Vegetarian restaurant in Bologna

Recommendations

Problem definition

- Opening a new vegetarian restaurant in Bologna
- Select the characteristics of the restaurant depending on the characteristics of areas

Data from municipality Open Data

- Statistical Areas - Three levels: Borough, Neighbourhood, Stat area (http://dati.comune.bologna.it/download/file/fid/1275)

- Income in 2017 per Statistical Area (http://dati.comune.bologna.it/download/file/fid/5066)

- Age per Statistical Area - 2018 (12/31?) (http://dati.comune.bologna.it/download/file/fid/5094)

- Statistical area cartography (http://dati.comune.bologna.it/download/file/fid/5161)

Map of statistical area

Data from Foursquare (categories)

- Vegetarian/Vegan Restaurants: 4bf58dd8d48988d1d3941735
- School: 4bf58dd8d48988d13b941735
- College & University: 4d4b7105d754a06372d81259
- Office: 4bf58dd8d48988d124941735
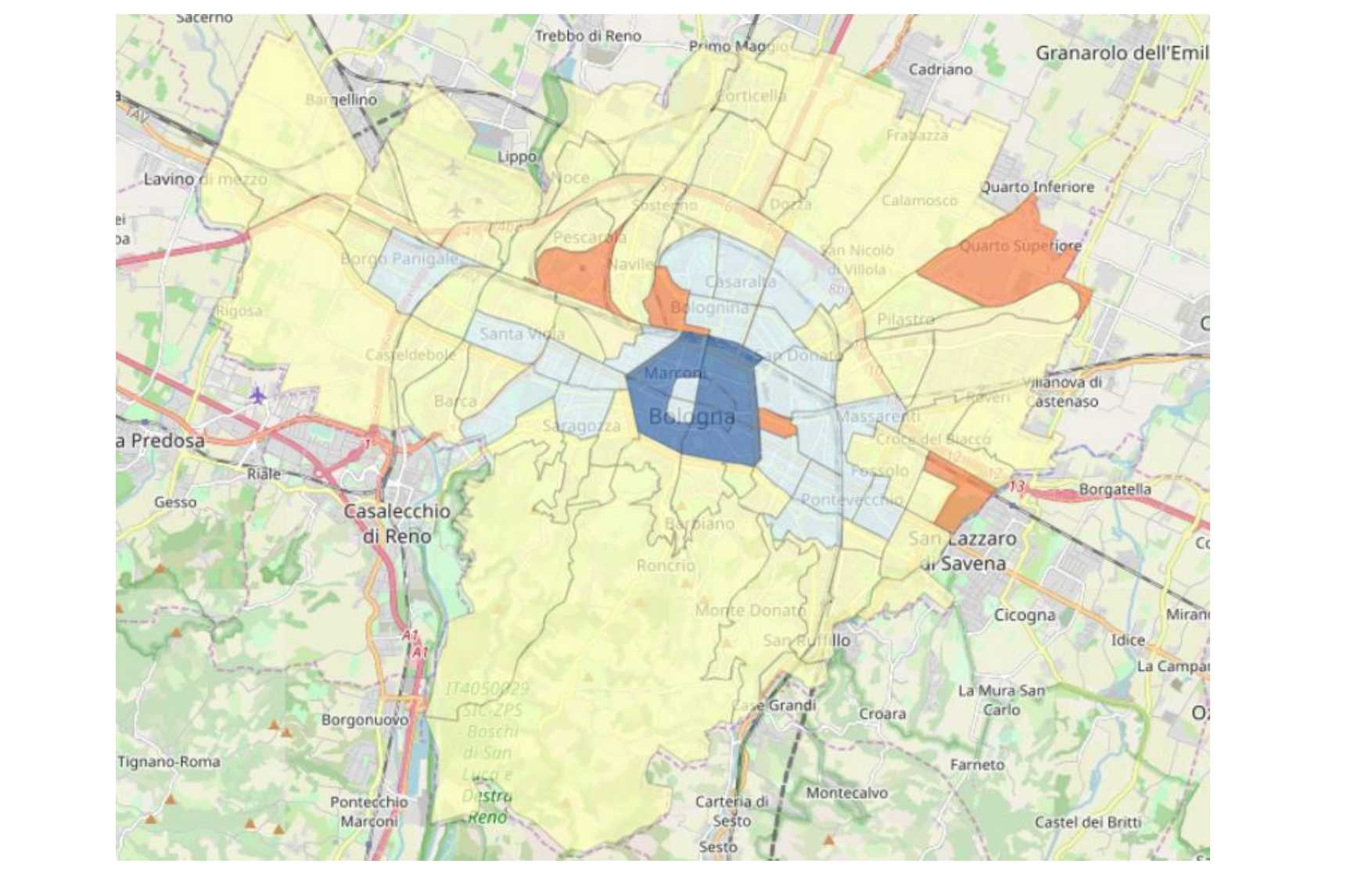- Museum: 4bf58dd8d48988d181941735.

Final dataset

	name	income_x_taxpayer	density	15-29_perc	30-44_perc	45-64_perc	65-74_perc	veg_restaurant_nr	office_nr	school_nr	university_nr	museum_nr
0	BITONE	21837.937219	17958.249550	16.662391	31.618779	38.045151	13.673679	1.0	10.0	5.0	3.0	0.0
1	XXI APRILE	26021.767837	15635.233271	17.612917	31.205150	38.001266	13.180667	0.0	27.0	4.0	8.0	0.0
2	DAGNINI	25910.428492	15264.883873	17.029993	30.446233	39.019751	13.504023	0.0	15.0	8.0	7.0	0.0
3	MARCONI-2	30567.398289	13941.735177	17.519031	32.454165	36.346092	13.680712	2.0	18.0	18.0	21.0	3.0
4	VIA MONDO	20246.937130	13908.284476	18.589744	32.591093	35.307018	13.512146	0.0	7.0	4.0	5.0	0.0

Clustering (Kmeans) and mean for each cluster

	cluster	income_x_taxpayer	density	15-29_perc	30-44_perc	45-64_perc	65-74_perc	veg_restaurant_nr	office_nr	school_nr	university_nr	museum_nr
0	0	20071.165994	373.997183	34.120594	31.774981	22.989069	11.115355	0.800000	9.600000	2.000000	8.800000	0.200000
1	1	27752.985664	3152.284373	18.796627	25.463121	41.236637	14.503615	0.196429	6.910714	1.892857	2.160714	0.375000
2	2	25265.118308	11212.663601	17.258685	31.688826	37.941220	13.111269	0.652174	16.434783	4.000000	6.217391	0.913043
3	3	36936.794307	11403.793382	18.268855	29.993880	37.682399	14.054867	4.500000	18.333333	12.000000	19.333333	8.666667

Clustering results on map

Recomms for each cluster 1/3

- **Cluster 0 (Light Yellow)**: In this cluster the opening of a new veg restaurant is not so much recommended.

- **Cluster 1 (Light Blue)**: Not so many offices, not a big income, but high density and middle-high aged people. So people seems to work away from home. We recommend a low cost-take away veg restaurant, for people who get home after work and don't want to make dinner.

Recomms for each cluster 2/3

- **Cluster 2 (Blue)**: High income of residents and high activity. Here we recommend a veg restaurant opened at midday with lower prices and at evening with higher prices and better service, at midday for people from offices and at evening for residents. Of course there are already many veg restaurants in this cluster. But if we go on detail we see that there are areas in this cluster where the veg restaurants are relatively few, e.g. MARCONI-2 and GALVANI-1:

name	income_x_taxpayer	cluster	density	15-29_perc	30-44_perc	45-64_perc	65-74_perc	veg_restaurant_nr	office_nr	school_nr	university_nr	museum_nr
MARCONI-2	30567.398289	2	13941.735177	17.519031	32.454165	36.346092	13.680712	2.0	15.0	18.0	20.0	3.0
GALVANI-1	55681.036126	2	8471.420230	19.060967	25.227751	41.485634	14.225648	3.0	17.0	5.0	17.0	12.0
GALVANI-2	37403.042157	2	12416.741189	18.108170	28.046554	39.262894	14.582382	4.0	18.0	13.0	26.0	14.0
IRNERIO-1	36250.047223	2	11546.030765	18.739235	29.417844	36.823975	15.018946	4.0	20.0	9.0	18.0	5.0
MALPIGHI-2	29785.946051	2	12600.483171	15.965001	31.904641	38.638093	13.492265	6.0	15.0	15.0	9.0	6.0
IRNERIO-2	31933.295992	2	9446.349759	20.220723	32.912324	33.537707	13.329246	8.0	17.0	12.0	26.0	12.0

Recomms for each cluster 3/3

- **Cluster 3 (Orange):** Low income, not high density, many young people, not many activities. For many aspects it is similar to Cluster 1. People here are younger, so we recommend take away restaurant with fast service and low prices

Conclusion

- Good place to open a veg restaurant is still cluster 2, but it is the most challenging cluster. Cluster 1 and cluster 3 offer good possibilities for starting a new and different type of restaurant, low cost and faster in service