

# The Battle of Neighbourhoods

## Introduction

Being a Indian and Love for the Indian food all over the world is amazing but availability of Indian food and taste is not easy to find.

Switzerland is one of the famous tourist place and one of the favourite place for the Indians but the Availability of Indian food is not that much even if the location is in Downtown.

This Project will help us to find the location in Switzerland (Zurich) and its nearby areas where Asian food can be available as Indian Food specifically will narrow our search.

Prior launching any restaurant, it's important to know if the business as a good opportunity. In order to do so, this report will try to gather data about other restaurant localization, competitors and best localization.

These data could be useful for a business plan afterward

## Problem

As the goal of this is to create a business plan in the end, we need to make sure data from api are correct. We also need to check that customer could be interested in this specific business.

In order to do so, a survey in Zurich will be done in addition to data gathering. I'll go in the cities and check at different hours if restaurants are working, if streets are full and so on, and what kind of restaurant works well. This survey will allow to validate the data analysis done here.

## Business Interest

This study can be used by anyone interested by opening a restaurant. Or any other business.

## Data

The idea of doing the project and data collection is taken from one of the template shared in coursera project. I will keep the idea of clustering the city by area and then plot heatmap to find better area.

We will change some data as Per are modification. Some specification regarding the data is given below:

Country/City: Switzerland

Goal: Open a restaurant/little shop for workers in weekday and maybe Saturday. So, I will cross data from working days, and localisations.

- I will use the following API:

Foursquare API: to find restaurant/venues

Google API: reverse geolocalisation

- Neighbourhood Candidates

Firstly, we will create latitude & longitude coordinates for centroids of our candidate neighbourhoods. We will be creating a grid of cells covering our area of interest which is approx. 1.5km kilometres centered around Zurich city centre.

Let's first find the latitude & longitude of Zurich city centre, using specific, well known address and Google Maps geocoding API. We'll consider the Prefecture to be the city centre, as a lot of companies are around.

## Methodology and Analysis

First we all load all the libraries as shown in below screenshot. These libraries will be useful in manipulating the data, converting the data into required dataframe, Data visualization and we also apply some Machine learning Algorithms.

Then, we will segmentation as per canton of Zurich and Cluster them with the help of K means Clustering algorithms .

### Libraries and modules used:

```
import requests # Library to handle requests
import pandas as pd # Library for data analysis
import numpy as np # Library to handle data in a vectorized manner
import random # Library for random number generation

!pip install geopy
from geopy.geocoders import Nominatim # module to convert an address into Latitude and Longitude values

# Libraries for displaying images
from IPython.display import Image
from IPython.core.display import HTML

# transforming json file into a pandas dataframe library
from pandas.io.json import json_normalize

!pip install shapely
import shapely.geometry

!pip install pyproj
import pyproj

import math
import warnings

!pip install folium==0.5.0
import folium # plotting library

print('Folium installed')
print('Libraries imported.')
```

## Conversion into required Dataframe and columns filtration:

### Filtering the data frame

```
In [10]: ## keeping only the data frames that is related to venues and locations
filtered_columns = ['name', 'categories'] + [col for col in dataframe.columns if col.startswith('location.')] + ['id']
dataframe_filtered = dataframe.reindex(columns = filtered_columns)

def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return(categories_list)[0]['name']

# filter the category for each row
dataframe_filtered['categories'] = dataframe_filtered.apply(get_category_type, axis=1)

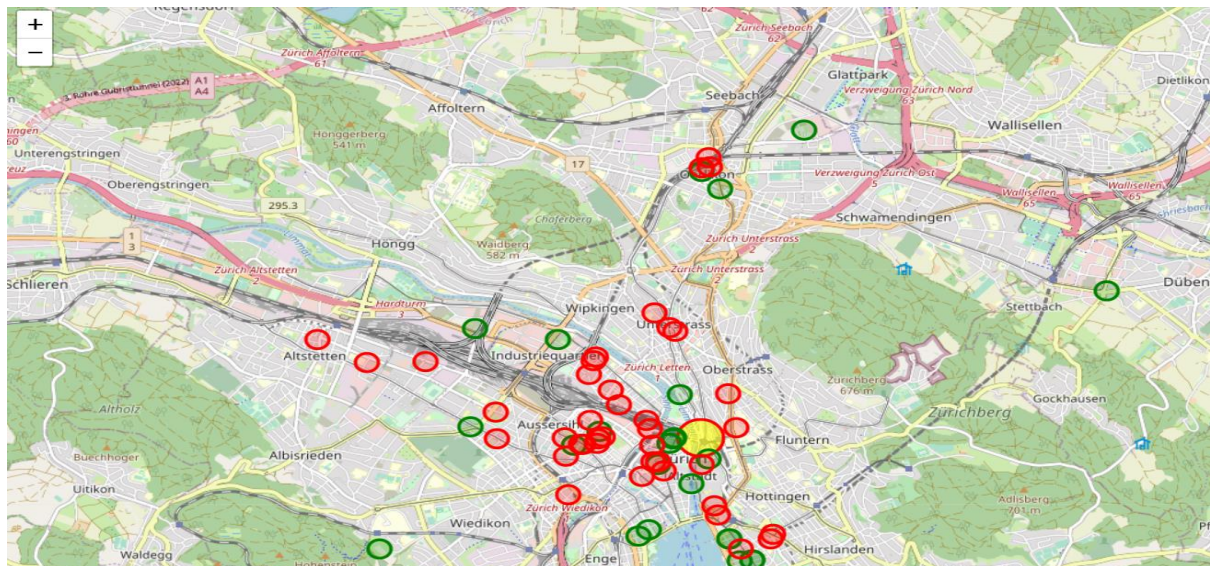
# clean column names by keeping only last term
dataframe_filtered.columns = [column.split('.')[0] for column in dataframe_filtered.columns]

dataframe_filtered
```

Out[10]:

	name	categories	address	lat	lng	labeledLatLngs	distance	cc	city	state	country	formattedAddress
0	Fo Ke Kio Asian Take Away	Asian Restaurant	Talacker 50A	47.372142	8.534841	[{"label": "display", "lat": 47.37214184335466...	861	CH	Zürich	Zürich	Schweiz	[Talacker 50A, Zürich, Schweiz]
1	Asian Sport Center	College Gym	NaN	47.382676	8.547708	[{"label": "display", "lat": 47.3826760023631,...	694	CH	Zürich	Zürich	Schweiz	[Zürich, Schweiz]
2	Little Nooch Asian Streetfood	Asian Restaurant	Hofwiesenstr. 369	47.411235	8.543783	[{"label": "display", "lat": 47.41123460919642...	3801	CH	Zürich	Zürich	Schweiz	[Hofwiesenstr. 369 (Bahnhof Oerlikon), 8050 Zü...
3	Asian Moon	Chinese Restaurant	Seefeldstrasse 40	47.363043	8.549531	[{"label": "display", "lat": 47.36304278640203...	1625	CH	Zürich	Zürich	Schweiz	[Seefeldstrasse 40 (at Kreuzstrasse), 8008 Zür...
4	Asian-Wellness	Spa	Schaffhauserstrasse 43	47.391070	8.538933	[{"label": "display", "lat": 47.39107015696727...	1596	CH	Zürich	Zürich	Schweiz	[Schaffhauserstrasse 43, 8037 Zürich, Schweiz]
5	YEN'S Sushi & Asian Cuisine	Sushi Restaurant	Hallwylerstr. 43	47.371369	8.528704	[{"label": "display", "lat": 47.37136901098179...	1292	CH	Zürich	Zürich	Schweiz	[Hallwylerstr. 43, 8004 Zürich, Schweiz]

## Resturants and hotels around centre of Zurich generated with the help of folium library:



## One hot encoding to translate the categorical data to numbers

Use one hot encoding to translate the categorical data to numbers that we can use in calculations

```
In [52]: # one hot encoding
df_Canton_other_venues_onehot = pd.get_dummies(df_Canton_other_venues[['Venue_Category']], prefix = "", prefix_sep = "")

# add Place Name column back to dataframe
df_Canton_other_venues_onehot['Place'] = df_Canton_other_venues['Place']

# move Place Name column to the first column
fixed_columns = [df_Canton_other_venues_onehot.columns[-1]] + list(df_Canton_other_venues_onehot.columns[:-1])
df_Canton_other_venues_onehot = df_Canton_other_venues_onehot[fixed_columns]

df_Canton_other_venues_onehot.head()
```

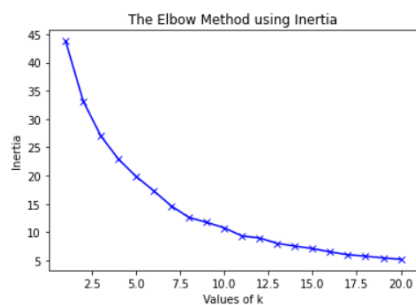
```
Out[52]:
```

	Place	American Restaurant	Asian Restaurant	Athletics & Sports	Austrian Restaurant	BBQ Joint	Bar	Beach	Bed & Breakfast	Boarding House	...	Swiss Restaurant	Szechuan Restaurant	Taiwanese Restaurant	Tapas Restaurant	Thai Restau
0	Zürich	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0
1	Zürich	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0
2	Zürich	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0
3	Zürich	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0
4	Zürich	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0

5 rows × 84 columns

## Elbow method to find number of clusters

```
plt.plot(k_range, inertias, 'bx-')
plt.xlabel('Values of k')
plt.ylabel('Inertia')
plt.title('The Elbow Method using Inertia')
plt.show()
```



## Results and Discussion

The analysis of whole project is summarised in following points: -

1. Most of the Asian restaurants lies near the Downtown of the Zurich.
2. During clustering, if we taking cluster value > 11, there is no value that is found in that cluster visible in the last cluster where k = 12
3. There are other restaurants that are found along with Asian food Restaurants like American restaurants, food court, Bar, winery shop and many more.
4. Cluster 1 is the downtown of the Zurich where majorly are restaurants lie.

## Finally, how clusters look like:

68	35.0	Bezirk Winterthur	Winterthur	39.308990	-74.531310	0	Asian Restaurant	Chinese Restaurant	Resort	Japanese Restaurant	Bed & Breakfast	Sushi Restaurant	Thai Restaurant
70	36.0	Bezirk Winterthur	Winterthur	39.362880	-74.426380	0	Asian Restaurant	Chinese Restaurant	Resort	Japanese Restaurant	Bed & Breakfast	Sushi Restaurant	Thai Restaurant
72	37.0	Bezirk Winterthur	Winterthur	39.341885	-74.481930	0	Asian Restaurant	Chinese Restaurant	Resort	Japanese Restaurant	Bed & Breakfast	Sushi Restaurant	Thai Restaurant
74	38.0	Bezirk Winterthur	Winterthur	47.507565	8.683199	0	Asian Restaurant	Chinese Restaurant	Resort	Japanese Restaurant	Bed & Breakfast	Sushi Restaurant	Thai Restaurant
180	91.0	Bezirk Winterthur	Winterthur	47.507928	8.778716	0	Asian Restaurant	Chinese Restaurant	Resort	Japanese Restaurant	Bed & Breakfast	Sushi Restaurant	Thai Restaurant
100	51.0	Bezirk Horgen	Wädenswil	40.565680	-74.342530	0	Chinese Restaurant	Asian Restaurant	Sushi Restaurant	Japanese Restaurant	Motel	Resort	Thai Restaurant
240	121.0	Bezirk Meilen	Zollikon	47.341435	8.578001	0	Thai Restaurant	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Vietnamese Restaurant	Chinese Restaurant	Resort
0	1.0	Bezirk Zürich	Zürich	39.558495	-75.358970	0	Chinese Restaurant	Motel	Asian Restaurant	Resort	Sushi Restaurant	Bed & Breakfast	Japanese Restaurant
2	2.0	Bezirk Zürich	Zürich	39.942390	-75.032190	0	Chinese Restaurant	Motel	Asian Restaurant	Resort	Sushi Restaurant	Bed & Breakfast	Japanese Restaurant
4	3.0	Bezirk Zürich	Zürich	39.900932	-74.961514	0	Chinese Restaurant	Motel	Asian Restaurant	Resort	Sushi Restaurant	Bed & Breakfast	Japanese Restaurant
6	4.0	Bezirk Zürich	Zürich	39.767690	-74.890980	0	Chinese Restaurant	Motel	Asian Restaurant	Resort	Sushi Restaurant	Bed & Breakfast	Japanese Restaurant
8	5.0	Bezirk Zürich	Zürich	39.771025	-74.257662	0	Chinese Restaurant	Motel	Asian Restaurant	Resort	Sushi Restaurant	Bed & Breakfast	Japanese Restaurant
10	6.0	Bezirk Zürich	Zürich	39.756435	-74.108260	0	Chinese Restaurant	Motel	Asian Restaurant	Resort	Sushi Restaurant	Bed & Breakfast	Japanese Restaurant
12	7.0	Bezirk Zürich	Zürich	39.563560	-74.239745	0	Chinese Restaurant	Motel	Asian Restaurant	Resort	Sushi Restaurant	Bed & Breakfast	Japanese Restaurant

## Conclusion

- During the Analysis this project will be helpful to those who are looking for the food and have craving for other kind of food like Swiss food, Pizzas, Italian food, European food and of course who has love for towards the cocktail and mocktail side as well.
- The clusters will help in finding nearby food trucks, deli/bodegas, bakeries, sandwich places, fast food restaurants, food courts, American restaurants, Indian restaurants, wings joints, snack places, Czech restaurants, cafeterias, dim sum restaurants, diners, Eastern European restaurants, falafel restaurants, Ethiopian restaurants, empanada restaurants, and dumpling restaurants.