train.



## 6. References

- [1] [Mercer](#)
- [2] [Zurich - postal codes](#)
- [3] [Real Estate Market](#)
- [4] [Foursquare API](#)



## Appendices

