Capstone Project - The Battle of Neighborhoods (Week 2)

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Introduction: Business Problem

Due to the **Covid-19 crisis**, many businesses have had to close. I have been able to appreciate this horrible situation especially in the neighborhood where I live.

When the novel coronavirus pandemic initially hit back in March and politicians ordered all restaurants and bars to close to in-room dining, a panic soared throughout the hospitality industry. Thousands of establishments shut their doors immediately for indoor dining, leaving countless people out of work. Many questions arose: When could restaurants fully reopen? How many might not return? What would the landscape look like with so much restaurant vacancy?

I'm going to analyze the number of food businesses in the area where I live to see if it would be a good business opportunity to open a restaurant at this moment. It is a good way to revive the economy and bring the neighborhood back to life.

Data

I am going to check the restaurants in my neighborhoods and analyze the most surrounding areas to conclude if there are business opportunities for food places at the moment.

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

- number of existing restaurants in the neighborhood (any type of restaurant)
- number of and distance to different sports centers in the neighborhood, if any

I will import the coordinates of my neighborhood and visualize using **Foursquare API** the restaurants and bars that are nearby. Also,I wil show the different sport centers as it is very typical to have a drink after doing sports with friends. I'm gonna use Folium for the graphics.

Import necessary libraries

```
In [2]:  import requests # library to handle requests
         import pandas as pd # library for data analsysis
         import numpy as np # library to handle data in a vectorized manner
         import random # library for random number generation

         !conda install -c conda-forge geopy --yes
         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

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

         !conda install -c conda-forge folium=0.5.0 --yes
         import folium # plotting library

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

```
Requirement already satisfied: geopy in /opt/conda/envs/Python36/lib/python3.6/site-packages (2.0.0)
Requirement already satisfied: geographiclib<2,>=1.49 in /opt/conda/envs/Python36/lib/python3.6/site-packag
es (from geopy) (1.50)
Solving environment: done

# All requested packages already installed.

Solving environment: done

# All requested packages already installed.

Libraries imported.
```

Define Foursquare Credentials and Version

```
In [351]:  # @hidden_cell
           CLIENT_ID = 'ET2ZUTRFK1440YYWTR3VSKMMIZBHTUHN10WOMR5OACTNX05Y' # your Foursquare ID
           CLIENT_SECRET = 'EBLM42LFLGGPLXXGBALASOP2SKXNFPBUHRWIGY1LM4SAZQ5A' # your Foursquare Secret
           VERSION = '20180604'
           LIMIT = 50
```

Let's visualize the restaurants that are nearby

```
In [352]:  address = 'Plaza De Peña Horcajo, Madrid, Spain'

           geolocator = Nominatim(user_agent="foursquare_agent")
           location = geolocator.geocode(address)
           latitude = location.latitude
           longitude = location.longitude
           print('The geograpical coordinates of my neighborhood are {}, {}.'.format(latitude, longitude))
```

```
The geograpical coordinates of my neighborhood are 40.4846746, -3.7218096.
```

```
In [353]: map_lacoma = folium.Map(location=[latitude, longitude], zoom_start=15)
          folium.Marker([latitude, longitude], popup='Point of interest').add_to(map_lacoma)

          map_lacoma

Out[353]: Make this Notebook Trusted to load map: File -> Trust Notebook
```

```
In [354]: radius = 1000
          food_category = '4d4b7105d754a06374d81259'
          url = 'https://api.foursquare.com/v2/venues/explore?client_id={}&client_secret={}&ll={},{}&v={}&radius={}&li
          mit={}'.format(CLIENT_ID, CLIENT_SECRET, latitude, longitude, VERSION, radius, LIMIT)
          import requests
          results = requests.get(url).json()
          items = results['response']['groups'][0]['items']
```

```
In [355]: dataframe = json_normalize(items) # flatten JSON

          # filter columns
          filtered_columns = ['venue.name', 'venue.categories'] + [col for col in dataframe.columns if col.startswith(
          'venue.location.')] + ['venue.id']
          dataframe_filtered = dataframe.loc[:, filtered_columns]

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

          # clean columns
          dataframe_filtered.columns = [col.split('.')[-1] for col in dataframe_filtered.columns]

          dataframe_filtered.head(50)
```

Out[355]:

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	
0	El Viejo Almacén de Buenos Aires	Argentinian Restaurant	C. Ramón Gómez de la Serna, 4	ES	Madrid	España	NaN	416	[C. Ramón Gómez de la Serna, 4, 28035 Madrid M...	[{'label': 'display', 'lat': 40.48112446689104...	40.4811
1	Tras Os Montes	Seafood Restaurant	Senda del Infante 28	ES	Madrid	España	NaN	730	[Senda del Infante 28, 28049 Madrid Madrid, Es...	[{'label': 'display', 'lat': 40.49122842350793...	40.4912
2	La Alternativa	Brewery	NaN	ES	Madrid Centro, Madrid	España	NaN	366	[Madrid Centro Madrid, España]	[{'label': 'display', 'lat': 40.48678467998688...	40.4867
3	Akira Comics	Comic Shop	Av de Betanzos, 74	ES	Madrid	España	Fermín Caballero	725	[Av de Betanzos, 74 (Fermín Caballero), 28034 ...	[{'label': 'display', 'lat': 40.48210086100509...	40.4821
4	CDM Go Fit Peñagrande	Gym / Fitness Center	Avenida Monforte de Lemos, 184	ES	Madrid	España	NaN	923	[Avenida Monforte de Lemos, 184, 28035 Madrid ...	[{'label': 'display', 'lat': 40.47706381409571...	40.4770
5	La Maso Sport Center - Padel	Sports Club	Calle de la Masó, 34	ES	Madrid	España	NaN	863	[Calle de la Masó, 34, 28034 Madrid Madrid, Es...	[{'label': 'display', 'lat': 40.489904, 'lng':...	40.4899
6	Singapur	Chinese Restaurant	C. Mirador de la Reina, 99	ES	Madrid	España	NaN	555	[C. Mirador de la Reina, 99, 28035 Madrid Madr...	[{'label': 'display', 'lat': 40.48914619140871...	40.4891
7	Los Granadinos	Tapas Restaurant	Av del Cardenal Herrera Oria, 248	ES	Madrid	España	NaN	402	[Av del Cardenal Herrera Oria, 248, 28035 Madr...	[{'label': 'display', 'lat': 40.48112023451070...	40.4811
8	Cala Millor	Bakery	C. Fermín Caballero, 70	ES	Madrid	España	Av. Betanzos	861	[C. Fermín Caballero, 70 (Av. Betanzos), 28034...	[{'label': 'display', 'lat': 40.48215283169287...	40.4821
9	Body Factory Mirasierra	Gym	C/ Valle de en medio 15	ES	Madrid	España	NaN	548	[C/ Valle de en medio 15, Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48838053202037...	40.4883
10	The Clover Irish Tavern	Pub	C. Valle de Pinares Llanos, 8	ES	Madrid	España	NaN	303	[C. Valle de Pinares Llanos, 8, 28035 Madrid M...	[{'label': 'display', 'lat': 40.4858706510018,...	40.4858
11	Churreria Avenida	Café	C. Cerro Minguete, 16	ES	Madrid	España	NaN	356	[C. Cerro Minguete, 16, 28035 Madrid Madrid, E...	[{'label': 'display', 'lat': 40.487003559763, ...	40.4870
12	Mesón Las Vegas	Spanish Restaurant	Calle de la Isla de Arosa, 29, 28035 Madrid	ES	Madrid	España	NaN	650	[Calle de la Isla de Arosa, 29, 28035 Madrid, ...	[{'label': 'display', 'lat': 40.48034557270606...	40.4803
13	Ginos Mirasierra	Italian Restaurant	C. del Mirador de la Reina, 107	ES	Madrid	España	NaN	660	[C. del Mirador de la Reina, 107, 28035 Madrid...	[{'label': 'display', 'lat': 40.49059779325799...	40.4905
14	Peggy Sue's	Diner	Av. Monforte de Lemos 185	ES	Madrid	España	NaN	960	[Av. Monforte de Lemos 185, 28035 Madrid Madri...	[{'label': 'display', 'lat': 40.47651545133406...	40.4765
15	Supercor Express	Food & Drink Shop	C/ Cerro Minguete, 9	ES	Madrid	España	NaN	308	[C/ Cerro Minguete, 9, 28035 Madrid Madrid, Es...	[{'label': 'display', 'lat': 40.48700313082754...	40.4870
16	Bonsai	Chinese Restaurant	Valle Pinares Llanos, 8	ES	Madrid	España	NaN	330	[Valle Pinares Llanos, 8, 28035 Madrid Madrid,...	[{'label': 'display', 'lat': 40.48579063622070...	40.4857
17	Lazcano	Café	NaN	ES	NaN	España	NaN	601	[España]	[{'label': 'display', 'lat': 40.48818724029966...	40.4881
18	La Ponderosa Bar	Tapas Restaurant	Av. Cardenal Herrera Oria, 231	ES	Madrid	España	NaN	459	[Av. Cardenal Herrera Oria, 231, 28034 Madrid ...	[{'label': 'display', 'lat': 40.48212002479462...	40.4821
19	Los Granadinos	Bar	C. Leopoldo Alas Clarín, 53	ES	Madrid	España	NaN	74	[C. Leopoldo Alas Clarín, 53, 28035 Madrid Mad...	[{'label': 'display', 'lat': 40.48454075118334...	40.4845
20	Polideportivo La Masó	Athletics & Sports	C. La Masó, 80	ES	Madrid	España	Av. Ventisquero de la Condesa	546	[C. La Masó, 80 (Av. Ventisquero de la Condesa...	[{'label': 'display', 'lat': 40.48450797800188...	40.4845

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	
21	SuperCor Exprés	Convenience Store	NaN	ES	NaN	España	NaN	985	[España]	[{'label': 'display', 'lat': 40.4759056665114,...	40.4759
22	Cervecería Granada	Bar	NaN	ES	Madrid	España	NaN	131	[Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48474093558645...	40.4847
23	Campo de Fútbol de Lacoma	BBQ Joint	Calle Ramón Gómez de la Serna	ES	Madrid	España	NaN	139	[Calle Ramón Gómez de la Serna, Madrid Madrid,...	[{'label': 'display', 'lat': 40.48484263040647...	40.4848
24	Polideportivo Isla Tabarca	Soccer Field	NaN	ES	NaN	España	NaN	871	[España]	[{'label': 'display', 'lat': 40.47687381375908...	40.4768
25	El Mirador	Restaurant	Calle Mirador de la Reina 99	ES	Madrid	España	Cerro de Álamos Blancos	543	[Calle Mirador de la Reina 99 (Cerro de Álamos...	[{'label': 'display', 'lat': 40.489086, 'lng':...	40.4890
26	VIPS Mirasierra	Burger Joint	C. Mirador de la Reina, 107	ES	Madrid	España	NaN	663	[C. Mirador de la Reina, 107, 28035 Madrid Mad...	[{'label': 'display', 'lat': 40.49061956122534...	40.4906
27	Instalación Deportiva Valdeyeros	Soccer Field	Rosalía de Castro	ES	Madrid	España	NaN	725	[Rosalía de Castro, Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48385972087871...	40.4838
28	Starving Conciertos	Bar	C. Fermín Caballero, 69	ES	Madrid	España	NaN	937	[C. Fermín Caballero, 69, 28029 Madrid Madrid,...	[{'label': 'display', 'lat': 40.48199789977096...	40.4819
29	Ginos Monforte de Lemos	Italian Restaurant	Av. Monforte de Lemos, 193	ES	Madrid	España	NaN	980	[Av. Monforte de Lemos, 193, 28035 Madrid Madr...	[{'label': 'display', 'lat': 40.47600665515477...	40.4760
30	Bar Carmelo	Breakfast Spot	Isla de Saipán 73	ES	Madrid	España	NaN	923	[Isla de Saipán 73, 28035 Madrid Madrid, España]	[{'label': 'display', 'lat': 40.47923696814644...	40.4792
31	Gama	Grocery Store	La maso 2	ES	Madrid	España	NaN	965	[La maso 2, Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48176480591085...	40.4817
32	Restaurante Tres Carro's	Restaurant	Alfonso Rodríguez Castelao	ES	NaN	España	NaN	983	[Alfonso Rodríguez Castelao, España]	[{'label': 'display', 'lat': 40.48205674009662...	40.4820

```
In [356]: #Cleaning
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'Comic Shop') ].index , inp
          lace=True)
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'Bakery') ].index , inplace
          =True)
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'Café') ].index , inplace=T
          rue)
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'Food & Drink Shop') ].inde
          x , inplace=True)
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'Convenience Store') ].inde
          x , inplace=True)
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'BBQ Joint') ].index , inpl
          ace=True)
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'Soccer Field') ].index , i
          nplace=True)
          dataframe_filtered.drop(dataframe_filtered[ (dataframe_filtered['categories'] == 'Grocery Store') ].index ,
          inplace=True)
          dataframe_filtered.reset_index(inplace=True, drop=True)
          dataframe_filtered.head(32)
```

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	la
0	El Viejo Almacén de Buenos Aires	Argentinian Restaurant	C. Ramón Gómez de la Serna, 4	ES	Madrid	España	NaN	416	[C. Ramón Gómez de la Serna, 4, 28035 Madrid M...	[{'label': 'display', 'lat': 40.48112446689104...	40.48112
1	Tras Os Montes	Seafood Restaurant	Senda del Infante 28	ES	Madrid	España	NaN	730	[Senda del Infante 28, 28049 Madrid Madrid, Es...	[{'label': 'display', 'lat': 40.49122842350793...	40.49122
2	La Alternativa	Brewery	NaN	ES	Madrid Centro, Madrid	España	NaN	366	[Madrid Centro Madrid, España]	[{'label': 'display', 'lat': 40.48678467998688...	40.48678
3	CDM Go Fit Peñagrande	Gym / Fitness Center	Avenida Monforte de Lemos, 184	ES	Madrid	España	NaN	923	[Avenida Monforte de Lemos, 184, 28035 Madrid ...	[{'label': 'display', 'lat': 40.47706381409571...	40.47706
4	La Maso Sport Center - Padel	Sports Club	Calle de la Masó, 34	ES	Madrid	España	NaN	863	[Calle de la Masó, 34, 28034 Madrid Madrid, Es...	[{'label': 'display', 'lat': 40.489904, 'lng':...	40.48990
5	Singapur	Chinese Restaurant	C. Mirador de la Reina, 99	ES	Madrid	España	NaN	555	[C. Mirador de la Reina, 99, 28035 Madrid Madr...	[{'label': 'display', 'lat': 40.48914619140871...	40.48914
6	Los Granadinos	Tapas Restaurant	Av del Cardenal Herrera Oria, 248	ES	Madrid	España	NaN	402	[Av del Cardenal Herrera Oria, 248, 28035 Madr...	[{'label': 'display', 'lat': 40.48112023451070...	40.48112
7	Body Factory Mirasierra	Gym	C/ Valle de en medio 15	ES	Madrid	España	NaN	548	[C/ Valle de en medio 15, Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48838053202037...	40.48838
8	The Clover Irish Tavern	Pub	C. Valle de Pinares Llanos, 8	ES	Madrid	España	NaN	303	[C. Valle de Pinares Llanos, 8, 28035 Madrid M...	[{'label': 'display', 'lat': 40.4858706510018,...	40.48587
9	Mesón Las Vegas	Spanish Restaurant	Calle de la Isla de Arosa, 29, 28035 Madrid	ES	Madrid	España	NaN	650	[Calle de la Isla de Arosa, 29, 28035 Madrid, ...	[{'label': 'display', 'lat': 40.48034557270606...	40.48034
10	Ginos Mirasierra	Italian Restaurant	C. del Mirador de la Reina, 107	ES	Madrid	España	NaN	660	[C. del Mirador de la Reina, 107, 28035 Madrid...	[{'label': 'display', 'lat': 40.49059779325799...	40.49059
11	Peggy Sue's	Diner	Av. Monforte de Lemos 185	ES	Madrid	España	NaN	960	[Av. Monforte de Lemos 185, 28035 Madrid Madri...	[{'label': 'display', 'lat': 40.47651545133406...	40.47651
12	Bonsai	Chinese Restaurant	Valle Pinares Llanos, 8	ES	Madrid	España	NaN	330	[Valle Pinares Llanos, 8, 28035 Madrid Madrid,...	[{'label': 'display', 'lat': 40.48579063622070...	40.48579
13	La Ponderosa Bar	Tapas Restaurant	Av. Cardenal Herrera Oria, 231	ES	Madrid	España	NaN	459	[Av. Cardenal Herrera Oria, 231, 28034 Madrid ...	[{'label': 'display', 'lat': 40.48212002479462...	40.48212
14	Los Granadinos	Bar	C. Leopoldo Alas Clarín, 53	ES	Madrid	España	NaN	74	[C. Leopoldo Alas Clarín, 53, 28035 Madrid Mad...	[{'label': 'display', 'lat': 40.48454075118334...	40.48454
15	Polideportivo La Masó	Athletics & Sports	C. La Masó, 80	ES	Madrid	España	Av. Ventisquero de la Condesa	546	[C. La Masó, 80 (Av. Ventisquero de la Condesa...	[{'label': 'display', 'lat': 40.48450797800188...	40.48450
16	Cervecería Granada	Bar	NaN	ES	Madrid	España	NaN	131	[Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48474093558645...	40.48474
17	El Mirador	Restaurant	Calle Mirador de la Reina 99	ES	Madrid	España	Cerro de Álamos Blancos	543	[Calle Mirador de la Reina 99 (Cerro de Álamos...	[{'label': 'display', 'lat': 40.489086, 'lng':...	40.48908
18	VIPS Mirasierra	Burger Joint	C. Mirador de la Reina, 107	ES	Madrid	España	NaN	663	[C. Mirador de la Reina, 107, 28035 Madrid Mad...	[{'label': 'display', 'lat': 40.49061956122534...	40.49062
19	Starving Conciertos	Bar	C. Fermin Caballero, 69	ES	Madrid	España	NaN	937	[C. Fermin Caballero, 69, 28029 Madrid Madrid,...	[{'label': 'display', 'lat': 40.48199789977096...	40.48199

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	la
20	Ginos Monforte de Lemos	Italian Restaurant	Av. Monforte de Lemos, 193	ES	Madrid	España	NaN	980	[Av. Monforte de Lemos, 193, 28035 Madrid Madr...	[{'label': 'display', 'lat': 40.47600665515477...	40.47600
21	Bar Carmelo	Breakfast Spot	Isla de Saipán 73	ES	Madrid	España	NaN	923	[Isla de Saipán 73, 28035 Madrid Madrid, España]	[{'label': 'display', 'lat': 40.47923696814644...	40.47923
22	Restaurante Tres Carro's	Restaurant	Alfonso Rodríguez Castelao	ES	NaN	España	NaN	983	[Alfonso Rodríguez Castelao, España]	[{'label': 'display', 'lat': 40.48205674009662...	40.48205

In [357]:
```python
#Bar
dataframe_filtered_bar = dataframe_filtered.iloc[0:0,:].copy()
cond = (dataframe_filtered['categories'] == 'Brewery')
rows = dataframe_filtered.loc[cond, :]
dataframe_filtered_bar = dataframe_filtered_bar.append(rows, ignore_index=True)
dataframe_filtered.drop(rows.index, inplace=True)

dataframe_filtered_bar.drop(dataframe_filtered_bar.index, inplace=True)
cond = (dataframe_filtered['categories'] == 'Bar')
rows = dataframe_filtered.loc[cond, :]
dataframe_filtered_bar = dataframe_filtered_bar.append(rows, ignore_index=True)
dataframe_filtered.drop(rows.index, inplace=True)

cond = (dataframe_filtered['categories'] == 'Breakfast Spot')
rows = dataframe_filtered.loc[cond, :]
dataframe_filtered_bar = dataframe_filtered_bar.append(rows, ignore_index=True)
dataframe_filtered.drop(rows.index, inplace=True)

cond = (dataframe_filtered['categories'] == 'Snack Place')
rows = dataframe_filtered.loc[cond, :]
dataframe_filtered_bar = dataframe_filtered_bar.append(rows, ignore_index=True)
dataframe_filtered.drop(rows.index, inplace=True)

cond = (dataframe_filtered['categories'] == 'Tapas Restaurant')
rows = dataframe_filtered.loc[cond, :]
dataframe_filtered_bar = dataframe_filtered_bar.append(rows, ignore_index=True)
dataframe_filtered.drop(rows.index, inplace=True)

cond = (dataframe_filtered['categories'] == 'Pub')
rows = dataframe_filtered.loc[cond, :]
dataframe_filtered_bar = dataframe_filtered_bar.append(rows, ignore_index=True)
dataframe_filtered.drop(rows.index, inplace=True)

dataframe_filtered_bar.reset_index(inplace=True, drop=True)
dataframe_filtered_bar.head(40)
```

Out[357]:

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	lat
0	Los Granadinos	Bar	C. Leopoldo Alas Clarín, 53	ES	Madrid	España	NaN	74	[C. Leopoldo Alas Clarín, 53, 28035 Madrid Mad...	[{'label': 'display', 'lat': 40.48454075118334...	40.484541
1	Cervecería Granada	Bar	NaN	ES	Madrid	España	NaN	131	[Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48474093558645...	40.484741
2	Starving Conciertos	Bar	C. Fermin Caballero, 69	ES	Madrid	España	NaN	937	[C. Fermin Caballero, 69, 28029 Madrid Madrid,...	[{'label': 'display', 'lat': 40.48199789977096...	40.481998
3	Bar Carmelo	Breakfast Spot	Isla de Saipán 73	ES	Madrid	España	NaN	923	[Isla de Saipán 73, 28035 Madrid Madrid, España]	[{'label': 'display', 'lat': 40.47923696814644...	40.479237
4	Los Granadinos	Tapas Restaurant	Av del Cardenal Herrera Oria, 248	ES	Madrid	España	NaN	402	[Av del Cardenal Herrera Oria, 248, 28035 Madr...	[{'label': 'display', 'lat': 40.48112023451070...	40.481120
5	La Ponderosa Bar	Tapas Restaurant	Av. Cardenal Herrera Oria, 231	ES	Madrid	España	NaN	459	[Av. Cardenal Herrera Oria, 231, 28034 Madrid ...	[{'label': 'display', 'lat': 40.48212002479462...	40.482120
6	The Clover Irish Tavern	Pub	C. Valle de Pinares Llanos, 8	ES	Madrid	España	NaN	303	[C. Valle de Pinares Llanos, 8, 28035 Madrid M...	[{'label': 'display', 'lat': 40.4858706510018,...	40.485871

```
In [358]: #Sports
          dataframe_filtered_sport = dataframe_filtered.iloc[0:0,:].copy()
          cond = (dataframe_filtered['categories'] == 'Gym / Fitness Center')
          rows = dataframe_filtered.loc[cond, :]
          dataframe_filtered_sport = dataframe_filtered_sport.append(rows, ignore_index=True)
          dataframe_filtered.drop(rows.index, inplace=True)

          cond = (dataframe_filtered['categories'] == 'Sports Club')
          rows = dataframe_filtered.loc[cond, :]
          dataframe_filtered_sport = dataframe_filtered_sport.append(rows, ignore_index=True)
          dataframe_filtered.drop(rows.index, inplace=True)

          cond = (dataframe_filtered['categories'] == 'Gym')
          rows = dataframe_filtered.loc[cond, :]
          dataframe_filtered_sport = dataframe_filtered_sport.append(rows, ignore_index=True)
          dataframe_filtered.drop(rows.index, inplace=True)

          cond = (dataframe_filtered['categories'] == 'Athletics & Sports')
          rows = dataframe_filtered.loc[cond, :]
          dataframe_filtered_sport = dataframe_filtered_sport.append(rows, ignore_index=True)
          dataframe_filtered.drop(rows.index, inplace=True)

          dataframe_filtered_sport.reset_index(inplace=True, drop=True)
          dataframe_filtered_sport.head(40)
```

Out[358]:

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	lat
0	CDM Go Fit Peñagrande	Gym / Fitness Center	Avenida Monforte de Lemos, 184	ES	Madrid	España	NaN	923	[Avenida Monforte de Lemos, 184, 28035 Madrid ...	[{'label': 'display', 'lat': 40.47706381409571...	40.477064
1	La Maso Sport Center - Padel	Sports Club	Calle de la Masó, 34	ES	Madrid	España	NaN	863	[Calle de la Masó, 34, 28034 Madrid Madrid, Es...	[{'label': 'display', 'lat': 40.489904, 'lng':...	40.489904
2	Body Factory Mirasierra	Gym	C/ Valle de en medio 15	ES	Madrid	España	NaN	548	[C/ Valle de en medio 15, Madrid Madrid, España]	[{'label': 'display', 'lat': 40.48838053202037...	40.488381
3	Polideportivo La Masó	Athletics & Sports	C. La Masó, 80	ES	Madrid	España	Av. Ventisquero de la Condesa	546	[C. La Masó, 80 (Av. Ventisquero de la Condesa...	[{'label': 'display', 'lat': 40.48450797800188...	40.484508

```
In [359]: dataframe_filtered.reset_index(inplace=True, drop=True)
          dataframe_filtered.head(40)
```

Out[359]:

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	lat
0	El Viejo Almacén de Buenos Aires	Argentinian Restaurant	C. Ramón Gómez de la Serna, 4	ES	Madrid	España	NaN	416	[C. Ramón Gómez de la Serna, 4, 28035 Madrid M...	[{'label': 'display', 'lat': 40.48112446689104...	40.481124
1	Tras Os Montes	Seafood Restaurant	Senda del Infante 28	ES	Madrid	España	NaN	730	[Senda del Infante 28, 28049 Madrid Madrid, Es...	[{'label': 'display', 'lat': 40.49122842350793...	40.491228
2	Singapur	Chinese Restaurant	C. Mirador de la Reina, 99	ES	Madrid	España	NaN	555	[C. Mirador de la Reina, 99, 28035 Madrid Madr...	[{'label': 'display', 'lat': 40.48914619140871...	40.489146
3	Mesón Las Vegas	Spanish Restaurant	Calle de la Isla de Arosa, 29, 28035 Madrid	ES	Madrid	España	NaN	650	[Calle de la Isla de Arosa, 29, 28035 Madrid, ...	[{'label': 'display', 'lat': 40.48034557270606...	40.480346
4	Ginos Mirasierra	Italian Restaurant	C. del Mirador de la Reina, 107	ES	Madrid	España	NaN	660	[C. del Mirador de la Reina, 107, 28035 Madrid...	[{'label': 'display', 'lat': 40.49059779325799...	40.490598
5	Peggy Sue's	Diner	Av. Monforte de Lemos 185	ES	Madrid	España	NaN	960	[Av. Monforte de Lemos 185, 28035 Madrid Madri...	[{'label': 'display', 'lat': 40.47651545133406...	40.476515
6	Bonsai	Chinese Restaurant	Valle Pinares Llanos, 8	ES	Madrid	España	NaN	330	[Valle Pinares Llanos, 8, 28035 Madrid Madrid,...	[{'label': 'display', 'lat': 40.48579063622070...	40.485791
7	El Mirador	Restaurant	Calle Mirador de la Reina 99	ES	Madrid	España	Cerro de Álamos Blancos	543	[Calle Mirador de la Reina 99 (Cerro de Álamos...	[{'label': 'display', 'lat': 40.489086, 'lng':...	40.489086
8	VIPS Mirasierra	Burger Joint	C. Mirador de la Reina, 107	ES	Madrid	España	NaN	663	[C. Mirador de la Reina, 107, 28035 Madrid Mad...	[{'label': 'display', 'lat': 40.49061956122534...	40.490620
9	Ginos Monforte de Lemos	Italian Restaurant	Av. Monforte de Lemos, 193	ES	Madrid	España	NaN	980	[Av. Monforte de Lemos, 193, 28035 Madrid Madr...	[{'label': 'display', 'lat': 40.47600665515477...	40.476007
10	Restaurante Tres Carro's	Restaurant	Alfonso Rodríguez Castelao	ES	NaN	España	NaN	983	[Alfonso Rodríguez Castelao, España]	[{'label': 'display', 'lat': 40.48205674009662...	40.482057

Methodology

In this project I'm trying to detect the areas of my neighborhood that have low restaurant density. I will limit my analysis to a radius of ~1km around the metro station.

In the first step, I have collected the required data: location and type (category) of every restaurant within 1km from the metro station of the neighborhood (Lacoma). I have also identified restaurants nearby (according to Foursquare categorization).

In the second step in my analysis, I will be calculating and exploring the different restaurant radius to identify a few promising areas close to the metro station with low number of restaurants in general, and focus our attention on those areas.

In the third and final step, I will analyze different sport services that are nearby the selected area to complete de studio. In the neighborhood, it is very typical to have a drink or have dinner around sports activities.

Analysis

Let's take a look at the restaurants and pubs in the area.

```
In [360]: venues_map = folium.Map(location=[latitude, longitude], zoom_start=15) # generate map centred around the met
          ro station

          # add a red circle marker to represent the metro station
          folium.features.CircleMarker(
              [latitude, longitude],
              radius=10,
              color='black',
              popup='Metro Station',
              fill = True,
              fill_color = 'black',
              fill_opacity = 0.6
          ).add_to(venues_map)

          for lat, lng, label in zip(dataframe_filtered.lat, dataframe_filtered.lng, dataframe_filtered.categories):
              folium.features.CircleMarker(
                  [lat, lng],
                  radius=5,
                  color='blue',
                  popup=label,
                  fill = True,
                  fill_color='blue',
                  fill_opacity=0.6
              ).add_to(venues_map)

          for lat, lng, label in zip(dataframe_filtered_bar.lat, dataframe_filtered_bar.lng, dataframe_filtered_bar.ca
          tegories):
              folium.features.CircleMarker(
                  [lat, lng],
                  radius=5,
                  color='red',
                  popup=label,
                  fill = True,
                  fill_color='red',
                  fill_opacity=0.6
              ).add_to(venues_map)

          folium.Circle([latitude, longitude], radius=250, fill=False, color='black').add_to(venues_map)
          folium.Circle([latitude, longitude], radius=500, fill=False, color='black').add_to(venues_map)
          folium.Circle([latitude, longitude], radius=1000, fill=False, color='black').add_to(venues_map)

          # display map
          venues_map
```

Out[360]: Make this Notebook Trusted to load map: File -> Trust Notebook

Let's take a look at the sports centers also, as it is very typical to have a drink after sports with friends in the area.

```
In [362]:  venues_map = folium.Map(location=[latitude, longitude], zoom_start=15) # generate map centred around the met
           ro station

           # add a red circle marker to represent the metro station
           folium.features.CircleMarker(
               [latitude, longitude],
               radius=10,
               color='black',
               popup='Metro Station',
               fill = True,
               fill_color = 'black',
               fill_opacity = 0.6
           ).add_to(venues_map)

           for lat, lng, label in zip(dataframe_filtered.lat, dataframe_filtered.lng, dataframe_filtered.categories):
               folium.features.CircleMarker(
                   [lat, lng],
                   radius=5,
                   color='blue',
                   popup=label,
                   fill = True,
                   fill_color='blue',
                   fill_opacity=0.6
               ).add_to(venues_map)

           for lat, lng, label in zip(dataframe_filtered_bar.lat, dataframe_filtered_bar.lng, dataframe_filtered_bar.ca
           tegories):
               folium.features.CircleMarker(
                   [lat, lng],
                   radius=5,
                   color='red',
                   popup=label,
                   fill = True,
                   fill_color='red',
                   fill_opacity=0.6
               ).add_to(venues_map)

           for lat, lng, label in zip(dataframe_filtered_sport.lat, dataframe_filtered_sport.lng, dataframe_filtered_sp
           ort.categories):
               folium.features.CircleMarker(
                   [lat, lng],
                   radius=8,
                   color='green',
                   popup=label,
                   fill = True,
                   fill_color='green',
                   fill_opacity=0.6
               ).add_to(venues_map)

           folium.Circle([latitude, longitude], radius=250, fill=False, color='black').add_to(venues_map)
           folium.Circle([latitude, longitude], radius=500, fill=False, color='black').add_to(venues_map)
           folium.Circle([latitude, longitude], radius=1000, fill=False, color='black').add_to(venues_map)

           # display map
           venues_map
```

Results and Discussion

The analysis shows that although there is a good number of food places in the neighborhood (~33 in our area of interest which was 1km around the metro station), there are pockets of low food service density fairly close to sports centers. Highest concentration of restaurants was detected north and south from the metro station, so we focused our attention to east area, corresponding to a high concentration of sport centers and low food and drink services. Another borough was identified as potentially interesting (Peñagrande, south-west from the metro) as it has only one bar and two restaurants, but our attention was focused on Mirasierra which offers a combination of steady flow of people, closeness to the metro station, strong socio-economic dynamics *and* a low restaurant density.

Recommended zones should therefore be considered only as a starting point for more detailed analysis which could eventually result in location which has not only no nearby competition but also other factors taken into account and all other relevant conditions met.

Conclusion

The purpose of this project was to identify areas close to Lacoma metro station with low number of restaurants (and bars) in order to starting a new food business exploiting the business opportunities due to Covid-19 impact through restaurants. There is the search for optimal location. By calculating restaurant density distribution from Foursquare data we have first identified general boroughs that justify further analysis (Mirasierra and Peñagrande) related to sport services around the areas.

Final decission on optimal restaurant location will be made by stakeholders based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location (proximity to park or water), levels of noise / proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood etc.

Patricia Perez

In [ ]: