

Opening an Italian restaurant

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I. Introduction - Business problem

The project describes the process of searching the best district to open an Italian restaurant in Ljubljana.

It is very important for new restaurant owners to decide which type of restaurant they will open. This research will also help them to decide which district is most promising to open a new restaurant.

As a city with many sights, Ljubljana is a target of many tourists and because of that I will define the country of the most numerous tourists. I assume that the most numerous tourists will visit the restaurant which offer dishes from the country they are coming from. Beside that I will show where the most important sights and monuments are located and which district is most attracted by tourists. It is generally known that there is a strong link between tourists and sights, so district with the largest number of sights will be the most interesting for tourists.

I assume that that Italians are the most numerous tourists in Ljubljana and because of that the logical choice is to open an Italian restaurant.

At the end of the project I will confirm the assumption.

II. Data description

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

- list of districts in Ljubljana,
- number of the most numerous tourists in Ljubljana,
- location of the most important sights in Ljubljana,
- number of restaurants which offer dishes from the country as the most numerous tourists are coming from (example: if the most numerous tourists are Italians, we will query Italian restaurants),
- list of chosen type of restaurants situated in the city districts.

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

- centers of candidate districts will be generated using OpenStreetMap (Nominatim) API.
- list of restaurants and their type and location in every districts will be obtained using Foursquare API,
- coordinate of Ljubljana center will be obtained using Nominatim geocoding,
- list of Ljubljana districts will be web scraped using Beautiful Soup,
- list of Ljubljana sights and list of Ljubljana visitors/tourists will be obtained by pre prepared statistical files.

In next sections I will describe the data that will be used to solve the problem and the source of the data.

A. List of district in Ljubljana

Ljubljana is a capital of Slovenia and it consists of 17 districts.

I used the data from the Wikipedia's web site

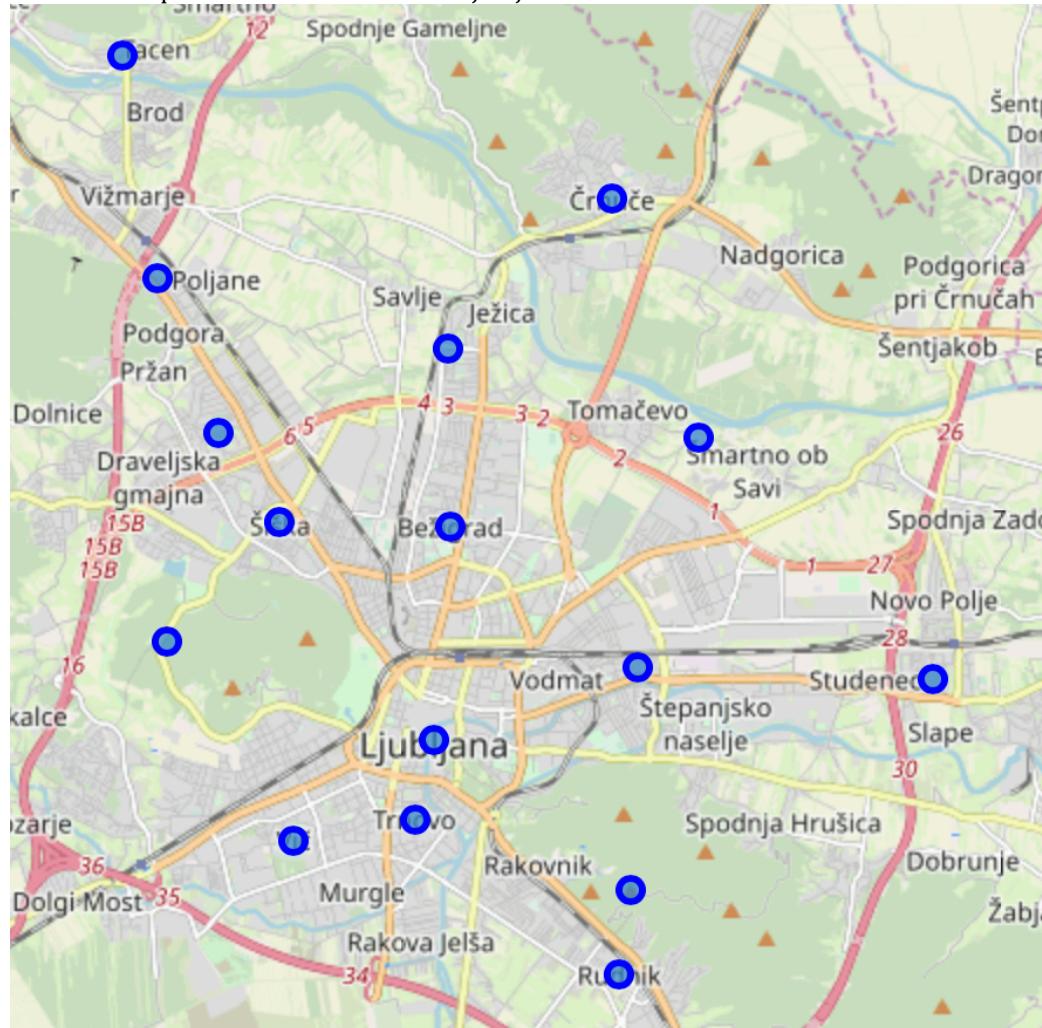
https://sl.wikipedia.org/wiki/Četrtna_skupnost_Ljubljane. I extract information about Ljubljana districts. The end result is the list of 17 districts with the geographical data (latitude & longitudes) of their centers.

Table 1: Districts in Ljubljana

Districts	Latitude	Longitude
Bežigrad	46.071523	14.509137
Center	46.049815	14.506782
Črnuče	46.105006	14.532862
Dravlje	46.081140	14.475201
Golovec	46.034705	14.535686
Jarše	46.080596	14.545600
Moste	46.057282	14.536756
Polje	46.056122	14.580008
Posavje	46.089738	14.508915
Rožnik	46.059990	14.467790
Rudnik	46.025988	14.533932

Sostro	46.035488	14.607094
Šentvid	46.096834	14.466245
Šiška	46.071956	14.484203
Šmarca gora	46.119496	14.461100
Trnovo	46.041719	14.503884
Vič	46.039693	14.486204

Picture 1: Map of the district centers in Ljubljana



B. number of the most numerous tourists in Ljubljana

There are many tourists that are coming in Ljubljana from all over the world. Slovenia has a border with 4 countries (Italy, Austria, hungary and Croatia). Geographically Ljubljana is situated the center of Slovenia but it is very near the border with Italy (less then 70 km). Many Italians are coming to visit Ljubljana because of the sights and attractions but also because a good food. It is known that Italians are great gourmets. Because of that I would like to find the most numerous visitors in Ljubljana and confirm that Italians are the most important tourists in Ljubljana.

I used the data from <http://www.onbria.com/wp-content/uploads/2019/04/Tourists.csv> where are statistical data on tourist arrivals and overnight stays in Ljubljana from 2008 till 2017.

Table 2: Tourist arrivals and overnight stays in Ljubljana from 2008 till 2017

Country	Arrivals	Overnights
Italy	615752	1016681
Germany	393852	715091
United Kingdom	293308	623496
United States	248841	538523
Slovenia	272515	445841
France	230181	433961
Austria	233303	369222
Spain	180749	354484
other Asian countries	189312	346650
Croatia	190177	334662
Serbia	184694	324839
Netherlands	134763	261810
Japan	152316	238514
Israel	87088	231558
Australia	121514	214152
Finland	81715	206747
Belgium	105365	204808
Russian Federation	82042	189494
China	132383	188241
Hungary	97599	169487
Switzerland	89853	163369
Poland	77309	153476
Bosnia and Herzegovina	85387	146005
Czech Republic	66171	126923
Bulgaria	86315	125854
Romania	69954	124603
Canada	56528	115810
Sweden	56530	111651
other countries of South and Middle America	52468	103154
Turkey	49081	97695
Macedonia	48069	97014
Portugal	50312	93693
Korea (Republic of)	67024	93194
Brazil	47690	92776
Denmark	42523	87702
Greece	42548	84186
other European countries	41708	82428
Slovakia	41180	77522
Ukraine	42614	71627
Ireland	31796	65098
Norway	29763	64194

Montenegro	25541	50824
other African countries	16245	45986
New Zealand	19537	33182
Malta	8130	31650
Lithuania	10175	25078
Iceland	7773	23190
Estonia	10290	21920
Latvia	8831	20748
South Africa	8412	18177
Cyprus	5400	13198
other countries of Oceania	4898	10248
Luxembourg	4577	8885
other countries of North America	3528	6306

I can confirm that the most numerous visitors in Ljubljana are coming from Italy.

C. location of the most important sights in Ljubljana

Ljubljana has a very interesting history. There are ruins from Roman Empire, many buildings from Napoleons time. Ljubljana was many years in Austro-Hungarian rule and after World War I it was a part of Italy. There are many sights and monuments from that periods.

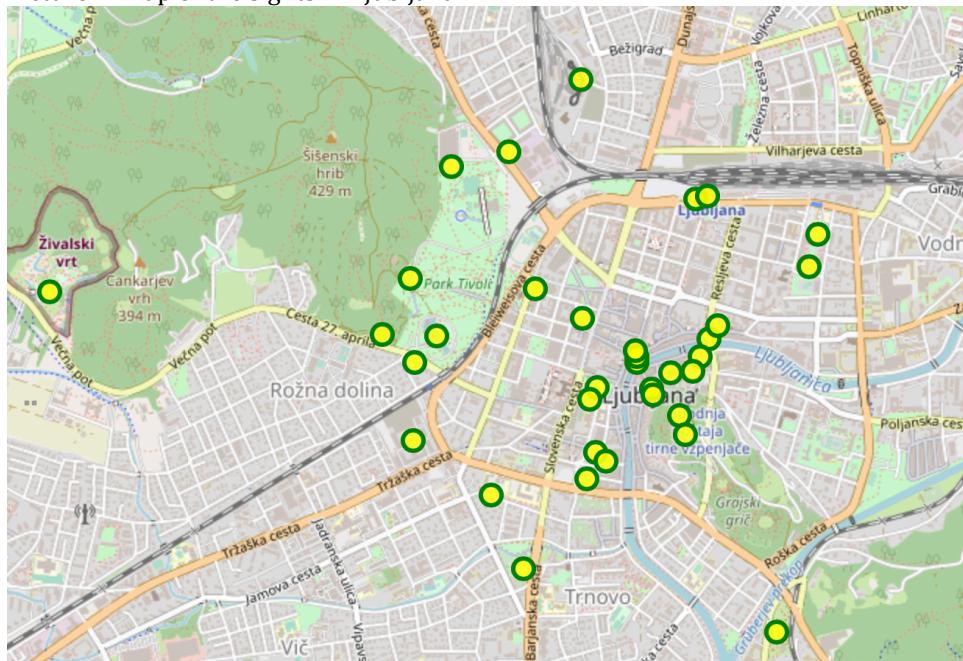
In the Table 3, these sights are shown with their geographical locations. The data was found on Internet and I upload the file with the list of sights from <http://www.onbria.com/wp-content/uploads/2019/03/Ljubljana.csv> .

Table 3: the most important sights in Ljubljana

Place	Lat	Long
Ljubljana Castle	46.049021	14.508629
Triple Bridge	46.051198	14.506200
Tivoli City park	46.052333	14.491331
Dragon Bridge	46.052134	14.510351
Presern monument	46.051416	14.506177
Robba Fountain	46.050114	14.506978
Krizanke	46.046465	14.503256
Metelkova	46.056400	14.516700
Ljubljana Central Market	46.051440	14.509869
National and University Library	46.047549	14.503796
Town Hall	46.049886	14.507132
Plecnik House	46.042877	14.499580
Zoo	46.054050	14.471876
Cathedral	46.050800	14.508100
Franciscan Church of the Annunciation	46.051700	14.506100
National Gallery	46.054179	14.500272
National Museum of Slovenia	46.051166	14.493165
National Museum of Contemporary History	46.059088	14.495353

Congress Square	46.050200	14.503800
The Skyscraper (Neboticnik)	46.053000	14.503000
Botanic Garden	46.040300	14.514300
Brewery Museum	46.059700	14.498700
Tivoli Castle	46.054614	14.492972
Vodnik Square	46.050846	14.509435
Slovenian Railway Museum	46.062625	14.502870
Slovenian Ethnographic Museum	46.055050	14.516204
The House of experiments	46.052672	14.510898
Museum of Illusions	46.049701	14.503397
Muro Romano	46.045860	14.497641
Monument The Fish	46.052254	14.494470
Bus Station	46.057791	14.509566
Railway Station	46.057946	14.510282
Slovene Geographical Museum	46.047207	14.504381
Tobacco Museum	46.048015	14.493085
Castle hill and Plecnik Sance	46.048247	14.509026

Picture 2: Map of the sights in Ljubljana



D. number of restaurants which offer dishes from the country as the most numerous tourists are coming from

In the previous section we found out that the most numerous visitors in Ljubljana are coming from Italy. In the introduction I assumed that these tourists will eat in restaurants which offer the dishes from their country.

This was the base to collect only Italian restaurants in Ljubljana with their geographical locations. I also represent the district where these restaurant are located.

I was utilizing the Foursquare API to pull the following location data on Italian restaurants in Ljubljana.

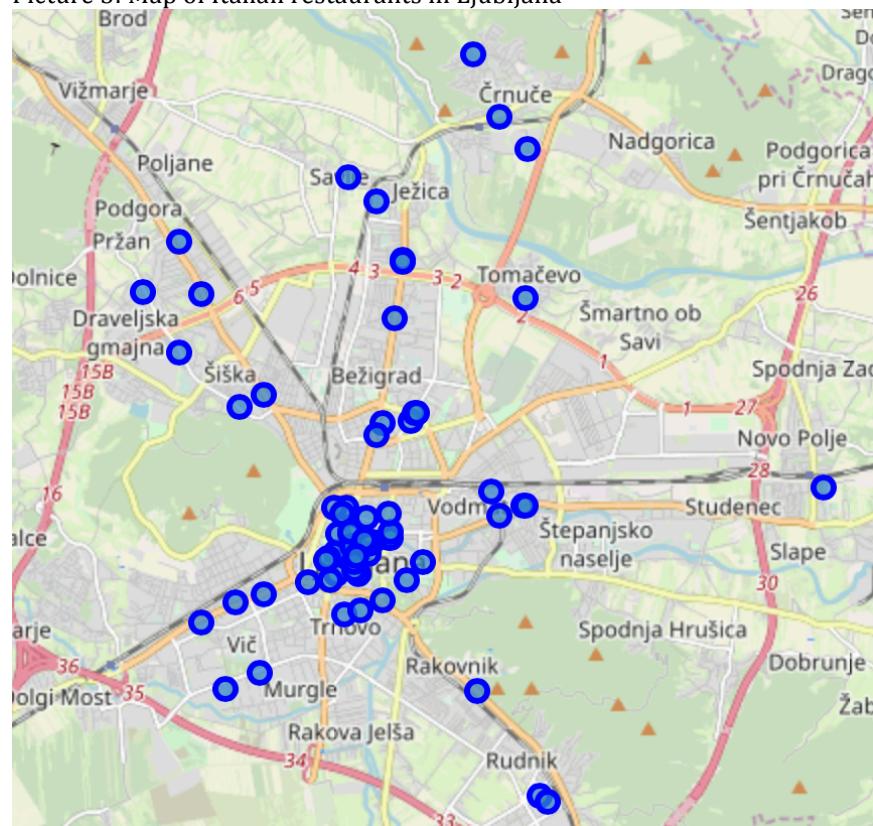
Table 4: List of Italian restaurants by district with location data

Restaurant offering Italian dishes	District	District Lat.	District Long.	Venue Lat.	Venue Long.	Venue Category
Alegria	Bežigrad	46.071523	14.509137	46.066030	14.514992	Italian Restaurant
Apertivo	Center	46.049815	14.506782	46.051403	14.504608	Italian Restaurant
As Aperitivo	Center	46.049815	14.506782	46.051400	14.504730	Mediterranean Restaurant
Bežigrajski dvor	Bežigrad	46.071523	14.509137	46.065758	14.510303	Pizza Place
Brazzera	Dravlje	46.081140	14.475201	46.074207	14.475384	Pizza Place
Capriccio	Center	46.049815	14.506782	46.052350	14.511394	Pizza Place
Emonska klet	Center	46.049815	14.506782	46.050612	14.502283	Pizza Place
Enjoy Italy	Center	46.049815	14.506782	46.052760	14.502481	Italian Restaurant
Family's Pizza Express	Moste	46.057282	14.536756	46.056124	14.534386	Pizza Place
Fany & Mary	Center	46.049815	14.506782	46.051823	14.508512	Bar
Favola	Bežigrad	46.071523	14.509137	46.078184	14.512142	Italian Restaurant
Focuslus	Center	46.049815	14.506782	46.048011	14.502157	Pizza Place
Foodie	Center	46.049815	14.506782	46.055904	14.504173	Pizza Place
Garaža	Golovec	46.034705	14.535686	46.034193	14.526273	Pizza Place
Gostilna Dubočica	Moste	46.057282	14.536756	46.054833	14.530232	Eastern European Restaurant
Gostilna in pizzerija Rogovilc	Črnuče	46.105006	14.532862	46.102100	14.529995	Pizza Place
Halo Janez	Bežigrad	46.071523	14.509137	46.064461	14.509093	Pizza Place
Halo Pinki - Moste	Moste	46.057282	14.536756	46.057862	14.528743	Fast Food Restaurant
Julija	Center	46.049815	14.506782	46.047964	14.506177	Italian Restaurant
Kot Barbe Dimaria	Posavje	46.089738	14.508915	46.092041	14.509013	Mediterranean Restaurant
La Storia Trattoria	Center	46.049815	14.506782	46.055786	14.501945	Italian Restaurant
Maxim	Center	46.049815	14.506782	46.049896	14.500976	Mediterranean Restaurant
Mediterraneo	Center	46.049815	14.506782	46.050439	14.507726	Mediterranean Restaurant
Medo bar	Šmarca gora	46.119496	14.461100	46.120281	14.465169	Pizza Place
Meta In Bazilika	Center	46.049815	14.506782	46.047060	14.497362	Italian Restaurant
Mexico Mediterra Place	Šiška	46.071956	14.484203	46.069247	14.489767	Mexican Restaurant
Mirjams Pub	Center	46.049815	14.506782	46.055111	14.503462	Italian Restaurant
Nolito	Šiška	46.071956	14.484203	46.067747	14.485775	Pizza Place
Paninoteka +	Center	46.049815	14.506782	46.048459	14.505439	Sandwich Place
Piazza Del Papa	Rudnik	46.025988	14.533932	46.021733	14.536843	Pizza Place
Picerija Osmica	Center	46.049815	14.506782	46.052712	14.504729	Pizza Place
Picestavracija Boccaccio	Dravlje	46.081140	14.475201	46.081022	14.479263	Pizza Place
Pinki	Center	46.049815	14.506782	46.049413	14.517111	Pizza Place
Pinsa Rustika	Center	46.049815	14.506782	46.052380	14.511705	Pizza Place
Pivnica Kratochwill	Rudnik	46.025988	14.533932	46.021138	14.538252	Brewery
Pizza Cutty	Center	46.049815	14.506782	46.051330	14.505009	Pizza Place
Pizza Hutt	Posavje	46.089738	14.508915	46.085255	14.513623	Pizza Place
Pizza dostava Novak	Polje	46.056122	14.580008	46.058157	14.585341	Pizza Place
Pizzeria Barjan	Vič	46.039693	14.486204	46.036374	14.489320	Pizza Place
Pizzeria Ljubljanski dvor	Center	46.049815	14.506782	46.049298	14.505231	Pizza Place
Pizzeria Luigi	Posavje	46.089738	14.508915	46.084875	14.513697	Pizza Place
Pizzeria Parma	Center	46.049815	14.506782	46.049625	14.500570	Pizza Place
Pizzeria Tunnel	Center	46.049815	14.506782	46.044795	14.510067	Pizza Place
Pizzeria Šestinka	Center	46.049815	14.506782	46.054715	14.507337	Pizza Place
Pizzerija Gregorino	Bežigrad	46.071523	14.509137	46.066939	14.515638	Pizza Place
Pizzerija Laterna	Vič	46.039693	14.486204	46.042233	14.479152	Pizza Place
Pizzerija Papirus	Črnuče	46.105006	14.532862	46.109495	14.525736	Pizza Place
Pizzerija Savlje	Posavje	46.089738	14.508915	46.094985	14.504191	Pizza Place
Pizzerija Soncek	Jarše	46.080596	14.545600	46.080502	14.534581	Pizza Place
Pizzerija Trnovski	Center	46.049815	14.506782	46.043263	14.503798	Pizza Place

zvon						
Prince of Orange	Center	46.049815	14.506782	46.052880	14.511455	Italian Restaurant
Promenada Pizza	Center	46.049815	14.506782	46.051646	14.507711	Pizza Place
Restavracija Allegria	Center	46.049815	14.506782	46.052879	14.504705	Italian Restaurant
Restavracija Angel	Dravlje	46.081140	14.475201	46.087256	14.475399	Pizza Place
Restavracija Klub 300	Dravlje	46.081140	14.475201	46.081335	14.469509	Italian Restaurant
Restavracija Tartuf	Center	46.049815	14.506782	46.052109	14.507008	Mediterranean Restaurant
Restavracija in kavarna Element	Črnuče	46.105006	14.532862	46.098193	14.534832	Italian Restaurant
Robin Food	Center	46.049815	14.506782	46.055168	14.511220	Mediterranean Restaurant
Trappa	Vič	46.039693	14.486204	46.034322	14.483457	Pizza Place
Trappica	Trnovo	46.041719	14.503884	46.047275	14.501119	Pizza Place
Trta	Center	46.049815	14.506782	46.043678	14.506567	Pizza Place
Verace	Center	46.049815	14.506782	46.047262	14.514356	Pizza Place
Volta cafe	Vič	46.039693	14.486204	46.045641	14.489822	Pizza Place
Za Pumpo	Vič	46.039693	14.486204	46.044540	14.485116	Pizza Place
Zlata Ribica	Center	46.049815	14.506782	46.050177	14.505883	Mediterranean Restaurant
pizza delivery	Moste	46.057282	14.536756	46.055975	14.534569	Pizza Place
pr gapetu	Bežigrad	46.071523	14.509137	46.066939	14.515861	Italian Restaurant

There are 67 restaurants in Ljubljana offering Italian dishes.

Picture 3: Map of Italian restaurants in Ljubljana



E. list of chosen type of restaurants situated in the city districts

From Table 5 we can see that the district with most Italian restaurants is "Center". There are 32 Italian restaurants out of 67.

Table 6 represents the list of districts with the distribution of Italian restaurants. The district with the smallest distribution is district “Center”. It means that in this district there is the highest density of Italian restaurants. With this I confirmed most Italian restaurant are located in the district “Center”.

Table 5: Number of Italian restaurants by Ljubljana districts

District	Nr. of Italian restaurants
Bežigrad	6
Center	32
Dravlje	4
Golovec	1
Jarše	1
Moste	4
Polje	1
Posavje	4
Rudnik	2
Trnovo	1
Vič	5
Črnuče	3
Šiška	2
Šmarca gora	1

Table 6: Italian restaurants distribution by Ljubljana districts

	District	Alegria	Apertivo	As Aperitivo	Bežigrajski dvor		pr gapetu
0	Bežigrad	0.166667	0.00000	0.00000	0.166667	...	0.166667
1	Center	0.000000	0.03125	0.03125	0.000000	...	0.000000
2	Dravlje	0.000000	0.00000	0.00000	0.000000	...	0.000000
3	Golovec	0.000000	0.00000	0.00000	0.000000	...	0.000000
4	Jarše	0.000000	0.00000	0.00000	0.000000	...	0.000000
5	Moste	0.000000	0.00000	0.00000	0.000000	...	0.000000
6	Polje	0.000000	0.00000	0.00000	0.000000	...	0.000000
7	Posavje	0.000000	0.00000	0.00000	0.000000	...	0.000000
8	Rudnik	0.000000	0.00000	0.00000	0.000000	...	0.000000
9	Trnovo	0.000000	0.00000	0.00000	0.000000	...	0.000000
10	Vič	0.000000	0.00000	0.00000	0.000000	...	0.000000
11	Črnuče	0.000000	0.00000	0.00000	0.000000	...	0.000000
12	Šiška	0.000000	0.00000	0.00000	0.000000	...	0.000000
13	Šmarca gora	0.000000	0.00000	0.00000	0.000000	...	0.000000

III. Mehodology

In this project, I used the basic methodology as it was represent in Week 3 lab. I used web scraping to get the data of Ljubljana districts.

```
#web site of the districts in Ljubljana
website_url = requests.get("https://sl.wikipedia.org/wiki/Četrtna_skupnost_Ljubljane").text

#web scraping the Ljubljana districts
soup = BeautifulSoup(website_url,'lxml')
My_table = soup.find('table',{'class':'nowraplinks collapsible autocollapse navbox-inner'})
links = My_table.findAll('a')
```

Nominatim-OpenStreetMap API helped me to get latitudes and longitudes of the districts.

```
#list of districts in Ljubljana with geographical coordinates (latitude & longitude)
df2 = df.copy()
latitudeCln = []
longitudeCln = []
districtCln=[]

for index, row in df2.iterrows():
    # print(row[0])
    lok=row[0].replace('Četrtna skupnost ','')
    lat, long = get_coords_local(district=lok, output_as='center')
    if lok == 'Rožnik':
        lat = 46.05999
        long = 14.46779
    if lok == 'Šmarna gora':
        lat = 46.119496
        long = 14.4611

    districtCln.append(lok)
    latitudeCln.append(lat)
    longitudeCln.append(long)

df2['Latitude'] = latitudeCln
df2['Longitude'] = longitudeCln
df2['Districts'] = districtCln
```

I also used Nominatim geolocator to get Ljubljana coordinates.

```
#geographical coordinates (latitude & longitude) of Ljubljana city
address = 'Ljubljana, Slovenia'

geolocator = Nominatim(user_agent="capstoneProject")
location = geolocator.geocode(address, timeout=60, exactly_one=True)
latitude = location.latitude
longitude = location.longitude
print('The decimal coordinates of Ljubljana are {}, {}'.format(latitude, longitude))
```

Then I used the Foursquare API to find all Italian restaurant in Ljubljana.

```
# list with the Italian restaurants in districts
```

```

italian_restaurant_categories = ['4bf58dd8d48988d1c0941735','4bf58dd8d48988d110941735',
'4bf58dd8d48988d1ca941735']
ljubljana_venues_ita_restaurant= pd.DataFrame(getNearbyVenues(names=df3['Districts'],
latitudes=df3['Latitude'], longitudes=df3['Longitude'], radius= 800,
categoryIds='4bf58dd8d48988d110941735'))
ljubljana_venues_italian = ljubljana_venues_ita_restaurant
for it_restoran in italian_restaurant_categories:
    ljubljana_venues_ita_restaurant= pd.DataFrame(getNearbyVenues(names=df3['Districts'],
latitudes=df3['Latitude'], longitudes=df3['Longitude'], radius= 800, categoryIds= it_restoran) )
    ljubljana_venues_italian = ljubljana_venues_italian.append(ljubljana_venues_ita_restaurant)

ljubljana_venues_italian['venue']=ljubljana_venues_italian['Venue']
ljubljana_venues_italian['district']=ljubljana_venues_italian['District']
ljubljana_venues_italian['venue category']=ljubljana_venues_italian['Venue Category']
ljubljana_venues_italian=ljubljana_venues_italian.groupby('Venue').first()
print('There are {} Italian restaurants in Ljubljana.'.format(ljubljana_venues_italian.shape[0]))
ljubljana_venues_italian

```

```

#district with the smallest distribution is Center district
#it means that in this district there is highest density of Italian restaurants
#in the table there is a list with Italian restaurant in district Center
ljubljana_venues_italian.shape
df4= ljubljana_venues_italian
df4_c= df4[df4['district'] == 'Center'].reset_index(drop=True)
df5=df4_c.drop(['District', 'District Latitude', 'District Longitude', 'Venue Category',
'district','venue category'], axis=1)
df5 = df5.reset_index()
df5=df5.drop(['index'], axis=1)
df5

```

Table 7: Italian restaurants in Ljubljana districts “Center”

District "Center" Italian restaurants	Latitude	Longitude
Apertivo	46,051403	14,504608
As Aperitivo	46,0514	14,50473
Capriccio	46,05235	14,511394
Emonska klet	46,050612	14,502283
Enjoy Italy	46,05276	14,502481
Fany & Mary	46,051823	14,508512
Foculus	46,048011	14,502157
Foodie	46,055904	14,504173
Julija	46,047964	14,506177
La Storia Trattoria	46,055786	14,501945
Maxim	46,049896	14,500976
Mediterraneo	46,050439	14,507726
Meta In Bazilika	46,04706	14,497362
Mirjams Pub	46,055111	14,503462
Paninoteka +	46,048459	14,505439

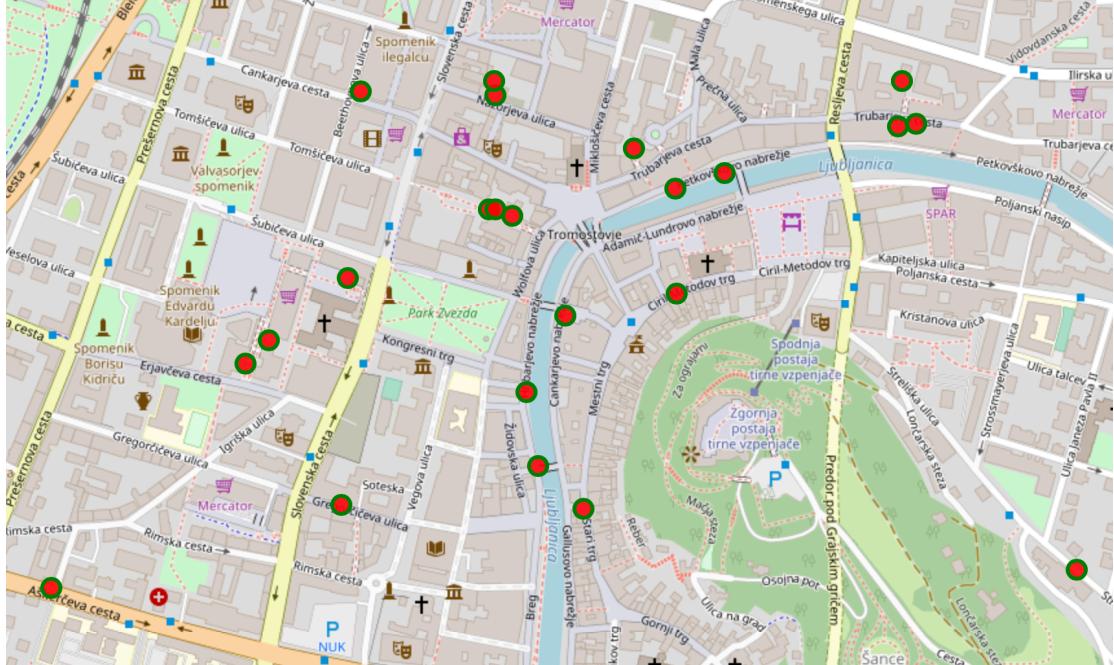
Picerija Osmica	46,052712	14,504729
Pinki	46,049413	14,517111
Pinsa Rustika	46,05238	14,511705
Pizza Cutty	46,05133	14,505009
Pizzeria Ljubljanski dvor	46,049298	14,505231
Pizzeria Parma	46,049625	14,50057
Pizzeria Tunnel	46,044795	14,510067
Pizzeria Šestinka	46,054715	14,507337
Pizzerija Trnovski zvon	46,043263	14,503798
Prince of Orange	46,05288	14,511455
Promenada Pizza	46,051646	14,507711
Restavracija Allegria	46,052879	14,504705
Restavracija Tartuf	46,052109	14,507008
Robin Food	46,055168	14,51122
Trta	46,043678	14,506567
Verace	46,047262	14,514356
Zlata Ribica	46,050177	14,505883

```
# create map of Ljubljana using latitude and longitude values
# on the map there will be shown:
# - all Italian restaurants in district Center
map_ljubljana_italian_center = folium.Map(location=[latitude, longitude], zoom_start=16)

# add markers to map: all Italian restaurants in district Center
for lat, lng, local in zip(df5['Venue Latitude'], df5['Venue Longitude'], df5['venue']):
    label = '{0}'.format(local)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=7,
        popup=label,
        color='green',
        fill=True,
        fill_color='red',
        fill_opacity=0.9).add_to(map_ljubljana_italian_center)

map_ljubljana_italian_center
```

Picture 4: Map of Italian restaurants in district “Center”



I used K-means clustering algorithm to complete two tasks.
First I find out centroid of Ljubljana sights.

```
#lets find out the centroid of the Ljubljana sights
lj_sights= ljubljana_data.reset_index(drop=True)

lj_sights_lat_lng = lj_sights[['Lat','Long']]
k_means = KMeans(init = "k-means++", n_clusters = 1, n_init = 10)
k_means.fit(lj_sights_lat_lng)

k_means_labels = k_means.labels_
k_means_labels
k_means_cluster_centers = k_means.cluster_centers_
k_means_cluster_centers
df_k_sight = pd.DataFrame(k_means_cluster_centers)
centroid= ['Centroid sight'] #, 'Centroid 2', 'Centroid 3', 'Centroid 4']
df_k_sight['Name']=centroid
df_4_sight = df_k_sight
df_4_sight.columns = ['Latitude', 'Longitude', 'Centroid']
```

	Latitude	Longitude	Centroid
0	46.051653	14.503397	Centroid sight

Secondly I search for centroid of Italian restaurant located in district “Center”.

```
#lets find out the centroid of the Italian restaurants in district Center
lj_it_center= ljubljana_venues_italian[ljubljana_venues_italian['district'] ==
'Center'].reset_index(drop=True)

lj_lat_lng_center = lj_it_center[['Venue Latitude','Venue Longitude']]
k_means = KMeans(init = "k-means++", n_clusters = 1, n_init = 10)
k_means.fit(lj_lat_lng_center )
```

```

k_means_labels = k_means.labels_
k_means_labels
k_means_cluster_centers = k_means.cluster_centers_
k_means_cluster_centers
df_k = pd.DataFrame(k_means_cluster_centers)

centroid= ['Centroid Italian restaurant'] #, 'Centroid 2', 'Centroid 3', 'Centroid 4']
df_k['Name']=centroid
df_4 = df_k
df_4.columns = ['Latitude', 'Longitude', 'Centroid']

```

	Latitude	Longitude	Centroid
0	46.050697	14.506184	Centroid Italian restaurant

The Folium library was used to visualize :

- centers of Ljubljana districts,
- Italian restaurants in Ljubljana,
- the most important sights in Ljubljana,
- centroid of sights in Ljubljana,
- centroid of Italian restaurants in district “Center”.

Based on dataframe analysis above, I found out that district “Center” has the highest number of Italian restaurants.

With the combined data it is possible to locate the most promising district.

IV. Results

```

#lets find out the centroid of the Italian restaurants in district Center

lj_it_center= ljubljana_venues_italian[ljubljana_venues_italian['district'] ==
'Center'].reset_index(drop=True)

lj_lat_lng_center = lj_it_center[['Venue Latitude','Venue Longitude']]
k_means = KMeans(init = "k-means++", n_clusters = 1, n_init = 10)
k_means.fit(lj_lat_lng_center )

k_means_labels = k_means.labels_
k_means_labels
k_means_cluster_centers = k_means.cluster_centers_
k_means_cluster_centers
df_k = pd.DataFrame(k_means_cluster_centers)

centroid= ['Centroid Italian restaurant'] #, 'Centroid 2', 'Centroid 3', 'Centroid 4'
df_k['Name']=centroid
df_4 = df_k
df_4.columns = ['Latitude', 'Longitude', 'Centroid']

```

```
# create map of Ljubljana using latitude and longitude values
```

```

# on the map there will be shown:
# - centroid of Italian restaurants in district Center,
# - centroid of the most important touristic sights in Ljubljana,
# - all Italian restaurants in district Center
# - the most important touristic sights in Ljubljana

map_ljubljana_italian_centroid = folium.Map(location=[latitude, longitude], zoom_start=16)

# add markers to map: centroid of Italian restaurants in district Center
for lat, lng, local in zip(df_4['Latitude'], df_4['Longitude'], df_4['Centroid']):
    label = '{}'.format(local)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=30,
        popup=label,
        color='red',
        fill=True,
        fill_color='black',
        fill_opacity=0.3).add_to(map_ljubljana_italian_centroid)

# add markers to map: centroid of Italian restaurants in district Center
for lat, lng, local in zip(df_4['Latitude'], df_4['Longitude'], df_4['Centroid']):
    label = '{}'.format(local)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=30,
        popup=label,
        color='red',
        fill=True,
        fill_color='black',
        fill_opacity=0.3).add_to(map_ljubljana_italian_centroid)

# add markers to map: centroid of the most important touristic sights in Ljubljana
for lat, lng, local in zip(df_4_sight['Latitude'], df_4_sight['Longitude'], df_4_sight['Centroid']):
    label = '{}'.format(local)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=30,
        popup=label,
        color='yellow',
        fill=True,
        fill_color='black',
        fill_opacity=0.3).add_to(map_ljubljana_italian_centroid)

# add markers to map: all Italian restaurants in district Center
for lat, lng, local in zip(df5['Venue Latitude'], df5['Venue Longitude'], df5['venue']):
    label = '{}'.format(local)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=7,
        popup=label,
        color='green',
        fill=True,
        fill_color='red',

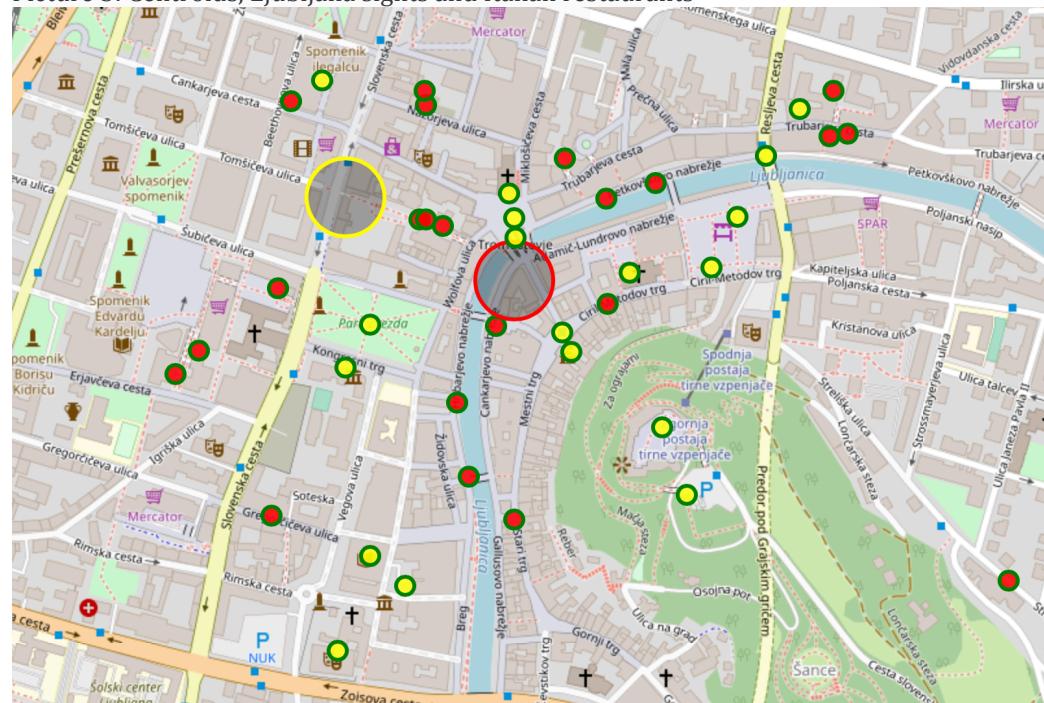
```

```
fill_opacity=0.9).add_to(map_ljubljana_italian_centroid)
```

```
# add markers to map: the most important touristic sights in Ljubljana
for lat, lng, label in zip(ljubljana_data['Lat'], ljubljana_data['Long'], ljubljana_data['Place']):
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=7,
        popup=label,
        color='green',
        fill=True,
        fill_color='yellow',
        fill_opacity=0.9,
        parse_html=False).add_to(map_ljubljana_italian_centroid)
```

map_ljubljana_italian_centroid

Picture 5: Centroids, Ljubljana sights and Italian restaurants



V. Discussion

In this project I maked only one cluster which gave me only one location for a new restaurant. For more refine decision it would be appropriate to give new restaurant owner few new locations.

At this point, it is missing a systematic, quantitative way to identify and distinguish different Italian restaurants and to describe the correlation between them with other parameters recorded in Foursquare, which I could not pulled out.

A further step in this classification would be to find a precise location/address, base by some parameters which would impact on the decision.

I believe that the proposed classification is enough useful to be used in reality. Further studies are indeed needed in order to relate the data acquired, then observe it to more meaningful and objective results.

VI. Conclusion

Using Foursquare API, it is possible to captured data of common places all around the world. Using it, we refer back to our main objectives, which is to determine;

- the type of the restaurant,
- classification of city district.

In conclusion the district “Center” actually attracts most of Ljubljana visitors. However, to decide the precise location is very difficult. There are many parameters which must be included in analysis for example: real estate prices, choice between renting or buying the restaurant place and so on.

With the correlation between two centroids (sights and Italian restaurants) which are located in the same district, I can propose that district “Center” is the best district to open new Italian restaurant.