Coursera Capstone Project

"Zurich best Neighbourhood for Datalinks"

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1.Introduction

1.1 Background

Zürich is the largest city in Switzerland and the capital of the canton of Zürich. It is located in north-central Switzerland at the north-western tip of Lake Zürich.

Zürich is a hub for railways, roads, and air traffic. Both Zurich Airport and railway station are the largest and busiest in the country.

Zürich is among the world's largest financial centres: the city is home to many financial institutions and banking companies. Many of Switzerland's research and development centres are concentrated in the Greater Zürich area and the low tax rates and canton funding subsidies attract overseas companies to set up their headquarters or finance treasury services in the city.

1.2 Problem

Datalinks a company specialising in data analytics wants to set up a branch in Zurich as it wants to target financial institutions as potential clients.

The company has decided that in order to choose one of Zurich's neighbourhood to open its branch a series of criteria must be met. Specifically, the neighbourhood must have a:

- Bus or Tram station as it makes it easier for the workforce to commute.
- Restaurant, Italian Restaurants would be ideal as the Managing Director of Datalinks is very fond of Italian cuisine as he always have his lunch at a restaurant and likes to discuss deals in front of a good carbonara.
- Park as the company encourages employees to have a daily walk at lunch break to unwind and relieve stress.
- Pizza place as it is tradition to have "pizza Fridays".

1.3 Target Audience

Datalinks has appointed me to recommend the best location based on the afore-mentioned criteria. The target audience is the senior management of the company as they will use this information to then look at available properties and decide which one to rent.

2. Data acquisition and cleaning

2.1 Data sources

The city of Zurich will be analysed in this project. Zurich is divided in 12 Kreis (Districts) which are further subdivided into 20 Neighbourhoods. The data regarding Zurich's neighbourhoods was taken from Wikipedia at this link. This data provides the name of the neighbourhood and which district the neighbourhood belongs to (Figure 1).

CoA ⬍	Name ⬍	Merger ⬍	District ⬍
	Affoltern	1934	11
	Albisrieden	1934	9
	Altstadt	1893	1
	Altstetten	1934	9
	Aussersihl	1893	4 and 5
	Enge	1893	2

Figure 1

In order to have the longitude and latitude for each neighbourhood an API call to the OpenStreetMap database was used.

The data to identify if the neighbourhoods meet the contractor's criteria will be taken from Foursquare. Specifically, an API call containing the coordinate of the various neighbourhood was used to identify what type of venues are within a radius of 600 meters from the neighbourhood (Figure 2).

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue
3	Altstetten	Bakery	Supermarket
18	Witikon	Bus Station	Indian Restaurant
0	Affoltern	Bus Station	Supermarket
15	Unterstrass	Café	Bakery

Figure 2

2.2 Data cleaning

The data scraped from Wikipedia was enriched with the latitude and longitude data coming from the OpenStreetMap database. The resulting table was checked to verify that the geocoordinate were correct. All the neighbourhood coordinates were correct except for the neighbourhood of Altstadt as it was pointing to the quarter of Altstadt in the city of Winterthur (Figure 3).

	Neighbourhood	District	Coordinates	Latitude	Longitude
0	Affoltern	11	(Affoltern, Kreis 11, Zürich, Bezirk Zürich, Z...	47.418762	8.507186
1	Albisrieden	9	(Albisrieden, Kreis 9, Zürich, Bezirk Zürich, ...	47.374857	8.484657
2	Altstadt	1	(Altstadt, Stadt, Winterthur, Bezirk Winterthu...	47.498731	8.726387
3	Altstetten	9	(Altstetten, Kreis 9, Zürich, Bezirk Zürich, Z...	47.387403	8.486061
4	Aussersihl	4 and 5	(H+ Hotel Zürich, 537, Badenerstrasse, Hard, A...	47.382450	8.500603
5	Enge	2	(Enge, Kreis 2, Zürich, Bezirk Zürich, Zürich,...	47.361789	8.528708

Figure 3

This error was rectified by manually inputting the right coordinate found at this link.(Figure 4)

	Neighbourhood	District	Coordinates	Latitude	Longitude
0	Affoltern	11	(Affoltern, Kreis 11, Zürich, Bezirk Zürich, Z...	47.418762	8.507186
1	Albisrieden	9	(Albisrieden, Kreis 9, Zürich, Bezirk Zürich, ...	47.374857	8.484657
2	Altstadt	1	(Altstadt, Stadt, Winterthur, Bezirk Winterthu...	47.366665	8.542498
3	Altstetten	9	(Altstetten, Kreis 9, Zürich, Bezirk Zürich, Z...	47.387403	8.486061
4	Aussersihl	4 and 5	(H+ Hotel Zürich, 537, Badenerstrasse, Hard, A...	47.382450	8.500603
5	Enge	2	(Enge, Kreis 2, Zürich, Bezirk Zürich, Zürich,...	47.361789	8.528708

Figure 4

3. Methodology

3.1 Exploratory Data Analysis

After cleaning and preparing the data the neighbourhood of Zurich were represented on a map to have a visual representation of the city (Figure 5).
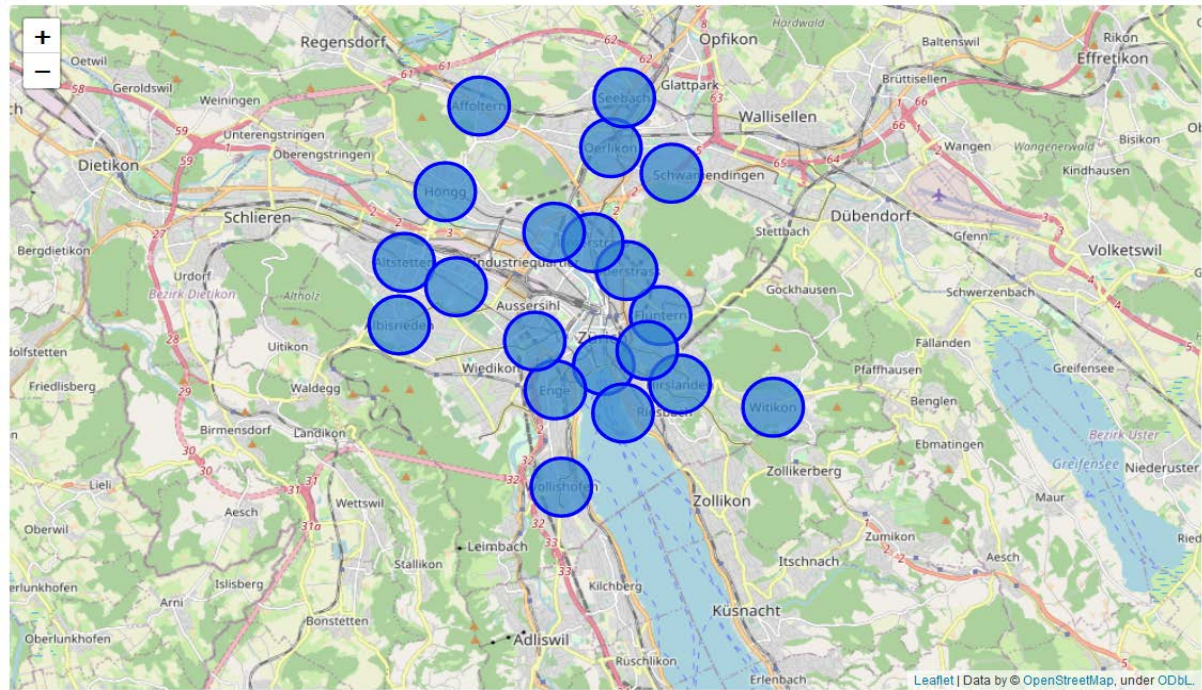

Figure 5

After that the Foursquare data was used to identify which types of venues were present in each of the neighbourhoods (Table 1).

	District	Neighbourhood	Latitude	Longitude	VenueName	id	VenueLatitude	VenueLongitude	VenueCategory
0	11	Affoltern	47.418762	8.507186	Migros	4e6e77251fc76d07a427bda9	47.420404	8.508402	Supermarket
1	11	Affoltern	47.418762	8.507186	Bahnhof Zürich Affoltern	4b555525f964a520cfe127e3	47.420950	8.507619	Train Station
2	11	Affoltern	47.418762	8.507186	Coop	4f4286f3e4b0c80f85da2192	47.419237	8.505753	Supermarket
3	11	Affoltern	47.418762	8.507186	Pizzeria Piazza	4d1c7ea03412594179cccb17	47.419276	8.505978	Italian Restaurant
4	11	Affoltern	47.418762	8.507186	Einkaufszentrum Affoltern	4b50adabf964a520042d27e3	47.419593	8.507790	Department Store

Table 1

To have a better idea of which venues had a high presence in the neighbourhoods a table with the 10 most common venues was generated (Table 2). This table helped provide information regarding the fact that the required venues were present in a high number in most of the neighbourhoods.

Neighbourhood	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
Schwamendingen	Bus Station	Arts & Crafts Store	Asian Restaurant	Automotive Shop	Tram Station	Trail	Swiss Restaurant	Electronics Store	Food & Drink Shop	Food
Witikon	Bus Station	Discount Store	Supermarket	Grocery Store	Church	Bakery	Optical Shop	Indian Restaurant	Tram Station	Department Store
Albisrieden	Bus Station	Grocery Store	Restaurant	Scenic Lookout	Trattoria/Osteria	Tram Station	Supermarket	Swiss Restaurant	Falafel Restaurant	Event Space
Affoltern	Bus Station	Miscellaneous Shop	Supermarket	Hotel	Diner	Light Rail Station	Gym / Fitness Center	Gym	Train Station	Italian Restaurant
Unterstrass	Café	Bus Station	Bakery	Hotel	Middle Eastern Restaurant	Italian Restaurant	Pizza Place	Gourmet Shop	Paella Restaurant	Doner Restaurant
Riesbach	Café	Italian Restaurant	Movie Theater	Hotel	Restaurant	Park	Bakery	Salad Place	Supermarket	Art Museum
Wiedikon	Café	Italian Restaurant	Swiss Restaurant	Bakery	Bar	Sushi Restaurant	Thai Restaurant	Pizza Place	Movie Theater	Japanese Restaurant
Hottingen	Coffee Shop	Swiss Restaurant	Italian Restaurant	Hotel	Plaza	Supermarket	History Museum	Grocery Store	Dessert Shop	Cafeteria
Enge	Hotel	Italian Restaurant	Park	Swiss Restaurant	Bar	Supermarket	Plaza	Tram Station	Japanese Restaurant	Chinese Restaurant
Oberstrass	Hotel	Italian Restaurant	Tram Station	Supermarket	Bakery	Swiss Restaurant	College Academic Building	Diner	Mountain	Restaurant
Wipkingen	Italian Restaurant	Art Museum	Grocery Store	Pizza Place	Park	Business Service	Pool	Plaza	Korean Restaurant	Breakfast Spot
Aussersihl	Italian Restaurant	Restaurant	Hotel	Plaza	Gym	Pizza Place	Supermarket	Soccer Stadium	Park	Shopping Mall
Altstetten	Supermarket	Bakery	Hotel	Middle Eastern Restaurant	Italian Restaurant	Platform	French Restaurant	Plaza	Burger Joint	Bus Station
Oerlikon	Supermarket	Hotel	Restaurant	Italian Restaurant	Indian Restaurant	Coffee Shop	Tram Station	Chinese Restaurant	Pub	Kebab Restaurant
Wollishofen	Supermarket	Tram Station	Pool	Restaurant	Swiss Restaurant	Cheese Shop	Bus Station	Music Venue	Mediterranean Restaurant	Irish Pub
Altstadt	Swiss Restaurant	Café	Hotel	Plaza	French Restaurant	Dessert Shop	Bar	Lounge	Italian Restaurant	Coffee Shop
Hirslanden	Swiss Restaurant	Park	Hotel	Tram Station	Plaza	Bus Station	Modern European Restaurant	French Restaurant	Botanical Garden	Steakhouse
Fluntern	Tram Station	Bakery	Swiss Restaurant	Grocery Store	Café	Cafeteria	Bus Station	Coffee Shop	Gym Pool	Gastropub
Höngg	Tram Station	Grocery Store	Pizza Place	Gas Station	Sporting Goods Shop	Steakhouse	Supermarket	Plaza	Mexican Restaurant	Beach
Seebach	Tram Station	Hookah Bar	Pizza Place	Pool	Plaza	Korean Restaurant	Supermarket	Restaurant	Grocery Store	Bakery

Table 2

A more in depth analysis of neighbourhoods to understand which one met the requirements specified by the client: 'Tram Station', 'Bus Station', 'Italian Restaurant', 'Park' and 'Pizza place' was carried out first using a table representing the frequencies of this venues in the neighbourhood (Table3).

Neighbourhood	Tram Station	Bus Station	Italian Restaurant	Park	Pizza Place
Affoltern	0.000000	0.235294	0.058824	0.000000	0.000000
Albisrieden	0.111111	0.222222	0.000000	0.000000	0.000000
Altstadt	0.000000	0.000000	0.030000	0.000000	0.000000
Altstetten	0.031250	0.031250	0.031250	0.000000	0.000000
Aussersihl	0.020833	0.020833	0.145833	0.020833	0.041667
Enge	0.033898	0.000000	0.067797	0.067797	0.000000
Fluntern	0.160000	0.080000	0.000000	0.000000	0.000000
Hirslanden	0.095238	0.047619	0.047619	0.095238	0.000000
Hottingen	0.043478	0.000000	0.086957	0.000000	0.000000
Höngg	0.150000	0.000000	0.050000	0.000000	0.100000

Oberstrass	0.083333	0.000000	0.125000	0.041667	0.000000
Oerlikon	0.031250	0.015625	0.046875	0.015625	0.015625
Riesbach	0.022727	0.000000	0.090909	0.068182	0.000000
Schwamendingen	0.142857	0.142857	0.000000	0.000000	0.000000
Seebach	0.166667	0.000000	0.000000	0.000000	0.111111
Unterstrass	0.030303	0.121212	0.060606	0.030303	0.030303
Wiedikon	0.000000	0.000000	0.079365	0.015873	0.031746
Wipkingen	0.033333	0.000000	0.100000	0.033333	0.066667
Witikon	0.090909	0.181818	0.000000	0.000000	0.000000
Wollishofen	0.133333	0.066667	0.000000	0.000000	0.000000

Table 3

However, this format was found to be not visually impactful enough so a violin plot was used to better display the results (Figure6).
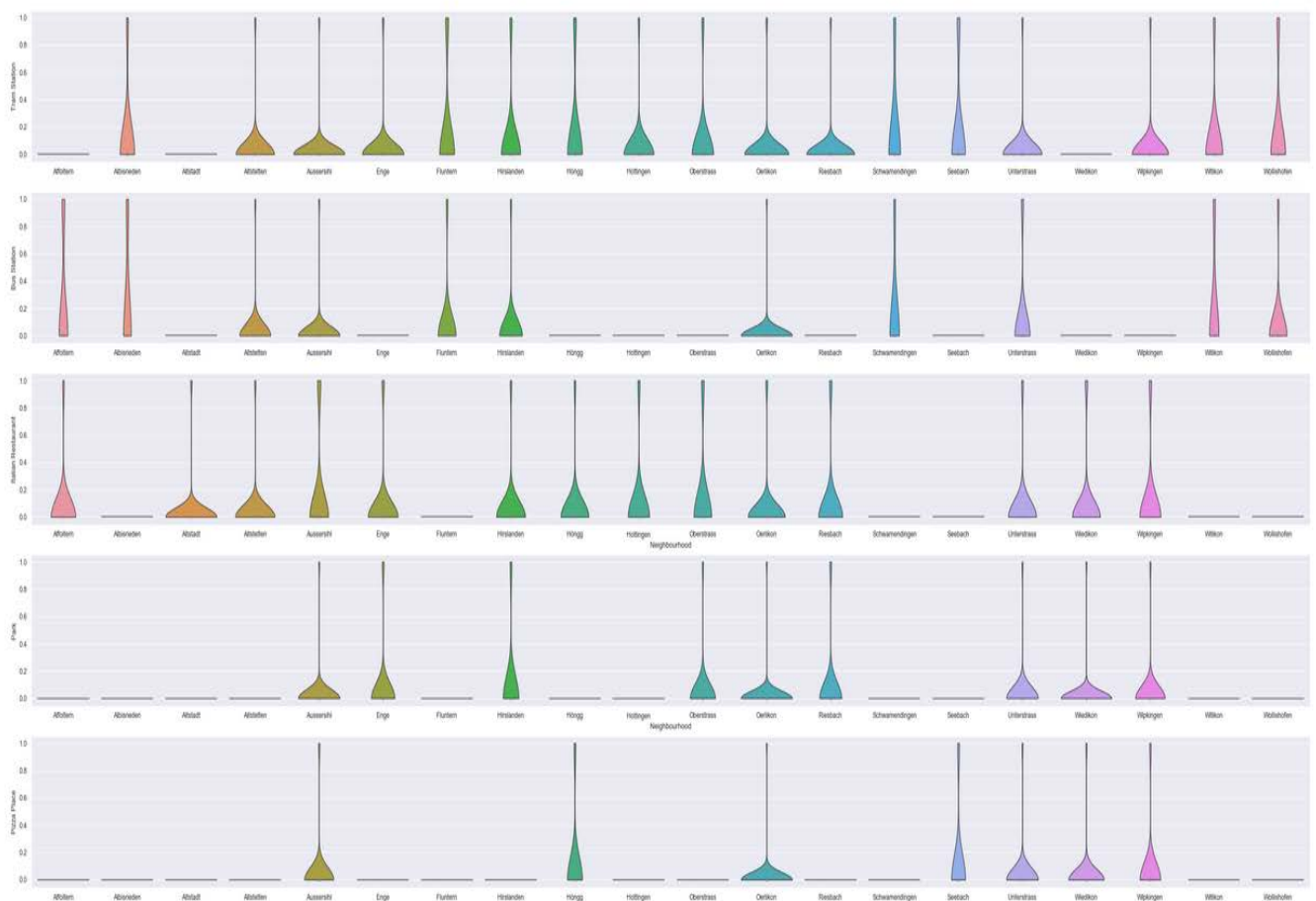

Figure 6

The plot shows that only three of the neighbourhoods Aussersihl, Oerlikon and Unterstrass meet all the requirements. The three neighbourhoods are represented in Figure 7 Aussersihl (blue), Oerlikon (orange) and Unterstrass (green).
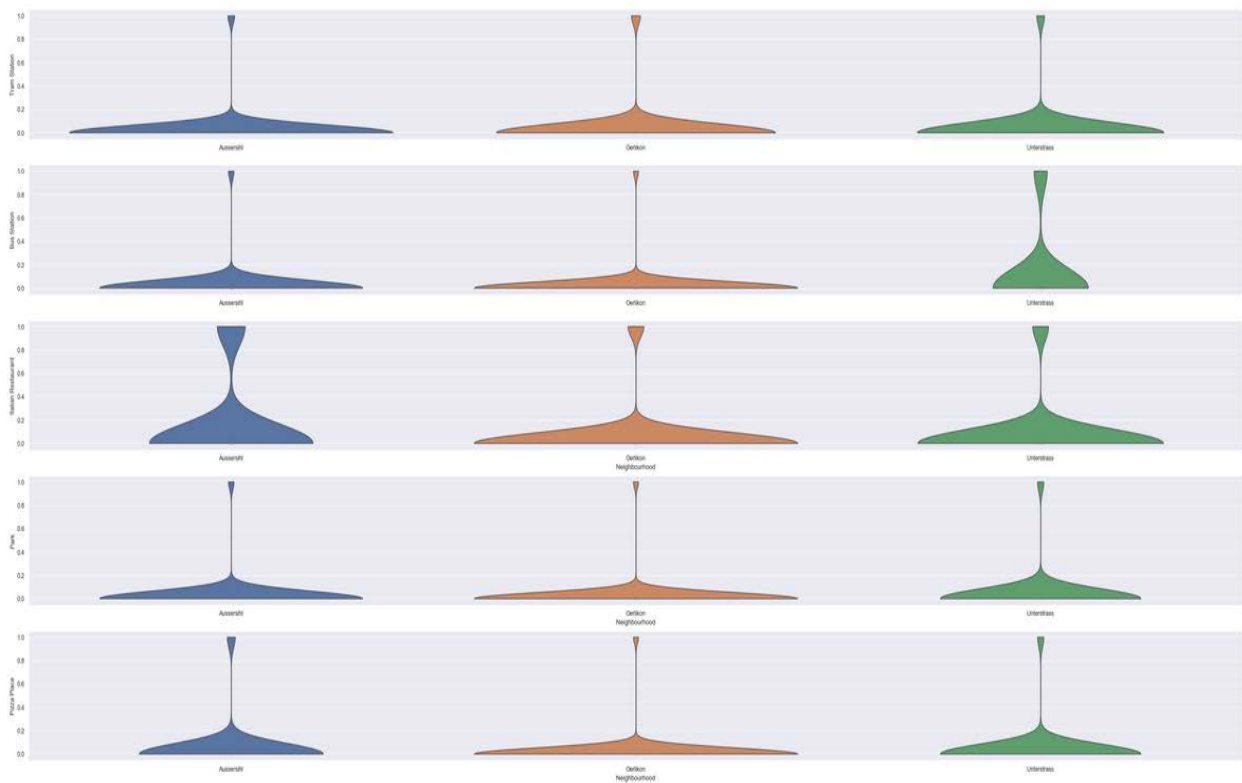
Figure 7

4.Results

The analysis clearly shows that only three Neighbourhoods Aussersihl, Oerlikon and Unterstrass meet all the requirements specified by the client.

5. Discussion

5.1 Recommendations

Before making a recommendation, I decided to analyse the ratings of the Italian restaurants that are present in the various neighbourhoods as I know that the Managin Director which is the main stakeholder for this project places a high importance on the quality of his food. After this Analysis I would recommend Oerlikon as the neighbourhood to choose as the restaurants have the highest ratings of the three neighbourhoods. But each of the three neighbourhood would fulfil the initial requirements.

6. Conclusions

The recommendations were based upon the data available if further data is available better recommendations can be made. Additionally, an avenue for future investigation would be to analyse real estate data regarding the selected neighbourhood in order to understand which properties are more suitable in terms of price and proximity to the venues.