The challenge

Where is the best possible place, for a new Migros supermarket to open in Zurich?

Analyse possible market opportunities based on the *density of existing stores*, *presence of competitors*, and *population density* to inform Migros deployment strategy.
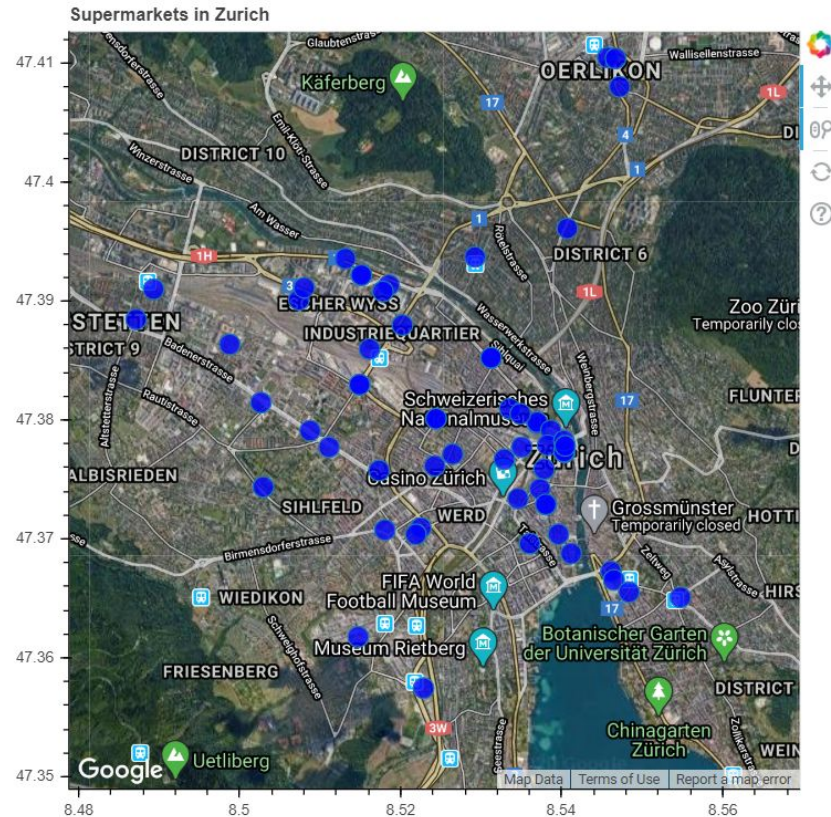
Our process

Scrape 'supermarkets' from Google API

- Used Google API

- Extract data from JSON

- Create a new map with the spatial data extracted from JSON

Get 'customer demand' data

Used:
- population by PLZ

Also considered:
- Volume of people passing through an area
- Near public transportation or parking
- New buildings/ area

Process supermarkets and demand data by postcode (PLZ)

In Python, import two CSVs:
- Zurich supermarkets
- population by PLZ

Then processed:
- aggreegating data for PLZ
- counting "migros" and "all" supermarkets by PLZ
- select a subset of Zurich PLZs

Make recommendations

We make recommendation of areas where Migros could examine, where:
- there are the higher ratios of people per supermarket
- where Migros has a low availability of stores

Further data on people movements and new building projects would support final decisions

The range we can use as an output
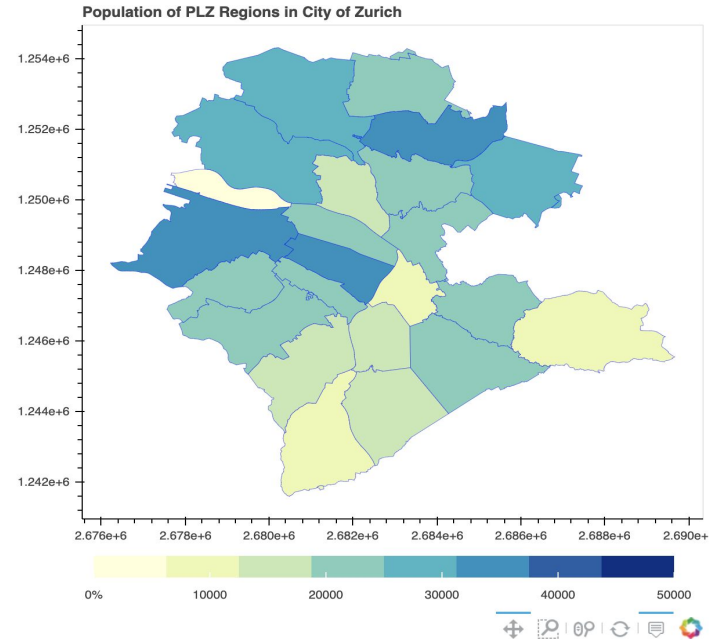
Two approaches:

Center *or* Districts:

Center: Find the best possible area (given in Zip code) within the center of Zurich for a new store
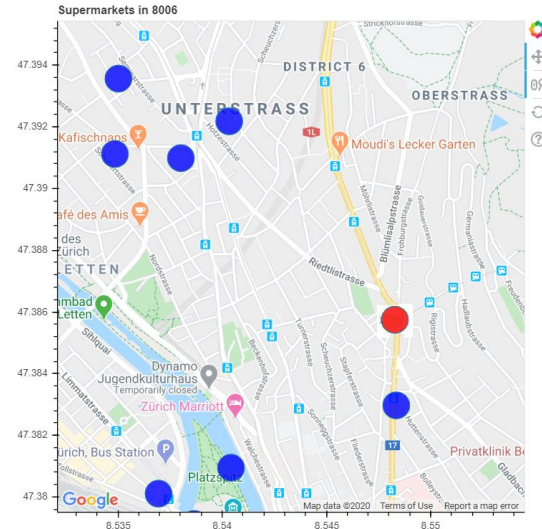
The range we can use as an output

Districts: Find the best possible area between the Districts for a new store taking into account:

Population density**, **Number of Migros shops, Number of competitive shops
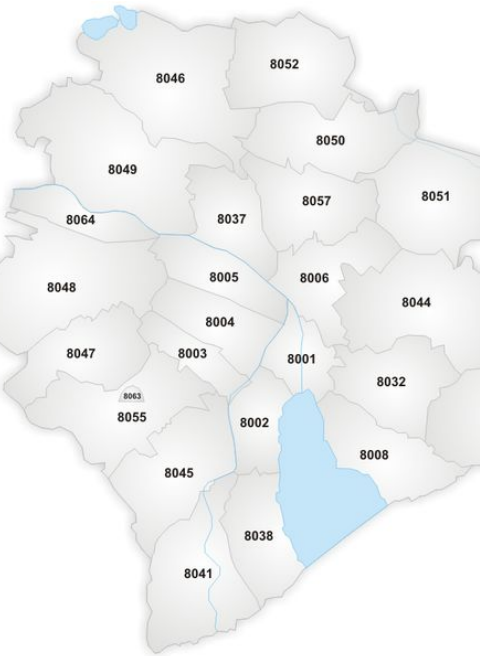
Extracting Data

Our goal: Make a dataframe of the information we wanted:

Important features: Names of the stores, zip codes, coordinates

|	Name	coordinates	Adress
2	Coop Pronto Shop	{'location': {'lat': 47.386432, 'lng': 8.5176263}, 'viewport': {'northeast': {'lat': 47.3877818;	Hardstrasse 221, 8005 Zürich
3	Coop Supermarkt Zürich Maagplatz	{'location': {'lat': 47.3859637, 'lng': 8.5161257}, 'viewport': {'northeast': {'lat': 47.3875020;	Maagpl. 1, 8005 Zürich
4	Coop Supermarkt Zürich Josefstrasse	{'location': {'lat': 47.3847681, 'lng': 8.527167}, 'viewport': {'northeast': {'lat': 47.3860945;	Röntgenstrasse 48, 8005 Zürich
5	Coop Supermarkt Pfingstweidstrasse Prim	{'location': {'lat': 47.3876058, 'lng': 8.5160441}, 'viewport': {'northeast': {'lat': 47.3888812;	Maschinenstrasse 10, 8005 Zürich
6	migrolino fresh	{'location': {'lat': 47.3798155, 'lng': 8.5279692}, 'viewport': {'northeast': {'lat': 47.3811871;	Langstrasse 134, 8004 Zürich
7	Coop Supermarkt Zürich Puls 5	{'location': {'lat': 47.3908056, 'lng': 8.5178}, 'viewport': {'northeast': {'lat': 47.3917986298!	Giessereistrasse 18, 8005 Zürich
8	Schaulager	{'location': {'lat': 47.3834853, 'lng': 8.512369699999999}, 'viewport': {'northeast': {'lat': 47:	Hohlstrasse 283, 8004 Zürich
9	Migros Supermarkt	{'location': {'lat': 47.391336, 'lng': 8.518552999999999}, 'viewport': {'northeast': {'lat': 47.:	Hardturmstrasse 11, 8005 Zürich
10	Ege	{'location': {'lat': 47.3801077, 'lng': 8.5243927}, 'viewport': {'northeast': {'lat': 47.3814135;	Feldstrasse 133, 8004 Zürich
11	Dirok Market	{'location': {'lat': 47.3839465, 'lng': 8.5322452}, 'viewport': {'northeast': {'lat': 47.3853280;	Limmatstrasse 119, 8005 Zürich
12	migrolino Shop	{'location': {'lat': 47.38133320000001, 'lng': 8.5100541}, 'viewport': {'northeast': {'lat': 47.:	Bullingerstrasse 73, 8004 Zürich
13	Corner Laden	{'location': {'lat': 47.3839198, 'lng': 8.5084678}, 'viewport': {'northeast': {'lat': 47.3852367;	Eichbühlstrasse 62, 8004 Zürich
14	Coop Supermarkt Zürich Hohlstrasse	{'location': {'lat': 47.3771218, 'lng': 8.526461399999999}, 'viewport': {'northeast': {'lat': 47	Hohlstrasse 35, 8004 Zürich
15	Coop Supermarkt Zürich Lochergut	{'location': {'lat': 47.3757513, 'lng': 8.517317199999999}, 'viewport': {'northeast': {'lat': 47	Badenerstrasse 244, 8004 Zürich
16	Coop Supermarkt Zürich Wipkingerbrücke	{'location': {'lat': 47.3925583, 'lng': 8.5246218}, 'viewport': {'northeast': {'lat': 47.3939317;	Röschibachstrasse 22, 8037 Zürich
17	Coop Supermarkt Zürich Albisriederplatz	{'location': {'lat': 47.3777117, 'lng': 8.5110996}, 'viewport': {'northeast': {'lat': 47.3791091;	Badenerstrasse 333, 8003 Zürich
18	Migros Supermarkt	{'location': {'lat': 47.3852242, 'lng': 8.531226499999999}, 'viewport': {'northeast': {'lat': 47	Limmatstrasse 152, 8005 Zürich
19	Migros Supermarket	{'location': {'lat': 47.3901133, 'lng': 8.507366}, 'viewport': {'northeast': {'lat': 47.3914678;	Pfingstweidstrasse 101, 8005 Zürich
20	Migros Supermarkt	{'location': {'lat': 47.3791051, 'lng': 8.5087542}, 'viewport': {'northeast': {'lat': 47.3804303;	Badenerstrasse 376, 8004 Zürich
21	Migros Supermarkt	{'location': {'lat': 47.3782609, 'lng': 8.5402757}, 'viewport': {'northeast': {'lat': 47.3797741;	Hauptbahnhof, 8001 Zürich
22	Corner Laden	{'location': {'lat': 47.3839198, 'lng': 8.5084678}, 'viewport': {'northeast': {'lat': 47.3852367;	Eichbühlstrasse 62, 8004 Zürich
23	Aggarwal AG	{'location': {'lat': 47.3761404, 'lng': 8.524235899999999}, 'viewport': {'northeast': {'lat': 47	Kernstrasse 27, 8004 Zürich
24	Coop Pronto Shop	{'location': {'lat': 47.386432, 'lng': 8.5176263}, 'viewport': {'northeast': {'lat': 47.3877818;	Hardstrasse 221, 8005 Zürich
25	Koscher City	{'location': {'lat': 47.3720147, 'lng': 8.520375}, 'viewport': {'northeast': {'lat': 47.3733868;	115, Weststrasse 8003 Zürich
26	Asia Store	{'location': {'lat': 47.3797249, 'lng': 8.536951499999999}, 'viewport': {'northeast': {'lat': 47	Konradstrasse 1, 8005 Zürich
27	Barkat Cash & Carry	{'location': {'lat': 47.3696251, 'lng': 8.5199423}, 'viewport': {'northeast': {'lat': 47.3710684;	Birmensdorferstrasse 141, 8003 Zürich

Searching on "Zurich" gives only a subset of results

Google maps search: "supermarket in Zurich"
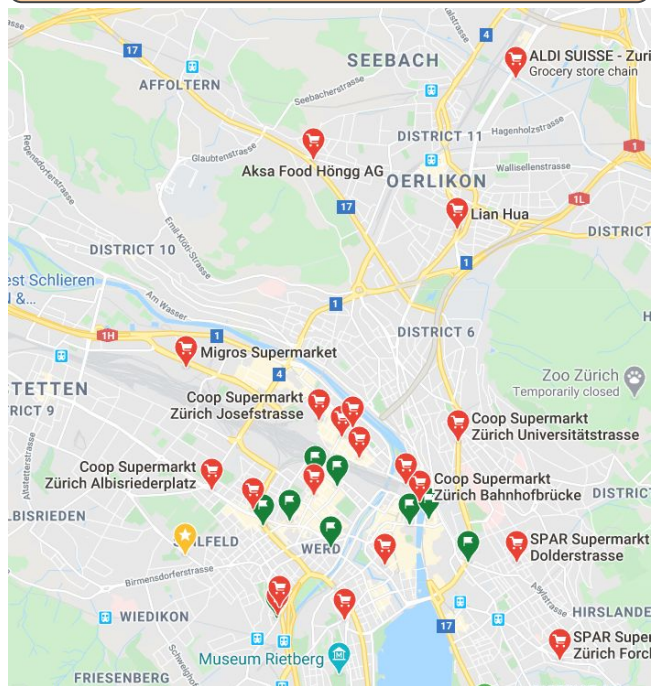
So introduce searching by PLZ

Google maps search: "supermarket in 8006 Zurich"
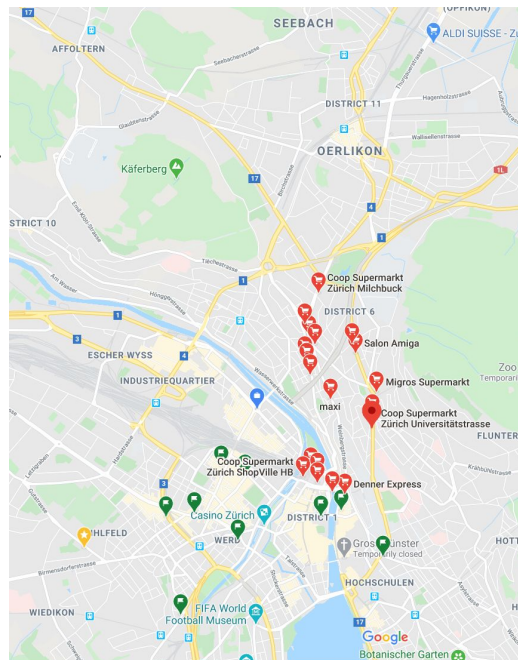
- Force a search for 25 PLZs in and around Zurich
- Gives ~350 unique stores
- Easy to drop repeat stores in search (>500 in total)

Population Data

Geospatial Data used from
http://opendata.swiss/de/perma/cc9cfe04-abae-2888-43c9-97063b72bc63@geoinformation-kanton-zuerich

Population Data from
https://opendata.swiss/de/dataset/bevoelkerung-pro-plz/resource/6218376e-db5d-41d5-b2b9-1a047c80cab0

- The population data by PLZ is provided by Swiss Post, so should be considered a dependable source
- However, it does have a higher total population than officially reported
- Nonetheless, we believe it to be the most appropriate data for detailed analysis at PLZ level

We process the scraped supermarket data

	Name	coordinates	Adress	Rating	Total Users Rates	PLZ	Migros
0	Coop Supermarkt Zürich Maagplatz	{'location': {'lat': 47.3859637, 'lng': 8.5161...	Maagpl. 1, 8005 Zürich	4.0	53	8005	0
1	Coop Supermarkt Zürich Puls 5	{'location': {'lat': 47.3908056, 'lng': 8.5178...	Giessereistrasse 18, 8005 Zürich	4.0	171	8005	0
2	Migros Supermarkt	{'location': {'lat': 47.391336, 'lng': 8.51855...	Hardturmstrasse 11, 8005 Zürich	4.3	191	8005	1
3	Ege	{'location': {'lat': 47.3801077, 'lng': 8.5243...	Feldstrasse 133, 8004 Zürich	4.5	214	8004	0
4	Coop Supermarkt Zürich Hohlstrasse	{'location': {'lat': 47.3771218, 'lng': 8.5264...	Hohlstrasse 35, 8004 Zürich	4.1	251	8004	0

1

```python
# decide if a supermarket is Migros as names have some variability
def check_migros(name):
    if name.lower().find("migro")==-1:
        return 0
    else:
        return 1

supermarkets["Migros"] = supermarkets['Name'].apply(lambda x: check_migros(x))

supermarkets
```

We can accommodate variations in the supermarket name

We included the petrol stations. Do not include Alnatura

2

```python
# get PLZ (postcode)into a new column. Help from Cassandra

def PLZ_extract(address):

    try:
        comma_position = address.find(",")
        if comma_position == -1:
            PLZ = address[0:4]
        else:
            PLZ = address[comma_position+2:comma_position+6]

        if PLZ.isdigit() == False:
            address = address[comma_position+1:]
            PLZ = PLZ_extract(address)
            return PLZ
        else:
            return PLZ
    except Exception:
        PLZ = "somethin went wrong: " + str(Exception)
        return PLZ
supermarkets["PLZ"] = supermarkets['Adress'].apply(lambda x: PLZ_extract(x))

supermarkets
```

we can loop past several commas to find the PLZ and handle errors

We then summarised by PLZ and added population

PLZ	num_all	num_migros
5400	1	0
8001	26	6
8002	6	6
8003	9	1
8004	26	6
8005	21	5
8006	9	1
8008	11	5
8021	2	0
8032	9	0
8037	5	1
8038	6	1
8041	4	2
8044	5	1
8045	10	1
8046	11	3
8047	11	3
8048	21	4
8049	7	1
8050	20	1
8051	13	1
8052	8	2
8053	6	1
8055	6	3
8057	6	1
8066	2	0
8093	1	0
8112	1	0
8117	1	1

PLZ	num_all	num_migros
5400	1	0
8001	26	6
8002	6	3
8003	9	1
8004	26	6
8005	21	5
8006	9	1
8008	11	5

Added population by PLZ then calculated the key metric **'people per supermarket'**

	index	PLZ	num_all	num_migros	POP	NAME	Pop_per_store
22	24	8057	6	1	24352.0	Zurich: Unterstrass/ Oerlikon	4059.0
16	18	8049	7	1	27167.0	Zurich: Höngg	3881.0
21	23	8055	6	3	21971.0	Zurich: Friesenberg	3662.0
8	10	8037	5	1	17998.0	Zurich: Wipkingen	3600.0
9	11	8038	6	1	18137.0	Zurich: Wollishofen	3023.0
19	21	8052	8	2	22909.0	Zurich: Seebach	2864.0
2	3	8003	9	1	23749.0	Zurich: Kreis 3 - Alt-Weidikon	2639.0
13	15	8046	11	3	28690.0	Zurich: Affoltern	2608.0
7	9	8032	9	0	23402.0	Zurich: Hirslanden/ Hottingen	2600.0
11	13	8044	5	1	12900.0	Gockhausen/Zurich	2580.0

- Remember, away from the centre of the search, the results from the Google Maps API was not consistently getting all supermarkets
- We forced the search to 25 PLZs, but Google may still miss some.
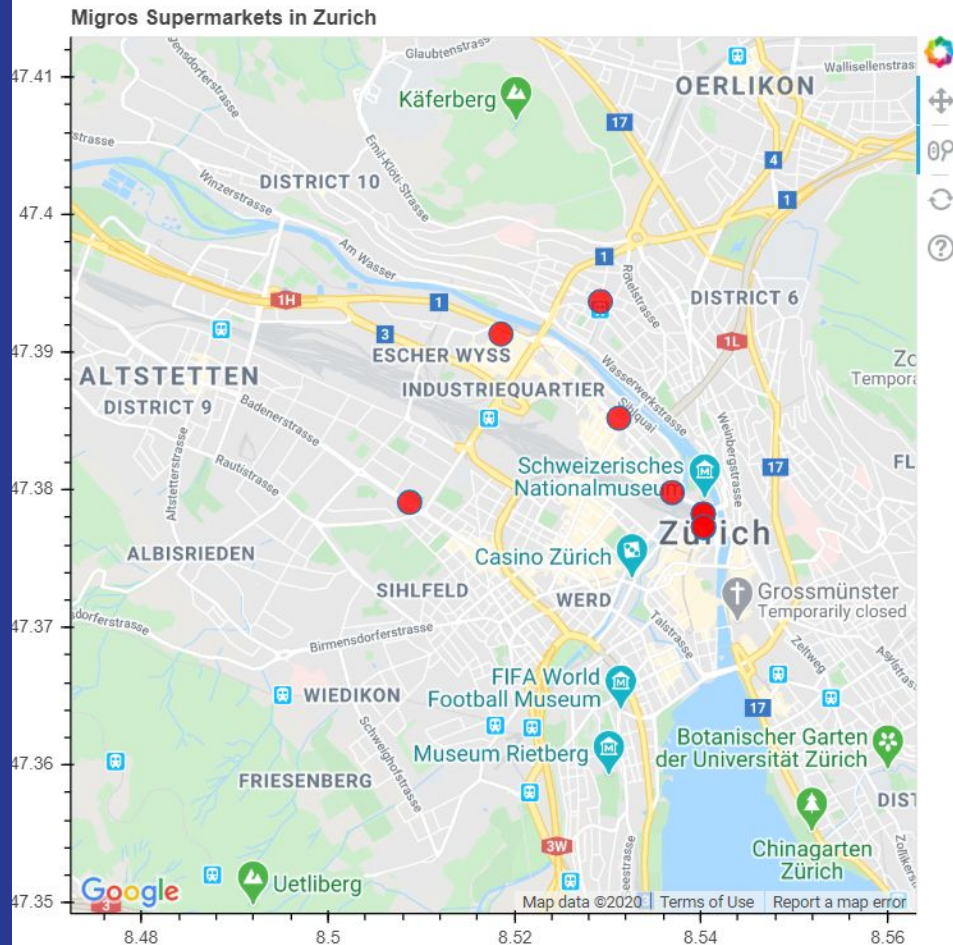- Recommendations come later
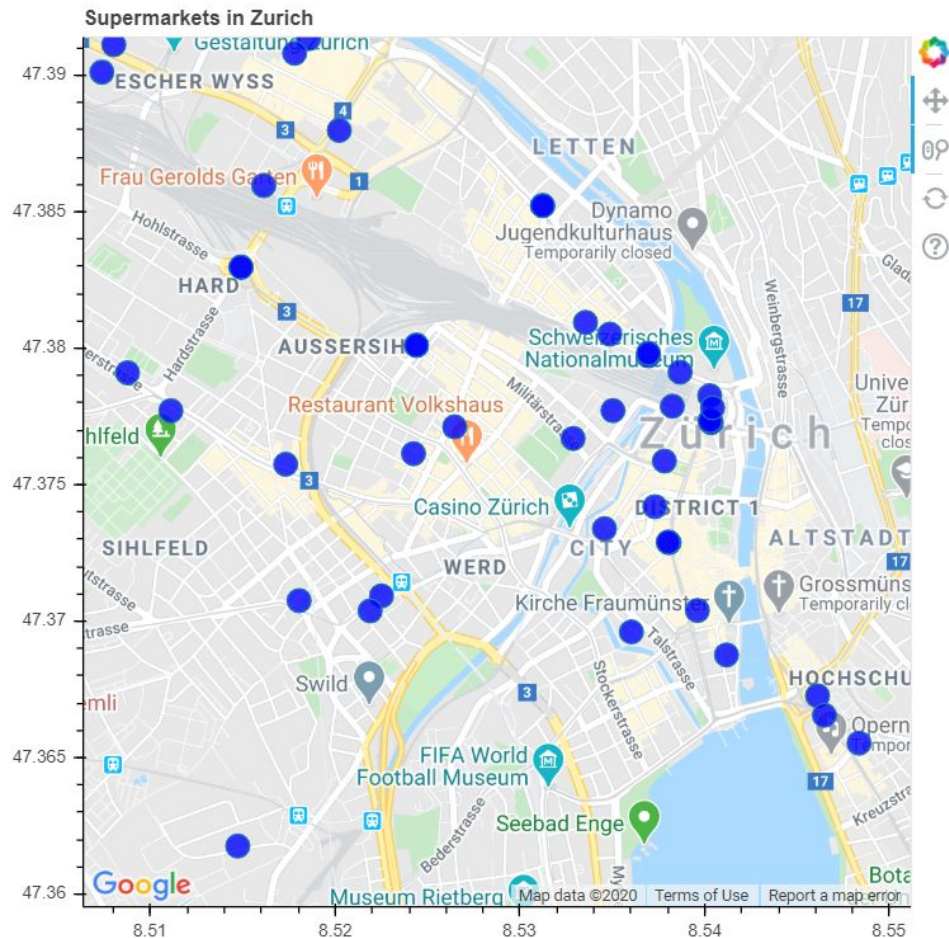
Visualisation & recommendations

Categorising by District and:

1. Population

2. Population per store (migro or competitor)

3. Relative availability of Migros stores

Plotting the existing Migros supermarkets

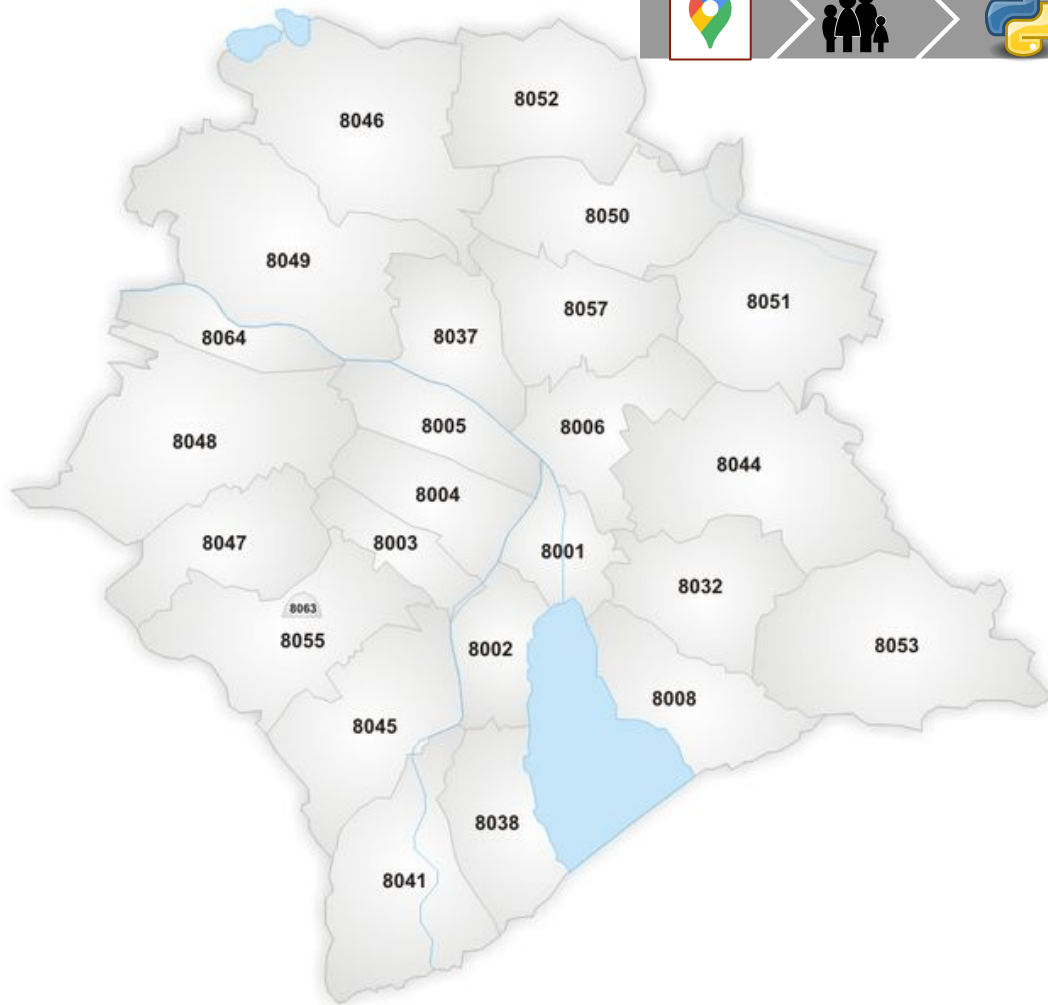Migros Supermarkets in Zurich

Plotting the existing rival stores

Zurich PLZs

8001-8008: Kreis 1-8 are 'urban' areas, with high population density as well as high levels of day-time workers and mobile population
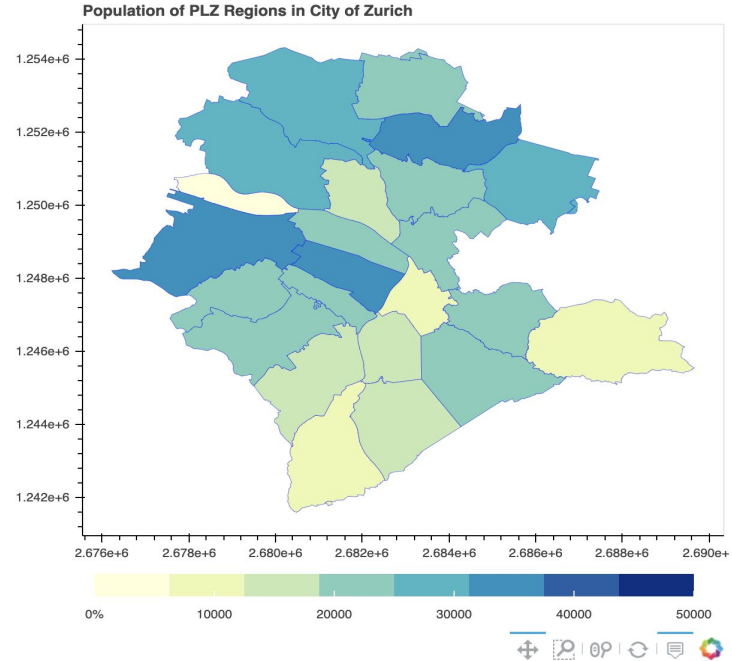
8021-8057: 'suburban' areas

We can visualise population by PLZ across Zurich PLZs

Provides a first view of high demand areas, based on static population

Population of PLZ Regions in City of Zurich

● Best viewed in browser

A population "density" per store allows recommendations

Defined as:

population density= population per PLZ
$\quad\quad\quad\quad\quad\quad$ # of all stores

So a high rate (*dark colour*) suggests PLZs where **Migros could consider deploying**

Population per Shop in Zurich

8049 Höngg

8057 Unterstrass/ Oerlikon

8003

- Best viewed in browser
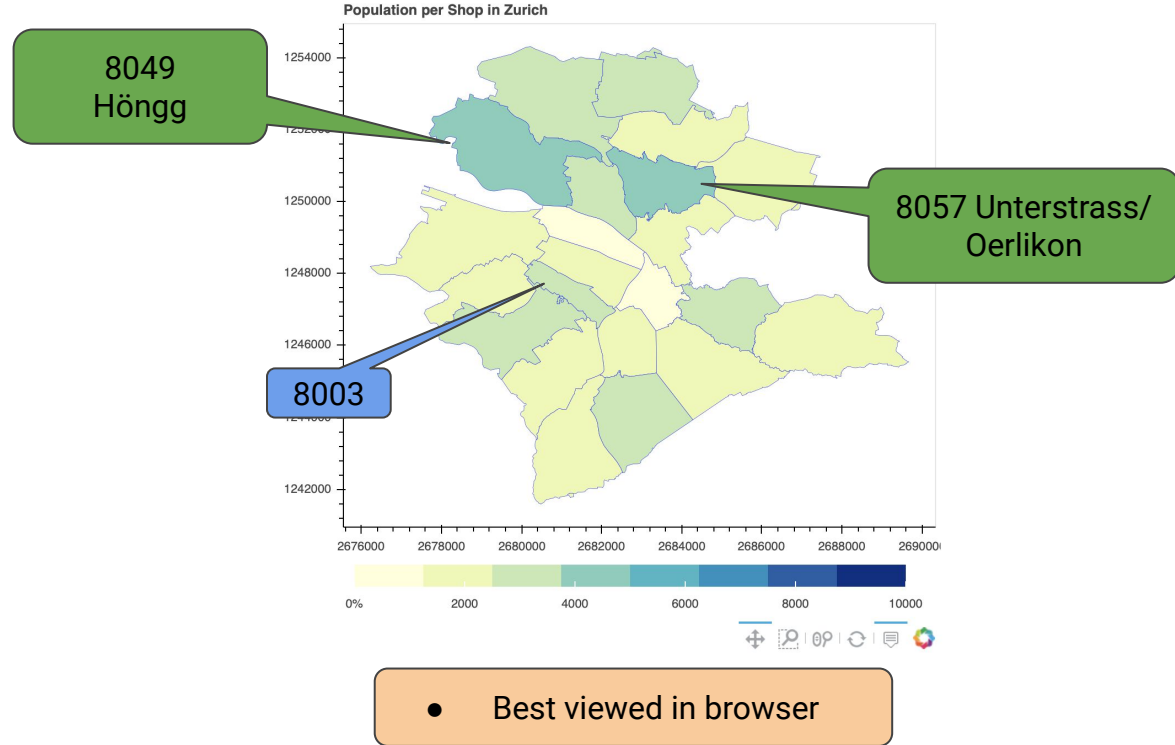
Urban PLZ: 8001-8008

Suburban PLZ : 8021-8057

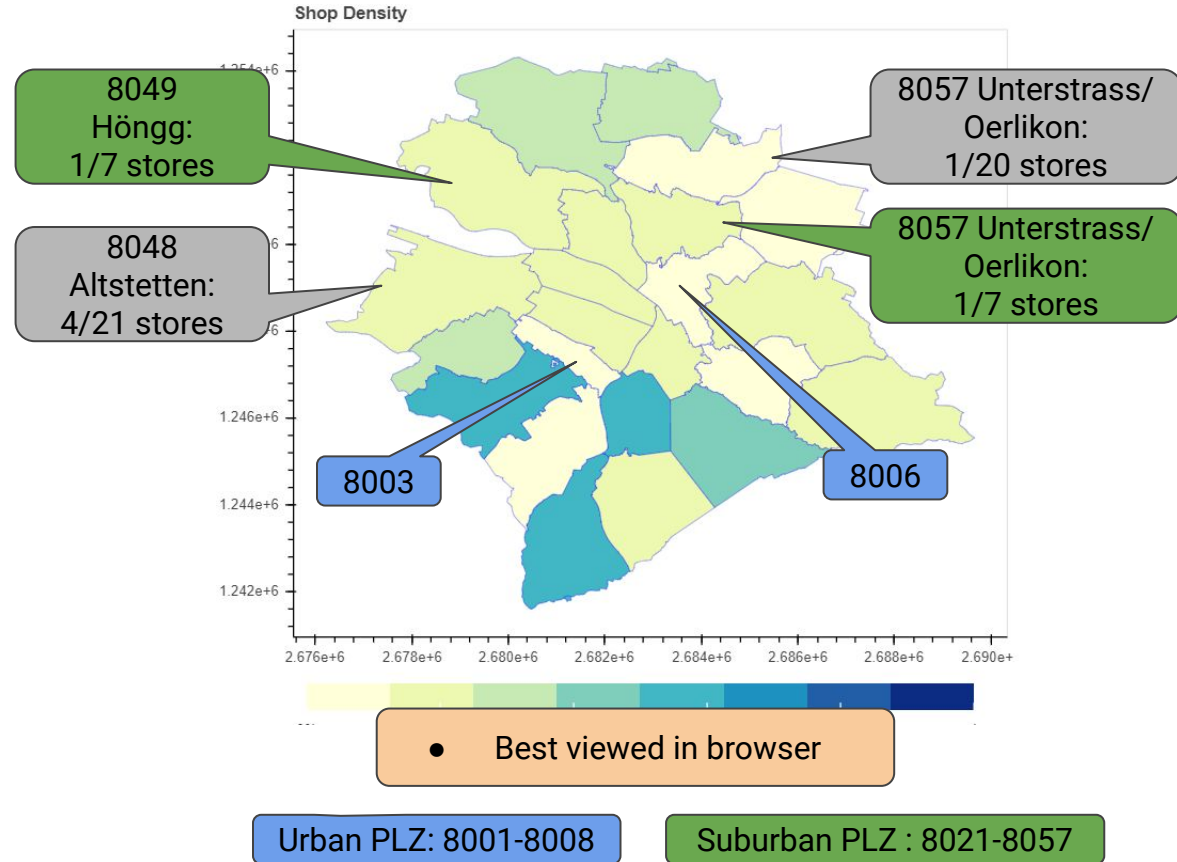# An "availability" metric of Migro stores allows recommendations

Defined as:

availability = <u># of migros stores</u>
            # of all stores

So a low rate (*light colour*) suggests PLZs where **Migros could consider deploying**

Shop Density

8049 Höngg: 1/7 stores

8057 Unterstrass/ Oerlikon: 1/20 stores

8048 Altstetten: 4/21 stores

8057 Unterstrass/ Oerlikon: 1/7 stores

8003

8006

● Best viewed in browser

Urban PLZ: 8001-8008

Suburban PLZ : 8021-8057

And the methodology could be expanded to other PLZs outside of Zurich

Defined as:

availability = $\dfrac{\text{# of migros stores}}{\text{# of all stores}}$

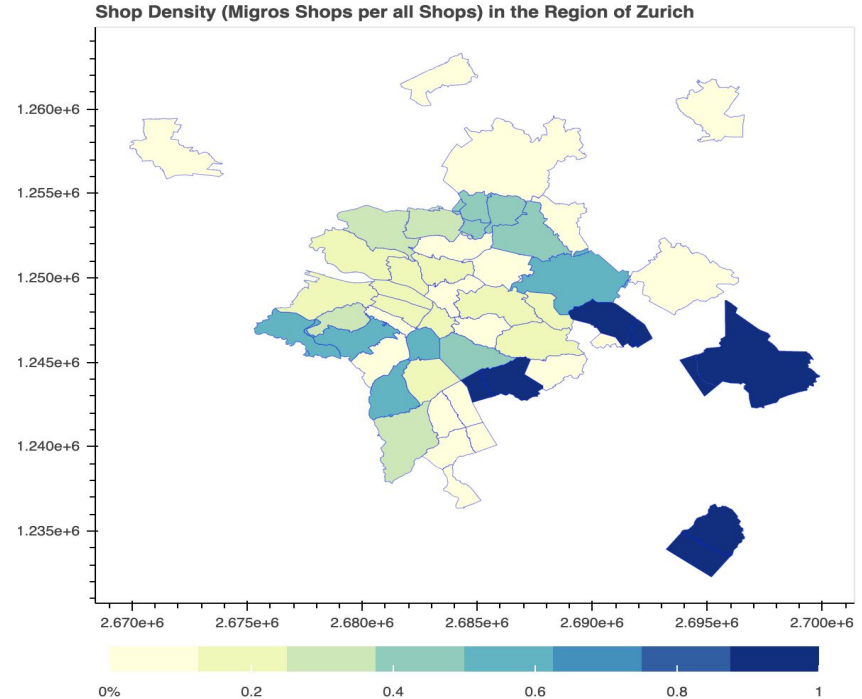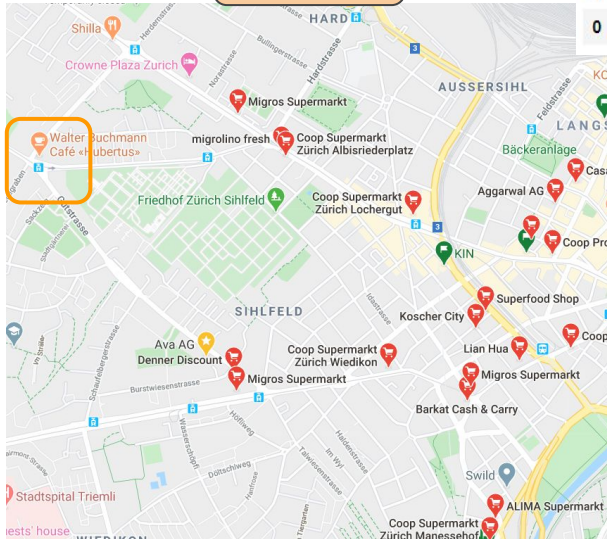So a low rate (*light colour*) suggests PLZs where **Migros could consider deploying**

Shop Density (Migros Shops per all Shops) in the Region of Zurich

- Best viewed in browser

In central Zurich, we recommend investigating new stores in 8003 & 8006

index		PLZ	num_all	num_migros	POP	NAME	Pop_per_market
2	3	8003	9	1	23749.0	Zürich	2639.0
5	6	8006	9	1	21476.0	Zürich	2386.0
1	2	8002	6	3	13228.0	Zürich	2205.0
6	7	8008	11	5	23410.0	Zürich	2128.0
3	4	8004	26	6	34014.0	Zürich	1308.0
4	5	8005	21	5	20169.0	Zürich	960.0
0	1	8001	26	6	11526.0	Zürich	443.0

PLZ: 8003

PLZ: 8006

Next to public transport hubs are obviously popular
Further information on new building projects and transport hubs would help
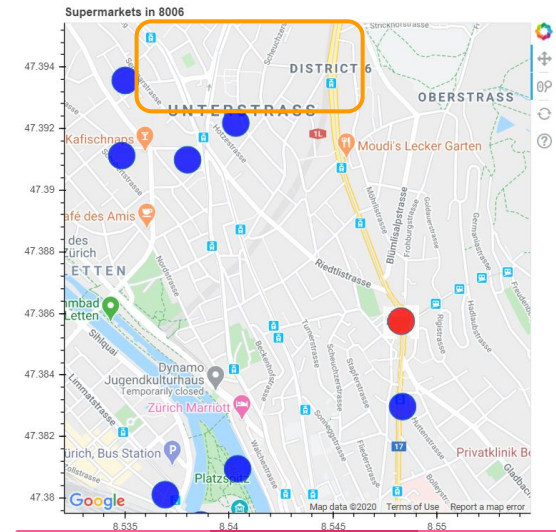
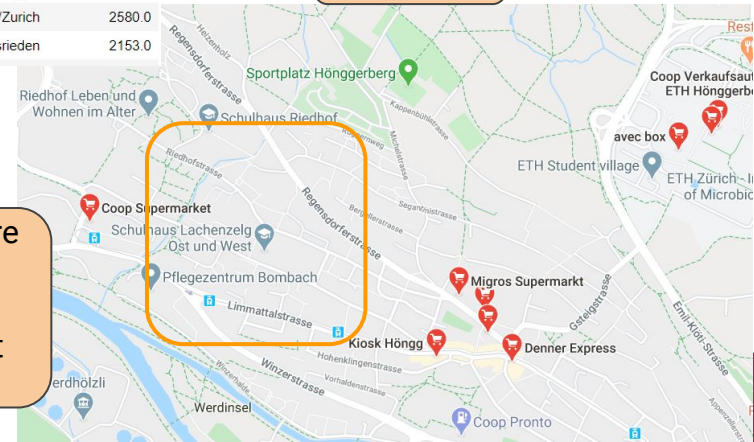# In suburban Zurich, there are many areas where Migros has a lower presence

	index	PLZ	num_all	num_migros	POP	NAME	Pop_per_store
15	24	8057	6	1	24352.0	Zurich: Unterstrass/ Oerlikon	4059.0
9	18	8049	7	1	27167.0	Zurich: Höngg	3881.0
14	23	8055	6	3	21971.0	Zurich: Friesenberg	3662.0
1	10	8037	5	1	17998.0	Zurich: Wipkingen	3600.0
2	11	8038	6	1	18137.0	Zurich: Wollishofen	3023.0
12	21	8052	8	2	22909.0	Zurich: Seebach	2864.0
6	15	8046	11	3	28690.0	Zurich: Affoltern	2608.0
0	9	8032	9	0	23402.0	Zurich: Hirslanden/ Hottingen	2600.0
4	13	8044	5	1	12900.0	Gockhausen/Zurich	2580.0
7	16	8047	11	3	23685.0	Zurich: Albisrieden	2153.0

PLZ: 8057
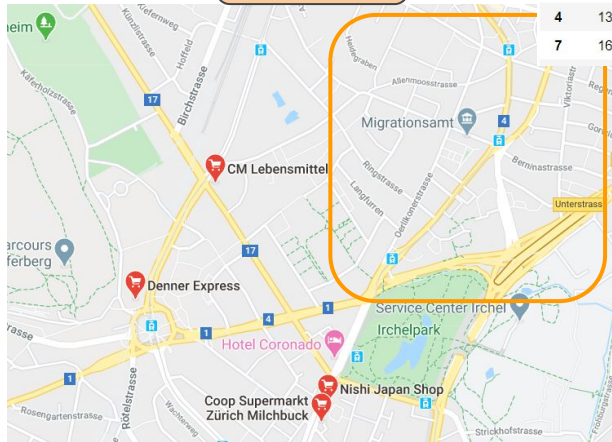
PLZ: 8049

Next to public transport hubs are obviously popular
Further information on new building projects and transport hubs would help