



# The Battle of the Neighborhoods – Sofia vs Bucharest

Martin Koshnicharov

17.01.2021





# Goal of the analysis:



- Analyze and compare **restaurants** and the **clusters of food venues** in the center of **Sofia and Bucharest**
- **Analyze whether there are any restaurants with traditional national dishes from one of the two countries in the other capital city** (Bulgarian restaurants in Bucharest and Romanian restaurants in Sofia) and **where in the city center is the best place for such a restaurants to be opened.**
- This analysis can be **of a great use for private entrepreneurs** from any of the two countries, who want to open a restaurant with traditional national cuisines in the neighbor country. It can **also help governmental or tourism companies** who want to promote their city and the diversity of restaurants and food venues it offers.



# Data:

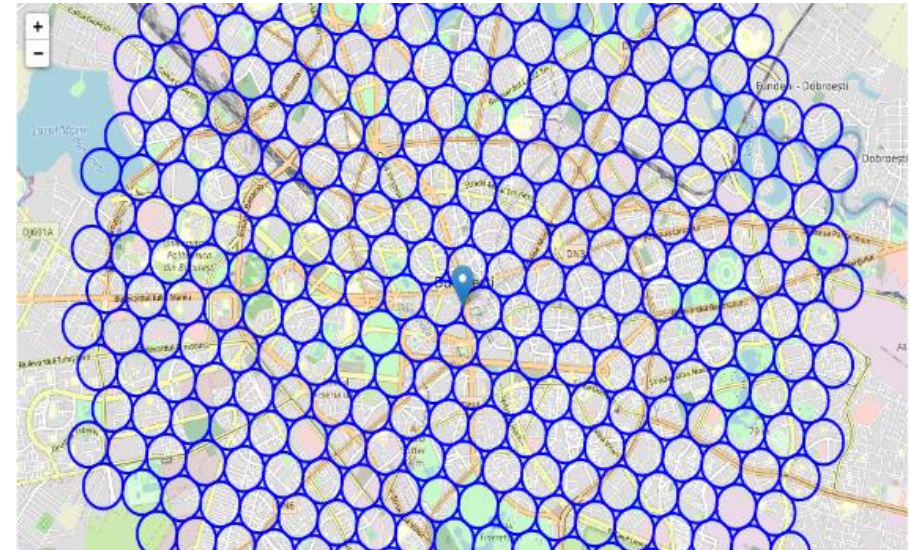
- Main touristic sightseeing place in both cities - **the Court House in Sofia** and **the Old Town in Bucharest**.
- Analyze **how many restaurants** there are nearby and whether there **are any Bulgarian/Romanian** restaurants.
- **Additionally, conduct a more expanded clustering (food venues based)** of the city center
- **K - Means Clustering** will be used for the both clustering cases - restaurants and venues based. It will help us find places with less number of restaurants nearby and will help us compare how similar they are to each other and how multicultural they are

Create a grid of "neighborhoods" with a radius of 300 meters in a big circle area with a radius of 6 km from Sofia the Court House/Bucharest the Old Town

**Sofia**



**Bucharest**



# Get the addresses of the neighborhoods' centers, the food venues and the number of restaurants

```
df_locations.head(10)
```

	Address	Latitude	Longitude	X	Y	Distance from center
0	ul. "Golyama mogila" 54, 1616 Kinotsentara III...	42.645792	23.291610	1.179897e+06	4.754933e+06	5992.495307
1	Botanical Garden, София, ул. Околовръстен път ...	42.645264	23.298853	1.180497e+06	4.754933e+06	5840.376700
2	ul. "Okolovrasten pat" 87, 1407 Krastova vada,...	42.644736	23.306095	1.181097e+06	4.754933e+06	5747.173218
3	bulevard "Cherni vrah" 190, 1407 Krastova vada...	42.644207	23.313338	1.181697e+06	4.754933e+06	5715.767665
4	ул. „проф. Георги Манев“, 1700 Kv. Vitosha, Sofia	42.643677	23.320579	1.182297e+06	4.754933e+06	5747.173218
5	ul. "Slav Karashev" 13, 1700 Kv. Vitosha, Sofia	42.643147	23.327821	1.182897e+06	4.754933e+06	5840.376700
6	Boulevard "Simeonovsko Shose 97, 1756 Malinova...	42.642617	23.335063	1.183497e+06	4.754933e+06	5992.495307
7	ul. "Boiana park", 1616 в.з. Бояна, Sofia	42.651214	23.281365	1.178997e+06	4.755452e+06	5855.766389
8	ul. "Golyama mogila" 115, 1616 Bojana, Sofia	42.650687	23.288608	1.179597e+06	4.755452e+06	5604.462508
9	ul. "Yordan Bakalov-Stubel" 23, 1404 Manastirs...	42.650159	23.295851	1.180197e+06	4.755452e+06	5408.326913

Total number of restaurants: 867

Total number of Romanian restaurants: 0

Percentage of Romanian restaurants: 0.00%

Average number of restaurants in neighborhood: 2.3873626373626373

Total number of restaurants: 955

Total number of Bulgarian restaurants: 0

Percentage of Bulgarian restaurants: 0.00%

Average number of restaurants in neighborhood: 2.6263736263736264

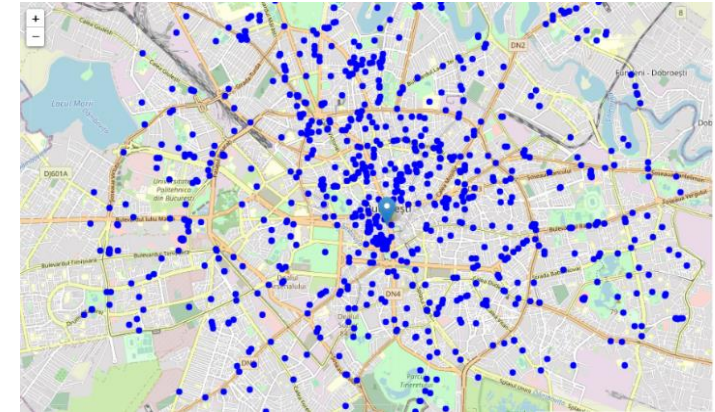
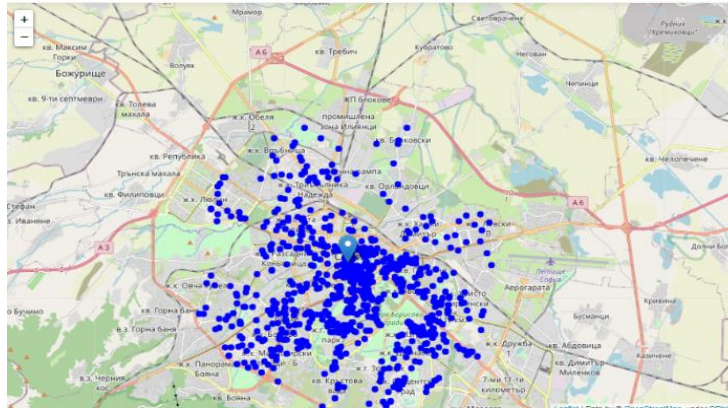




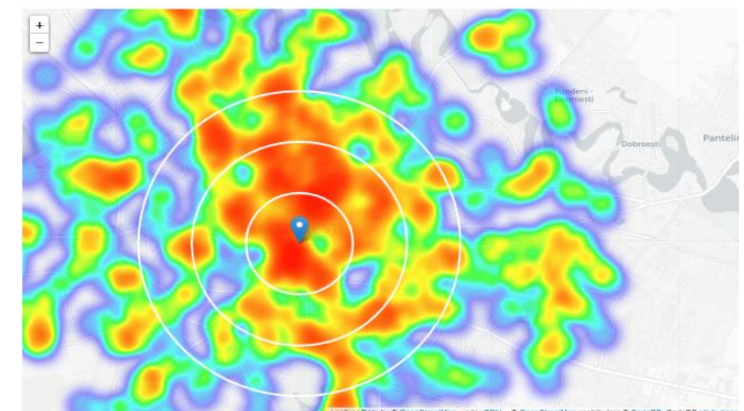
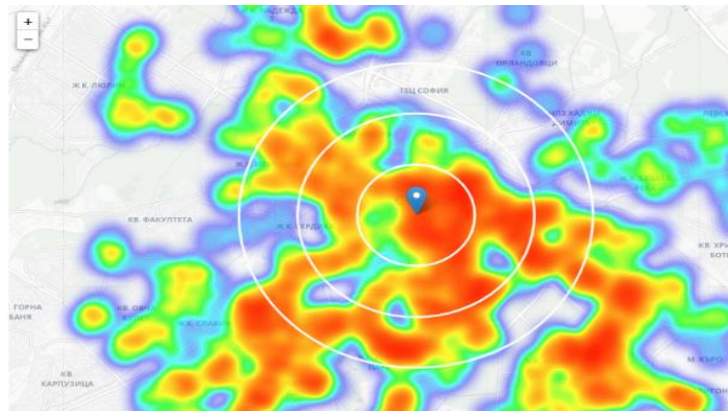
## ***Restaurants Analysis***



## Plot the restaurants on a map

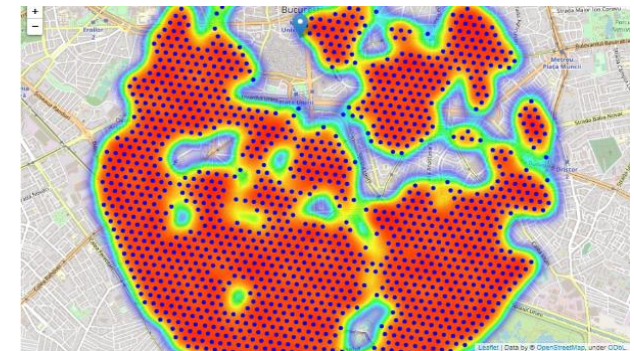
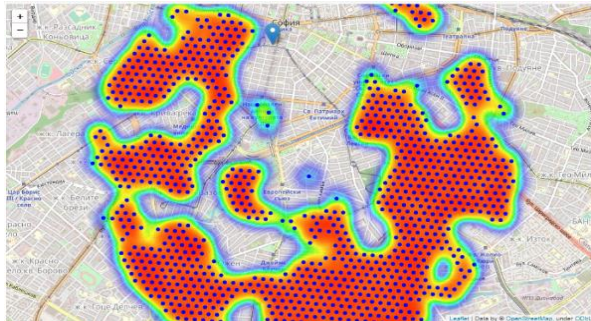
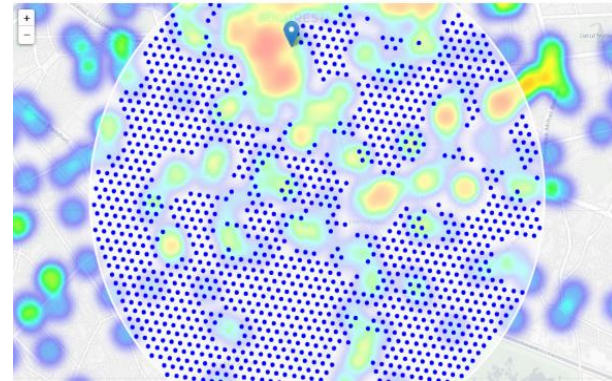
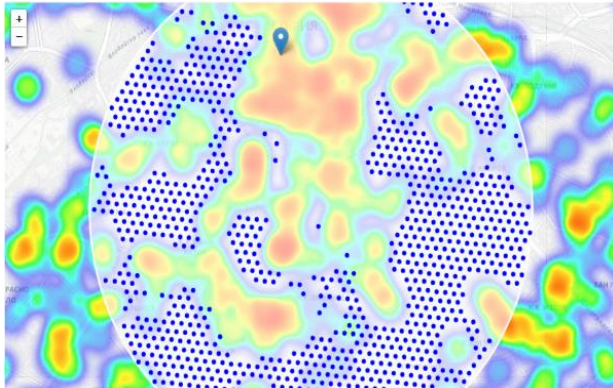


## Count the number of restaurants in every area and plot a heatmap



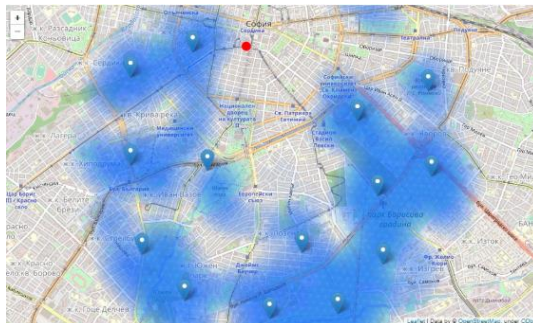
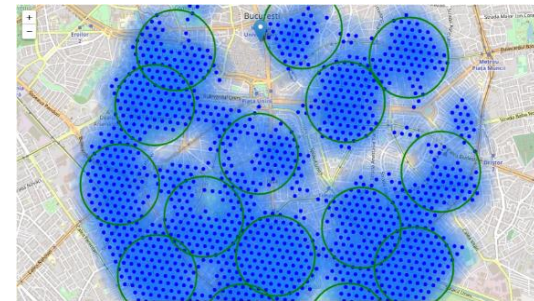
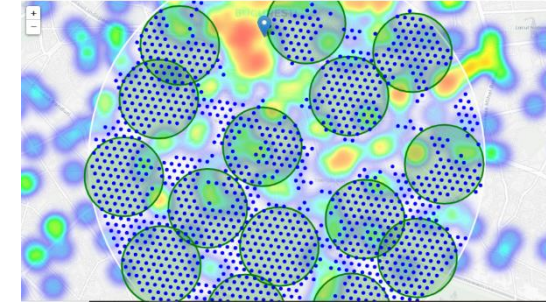
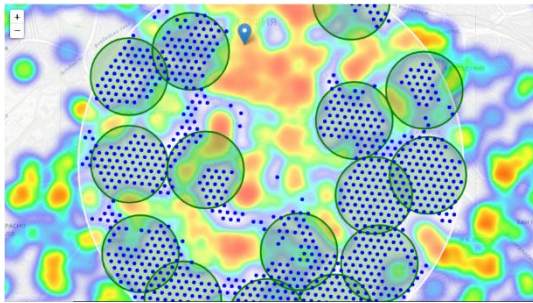


Define a new, more narrow region of interest with a radius of 2500 meters, low-restaurant-count on the South - East





# Use K-Means Clustering to define areas of interest and get their addresses



Strada Alexander von Humboldt 1, București      => 2.8km from the Old Town

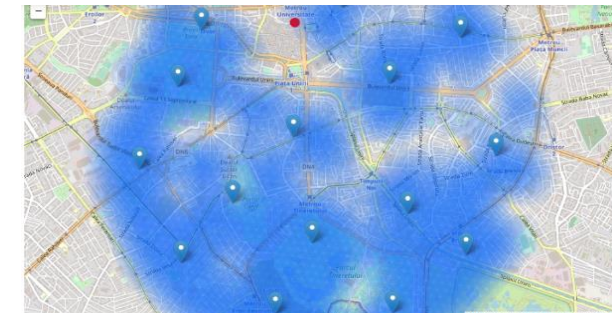
C:\ProgramData\Anaconda3\lib\site-packages\ipykernel\_launcher.py:4: DeprecationWarning: This  
[s://pyproj4.github.io/pyproj/stable/gotchas.html#upgrading-to-pyproj-2-from-pyproj-1](https://pyproj4.github.io/pyproj/stable/gotchas.html#upgrading-to-pyproj-2-from-pyproj-1)  
after removing the cwd from sys.path.

Strada Popa Nan 108, București      => 1.9km from the Old Town

C:\ProgramData\Anaconda3\lib\site-packages\ipykernel\_launcher.py:4: DeprecationWarning: This  
[s://pyproj4.github.io/pyproj/stable/gotchas.html#upgrading-to-pyproj-2-from-pyproj-1](https://pyproj4.github.io/pyproj/stable/gotchas.html#upgrading-to-pyproj-2-from-pyproj-1)  
after removing the cwd from sys.path.

Cimitirul Serban Voda, București      => 3.5km from the Old Town

C:\ProgramData\Anaconda3\lib\site-packages\ipykernel\_launcher.py:4: DeprecationWarning: This  
[s://pyproj4.github.io/pyproj/stable/gotchas.html#upgrading-to-pyproj-2-from-pyproj-1](https://pyproj4.github.io/pyproj/stable/gotchas.html#upgrading-to-pyproj-2-from-pyproj-1)



## ***Results:***

- Those areas have low density of restaurants - less than two in a radius of 250m
- Very useful for future stakeholders, because we highlighted very appealing areas of the city for such an investment
- The addresses of these new best "neighborhoods" were recorded which will be the perfect starting point for further analysis of the area and the choice of a restaurant spot.





## ***Food Venues Analysis***



What we have: the neighborhoods, the coordinates, the venues' names and category which we obtained at the beginning

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	ul. "Okolovrasten pat" 87, 1407 Krastova vada,...	42.644736	23.306095	Atspas	42.643090	23.308539	Modern European Restaurant
1	bulevard "Cherni vrah" 190, 1407 Krastova vada...	42.644207	23.313338	Mandjamika	42.646186	23.314297	Restaurant
2	bulevard "Cherni vrah" 190, 1407 Krastova vada...	42.644207	23.313338	Angeliki's Greek Taverna	42.646165	23.314415	Greek Restaurant
3	ul. "Slav Karaslavov" 13, 1700 Kv. Vitosha, Sofia	42.643147	23.327821	Neighbors	42.643944	23.330162	Italian Restaurant
4	Boulevard "Simeonovsko Shose 97, 1756 Malinova...	42.642617	23.335063	Делфинчето	42.643694	23.337646	Seafood Restaurant



We should then obtain the number of the unique categories of venues and the frequency of every given category. Group rows by neighborhood and take the mean of the frequency of occurrence of each category

Neighborhood	Afghan Restaurant	American Restaurant	Asian Restaurant	BBQ Joint	Bagel Shop	Bakery	Bistro	Breakfast Spot	Buffet	Bulgarian Restaurant	Burger Joint	Burrito Place	Cafeteria	Café	f
0 "Slivnitsa" Metro Station, 1360 Moderno predgr...	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0000	0.0	0.0	0.000000	0.0000	0.0	0.0	0.000000	
1 14 Tsar Osvoboditel Blvd., 5th floor, 1000 Old...	0.0	0.0	0.0	0.062500	0.0	0.125000	0.0625	0.0	0.0	0.000000	0.0625	0.0	0.0	0.000000	
2 62A, 1303 zh.k. Zona B-5-3, Sofia	0.0	0.0	0.0	0.058824	0.0	0.058824	0.0000	0.0	0.0	0.058824	0.0000	0.0	0.0	0.294118	
3 Balkankar AD, 1618 g.k. Slavia, Sofia	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0000	0.0	0.0	0.000000	0.0000	0.0	0.0	0.000000	
4 Block E2, 1404 Manastirski Livadi, Sofia	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0000	0.0	0.0	0.000000	0.0000	0.0	0.0	0.200000	

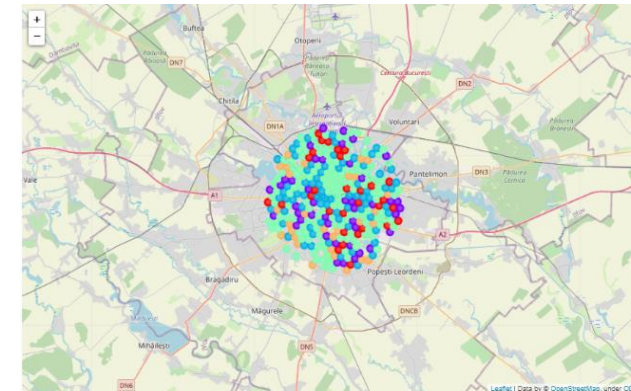
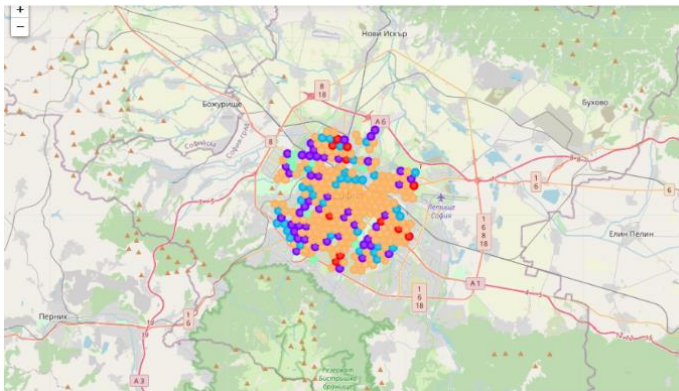
Sort the venues in a descending order, create a new data frame and display the top 10 venues for each neighborhood

Neighborhood	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
0 "Slivnitsa" Metro Station, 1360 Moderno predgr...	Restaurant	Comfort Food Restaurant	Eastern European Restaurant	Wings Joint	Czech Restaurant	Diner	Doner Restaurant	Donut Shop	Ethiopian Restaurant	Falafel Restaurant
1 14 Tsar Osvoboditel Blvd., 5th floor, 1000 Old...	Modern European Restaurant	Restaurant	Bakery	Italian Restaurant	Vegetarian / Vegan Restaurant	BBQ Joint	Bistro	Soup Place	Burger Joint	Sandwich Place
2 62A, 1303 zh.k. Zona B-5-3, Sofia	Café	Eastern European Restaurant	Pizza Place	Food Court	Donut Shop	Salad Place	Fast Food Restaurant	Bulgarian Restaurant	Bakery	BBQ Joint
3 Balkankar AD, 1618 g.k. Slavia, Sofia	Restaurant	Fast Food Restaurant	Wings Joint	Diner	Doner Restaurant	Donut Shop	Eastern European Restaurant	Ethiopian Restaurant	Falafel Restaurant	Fish & Chips Shop
4 Block E2, 1404 Manastirski Livadi, Sofia	Pizza Place	Vegetarian / Vegan Restaurant	Food Truck	Café	Falafel Restaurant	Deli / Bodega	Diner	Doner Restaurant	Donut Shop	Eastern European Restaurant

Use k – Means Clustering to put the neighborhoods in 5 clusters, depending on the top 10 venues for each neighborhood.

	Address	Latitude	Longitude	Cluster Labels	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
2	ul. "Okolovrasten pat" 87, 1407 Krastova vada,...	42.644736	23.306095	4	Modern European Restaurant	Wings Joint	Fast Food Restaurant	Diner	Doner Restaurant	Donut Shop	Eastern European Restaurant
3	bulevard "Cherni vrah" 190, 1407 Krastova vada...	42.644207	23.313338	1	Greek Restaurant	Restaurant	Czech Restaurant	Deli / Bodega	Diner	Doner Restaurant	Donut Shop
5	ul. "Slav Karaslavov" 13, 1700 Kv. Vitosha, Sofia	42.643147	23.327821	4	Italian Restaurant	Wings Joint	Fish & Chips Shop	Diner	Doner Restaurant	Donut Shop	Eastern European Restaurant
6	Boulevard "Simeonovsko Shose 97, 1756 Malinova...	42.642617	23.335063	4	Bakery	Café	Fast Food Restaurant	Eastern European Restaurant	BBQ Joint	Chinese Restaurant	Seafood Restaurant

Plot the clusters, analyze and name every one of them





## ***Results:***

**Sofia:** the **predominant cluster** in Sofia is luckily the fourth one (**orange**) - the **"Rich on International Restaurants"** cluster, followed by the **"Common Restaurants"**(dark blue) and the **"Cafes"** (light blue) cluster. And again luckily much - **much less neighborhoods** fall in the **"BBQ Joint"** (red) and **"The Fast Food"** (green) clusters.

**Bucharest:** The **predominant cluster** for Bucharest is rich on international restaurants, but not that well defined. There are a lot of spots with predominant common restaurants, Romanian restaurant and a lot of different food venues, too. That is why we called it a **"Mixed"** cluster (**green**). And it is **not that much dominating** the area like the predominant one in Sofia. **The second one** is the **"Cafes"** cluster (**light blue**) with **a small edge over the "Restaurants Cluster"** (**purple cluster**) with mainly common restaurants and some other types like Romanian, East –European restaurants, Hungarian and others. The **less often** to find are the **"Pizza Place"** (**orange**) and the **"Italian Restaurants"** (red) clusters.