

Choosing a place to run a food and restaurant business in Mexico City

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1. Introduction.

México City Abbreviated as CDMX; is the capital City of México and the most populous City in North America. México City is one of the most important cultural and financial centres in the world. It is located in the valley of México, a large Valley in the high plateaus in the center of Mexico, at an altitude of 7350ft (2240 meters). The City has 16 subdivisions, formerly known as boroughs and 1812 Neighborhoods.

Like most Latin American countries, social development is uneven and Mexico presents a very marked social inequality that can be seen even within the same district. As a consequence of this fact, criminal events are constant in the city, being an important factor to consider in the analysis of business opportunities.

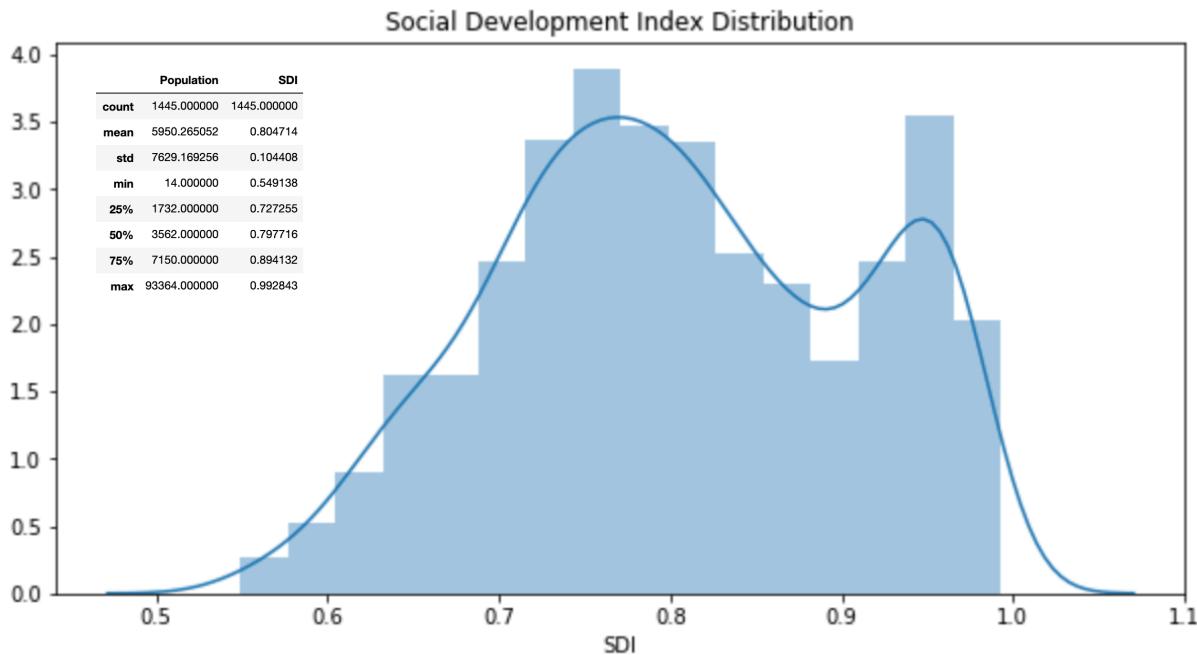
Within this context, this work tries to solve the next questions: What are the food and restaurant business opportunities in CDMX?; given the risks and opportunities that come with an unequal society, What places offer the right environment to run a restaurant business?. To reach the goal, I will describe the neighborhoods that make up the city using data such as: most common food venues, development index, population density and crime data grouped by neighborhood. I will present a map of Mexico City with neighborhoods classified with a background map of high impact crimes in the city to show the results. This work may be of interest to investors, small merchants, distri-

butors or suppliers in the food business field. Finally the reader will be able to choose the right place for the project in mind.

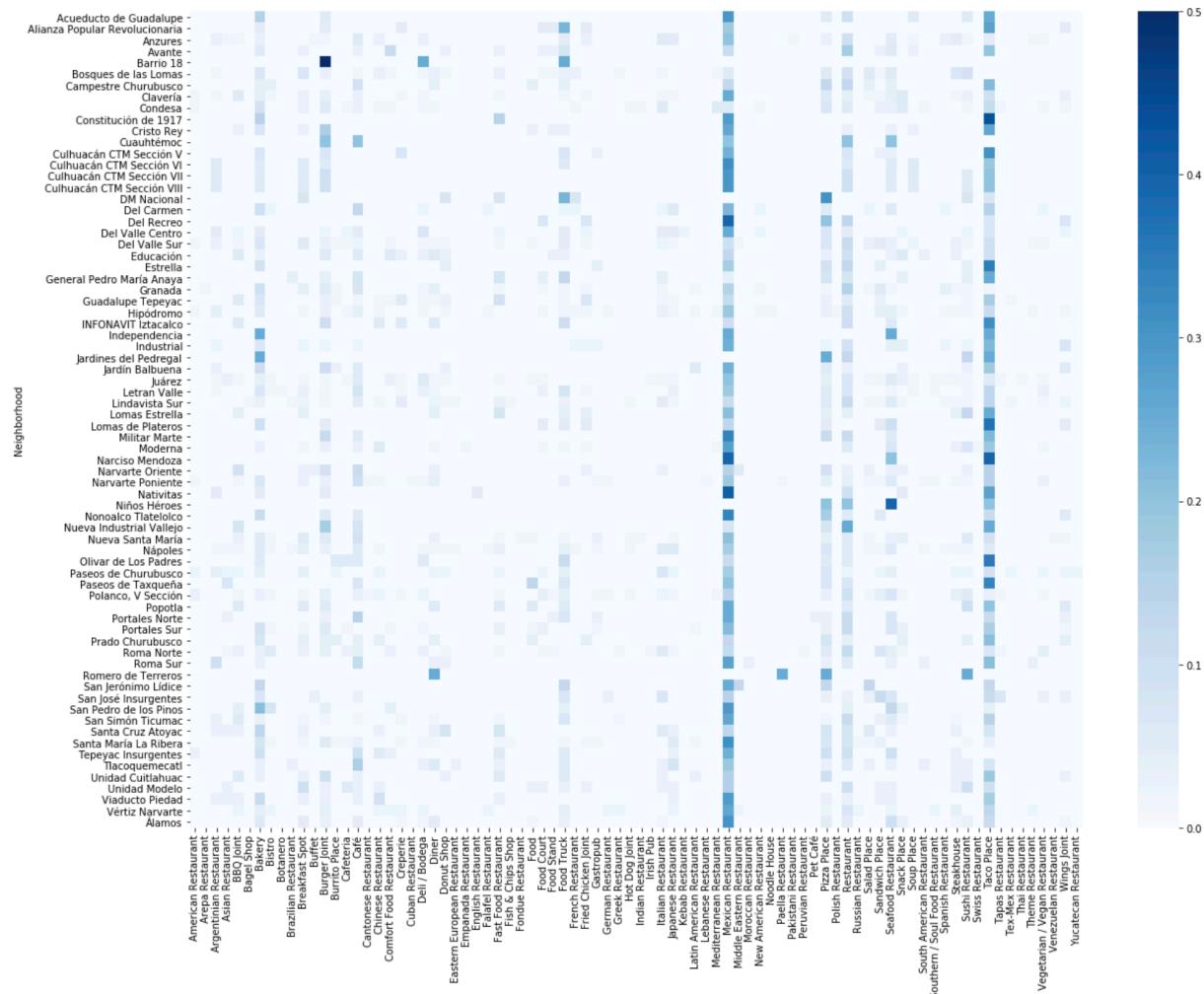
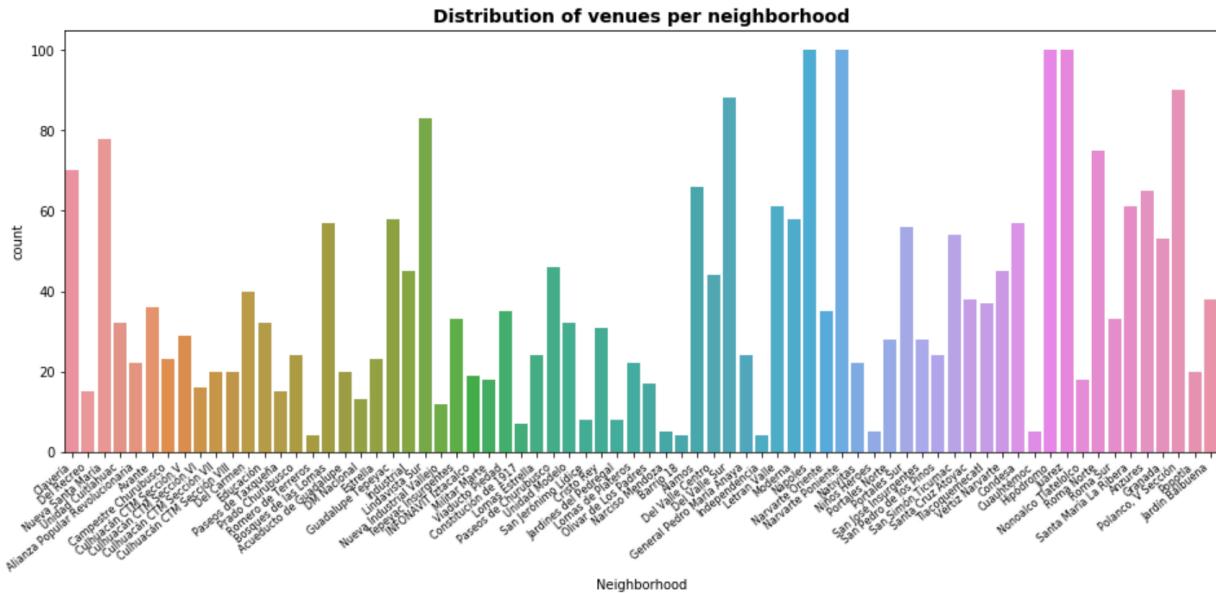
2. Data Description.

1. Data Sources.

- **Administrative Division Boroughs and Neighborhoods.** The divisions into which the city is divided in order to be managed and characterized by the similarities of its population. Mexico City is divided into 16 Boroughs and 1808 Neighborhoods. The geographical Coordinate of México City are 19.4326296, -991331785. You can download the Administrative Division Boroughs and Neighborhoods of Mexico City from this web site supported by the federal District goverment. https://datos.cdmx.gob.mx/explore/dataset/coloniascdmx/download/?format=geojson&timezone=America/Mexico_City&lang=es in GeoJson Format.
- **Social Development Index.** The population in poverty is divided into three strata according to the intensity of their deprivations: very high poverty, high poverty and moderate poverty; on the other hand, the non-poor population is also classified into three strata affected in the degree of satisfaction of their needs: minimum satisfaction, middle class and upper class, having an SDI ranging from 0.5 to 1 accordingly. 0.5 for very high poverty and 1 for upper class. The dataset is available through the next link: https://datos.cdmx.gob.mx/explore/dataset/diagnostico-cdmx_2015_nbi/information/ This dataset does not contain geographical coordinates for each Neighborhoods so its important to complete the dataset using a geocoder.

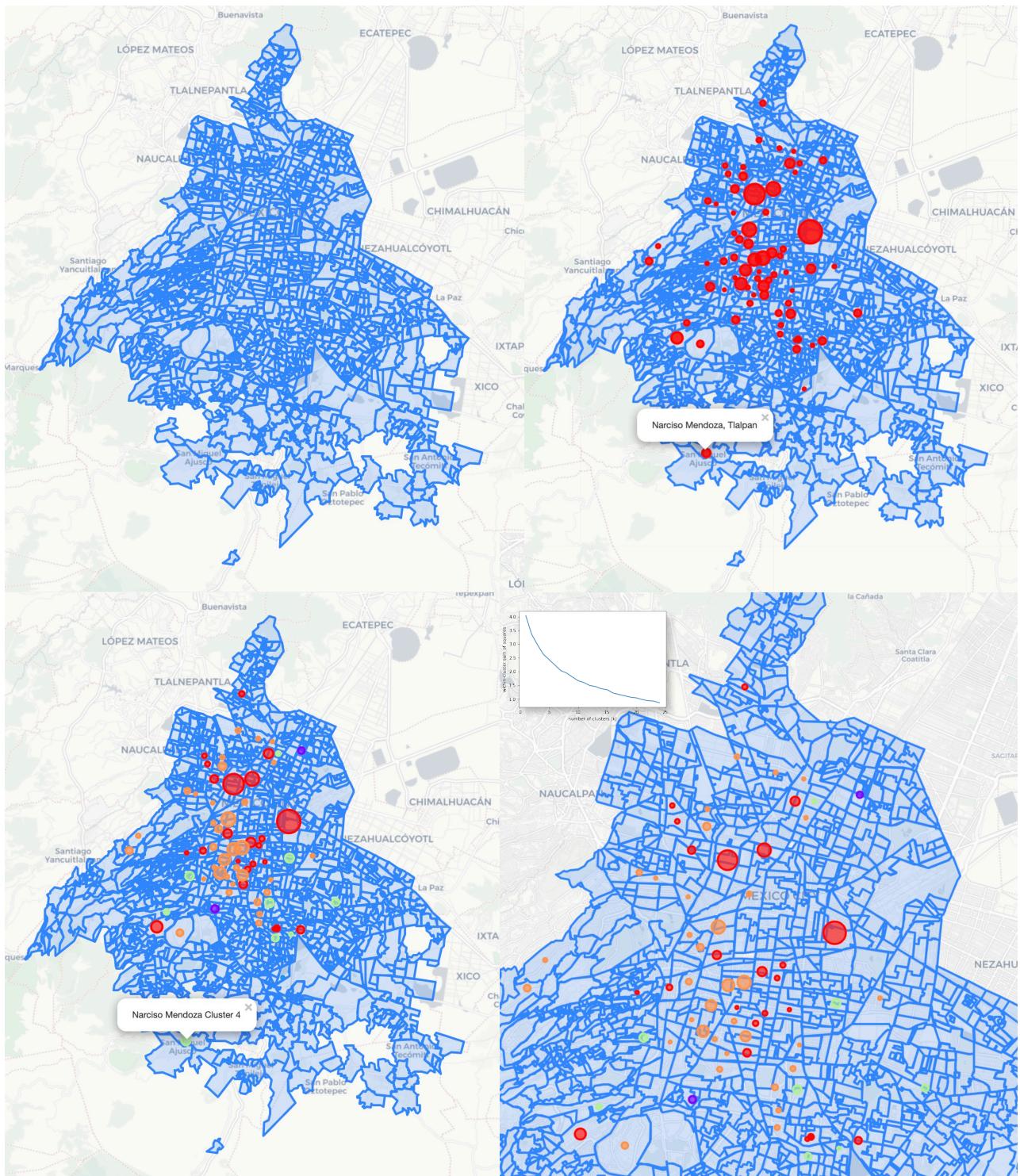


- **Population.** The Social Development Index dataset include this information grouped by neighborhoods.
- **Crime Data.** This database contains updated information on crime victims in the investigation folders of the Mexico City Attorney General's Office (FGJ) as of January 2019. Classified into two main categories: low and high impact crimes, the latter divided into 17 categories. So I finally used 330164 events grouped into 18 categories taking place in 1621 Neighborhoods The dataset is available through the next link:
https://datos.cdmx.gob.mx/explore/dataset/victimas-en-carpetas-de-investigacion-pjgj/download/?format=csv&timezone=America/Mexico_City&lang=es&use_labels_for_header=true&csv_separator=%2C
- **Foursquare Data:** Foursquare data were used to search for food and restaurants venues category “4d4b7105d754a06374d81259” Limited to 100 venues within 500m radius for each Neighborhood segmented.



3. Methodology.

- In order to have a dataset well suited for Foursquare api with a free account the dataset The Neighborhoods in the Social Development Index (SDI) dataset were segment by strata and Population. For this excercise an SDI geather than 0.9 and a Population greather than the mean ie 5950.265052 were used. Therefore, a data set with 95 neighborhoods was obtained after this filter.
- Social Development Index (SDI) dataset does not include Longitude and Latitude data so it was necessary to complement them using a Nominatim geocoder. In total, there were SDI data available for only 1445 Neighborhoods. The scope of this exercise is for food places.
- Then we search the Foursquare API to look for the most common places grouped by Neighborhood. The Foursquare food category "4d4b7105d754a06374d81259" was used for the Foursquare search. Also a 100 venue limit and a 500m radius was apointed for each Neighborhood from their given latitude and longitude data.
- Now that we have the venues data for every neighborhood segmented by Population and strata, the Venues were classified and grouped by Neighborhood using unsupervised learning **K-means algorithm**. The Number of groups were determinated by using the elbow technique commonly used in the K-Means algorithm cluster method of unsupervised learning. Finally we can explore the data obtained from Foursquare through a map with the data gathered and clasified.
- In the other hand, crime data of 1621 Neighborhoods with only high impact crimes were used to form a “heat map” of high Impact crime in Mexico City. Considering that high impact crimes are the most affecting crimes to local restaurants. This data



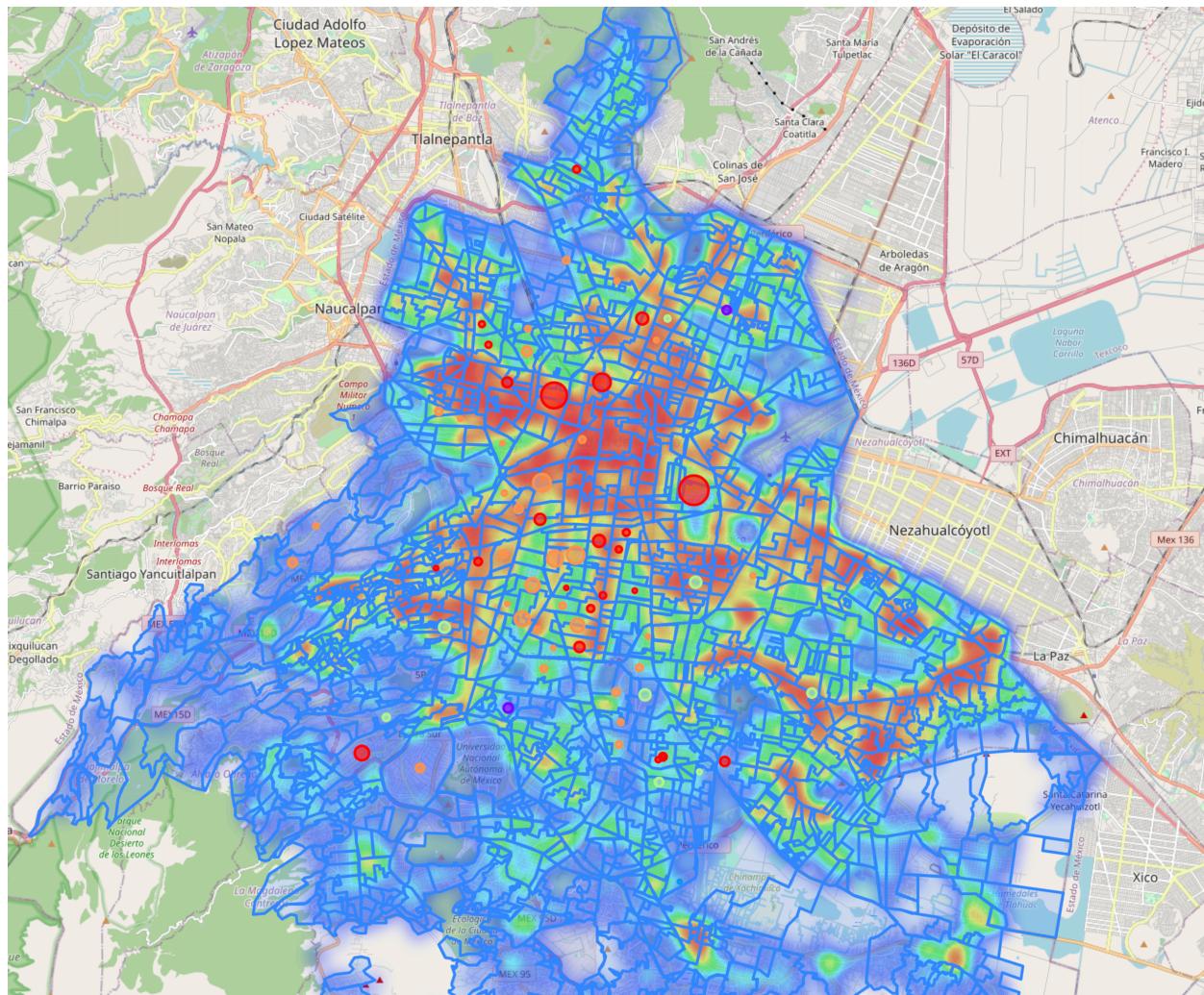
were used, to have the Picture where are the most common City are taking place.

Also by filtering the data by type of crime, to Say, robbery of business with and without violence heat map were yielded.

- Finally we merged those heat maps with the restaurant data location to have a great picture of the city and be able to choose the right place by looking the map.
- For further reading you can find in the results section, the neighborhoods classified into clusters considering the crime data to have a Big picture of the crime in Mexico city if that a good Point to consider in your desicion.

4. Results.

The descriptive statistics of the population in Mexico City according to the data obtained by the Mexican government are shown in Table 1. The population considered in this exercise constitutes 25% of the total population of the city, located in 95 neighborhoods mostly located in the north central region of the city. The results are shown on a folium map with the administrative divisions of the Boroughs and Neighborhoods that make up Mexico City. (Fig 1)The marks of the Neighborhoods are superimposed whose population is greater than the average of 5950 people and SDI is greater than 0.9 where the radius of the circles represents the size of the population. (Fig. 2). From Foursquare site we could obtain 2723 venues into 81 unique categories. from the resulting 95 Neighborhoods considered. Using the machine learning grouping technique we can classify the results returned by Foursquare for the selected Neighborhoods into groups. By means of the elbow technique, it was determined to use 6 groups. The groups are superimposed on the map of administrative divisions of Mexico City for their location (fig 3 and fig. 4).



Cluster 0

Borough	Neighborhood	Population	SDI	Latitude	Longitude	Venue 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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Azcapotzalco	9570.0	0.905083	19.465997	-99.16219	0 Mexican Restaurant	Taco Place	Pizza Place	Snack Place	Restaurant	Burger Joint	Seafood Restaurant	BBQ Joint	Bakery	Wings Joint	
1	Azcapotzalco	9261.0	0.919200	19.473118	-99.184572	0 Mexican Restaurant	Pizza Place	Restaurant	Food Court	Taco Place	Fried Chicken Joint	Wings Joint	Food Stand	Empanada Restaurant	Cuban Restaurant	
11	Coyoacán	8313.0	0.944338	19.322931	-99.120130	0 Mexican Restaurant	Taco Place	Breakfast Spot	Soup Place	Argentinian Restaurant	Bakery	Salad Place	Seafood Restaurant	Burger Joint	Donut Shop	
12	Coyoacán	6653.0	0.927984	19.323649	-99.118299	0 Mexican Restaurant	Taco Place	Burger Joint	Seafood Restaurant	Argentinian Restaurant	Bakery	Sushi Restaurant	Breakfast Spot	Soup Place	Yucatecan Restaurant	
13	Coyoacán	12242.0	0.943547	19.323649	-99.118299	0 Mexican Restaurant	Taco Place	Burger Joint	Seafood Restaurant	Argentinian Restaurant	Bakery	Sushi Restaurant	Breakfast Spot	Soup Place	Yucatecan Restaurant	
22	Gustavo A. Madero	11011.0	0.941804	19.526549	-99.149989	0 Mexican Restaurant	Taco Place	Bakery	Restaurant	Soup Place	Pizza Place	Sushi Restaurant	Burger Joint	Yucatecan Restaurant	Deli / Bodega	
29	Gustavo A. Madero	19044.0	0.939801	19.474992	-99.125778	0 Mexican Restaurant	Taco Place	Restaurant	Wings Joint	Bakery	Snack Place	Café	Breakfast Spot	Fried Chicken Joint	Gastropub	
38	Iztacalco	7111.0	0.954493	19.381014	-99.128638	0 Mexican Restaurant	Taco Place	Pizza Place	Restaurant	Burger Joint	Cafe	Seafood Restaurant	Yucatecan Restaurant	Diner	Donut Shop	
39	Iztacalco	10940.0	0.921418	19.401302	-99.131585	0 Mexican Restaurant	Taco Place	Chinese Restaurant	Bakery	Pizza Place	Japanese Restaurant	Fried Chicken Joint	Restaurant	Cafe	Fast Food Restaurant	
41	Iztapalapa	14701.0	0.927584	19.322130	-99.095729	0 Mexican Restaurant	Taco Place	Sushi Restaurant	Fast Food Restaurant	Food Truck	Pizza Place	BBQ Joint	Fried Chicken Joint	Restaurant	Steakhause	
44	La Magdalena Contreras	22859.0	0.947456	19.325037	-99.228424	0 Mexican Restaurant	Pizza Place	Food Truck	Salad Place	Bakery	Pizza Place	Middle Eastern Restaurant	English Restaurant	Deli / Bodega	Diner	
46	Álvaro Obregón	7007.0	0.922726	19.388899	-99.201274	0 Taco Place	Mexican Restaurant	Burger Joint	Bakery	Soup Place	Restaurant	Food	Breakfast Spot	BBQ Joint	Food Stand	
54	Benito Juárez	19120.0	0.949552	19.398194	-99.141743	0 Mexican Restaurant	Taco Place	Seafood Restaurant	Breakfast Spot	Café	Food Truck	Restaurant	Bakery	Burger Joint		
61	Benito Juárez	9952.0	0.924809	19.395318	-99.134495	0 Mexican Restaurant	Taco Place	Restaurant	Burger Joint	Sushi Restaurant	Chinese Restaurant	Restaurant	Seafood Restaurant	Café	Bakery	
65	Benito Juárez	10265.0	0.922305	19.361694	-99.140199	0 Mexican Restaurant	Taco Place	Restaurant	Burger Joint	Argentinian Restaurant	Bakery	English Restaurant	Snack Place	Yucatecan Restaurant	Diner	
68	Benito Juárez	10591.0	0.940498	19.379443	-99.140199	0 Mexican Restaurant	Taco Place	Restaurant	Bakery	Burger Joint	Seafood Restaurant	Snack Place	Pizza Place	Fast Food Restaurant	Food Court	
70	Benito Juárez	12007.0	0.961792	19.391152	-99.185910	0 Mexican Restaurant	Bakery	Seafood Restaurant	Bistro	Snack Place	Burger Joint	Restaurant	Taco Place	BBQ Joint	Comfort Food Restaurant	
71	Benito Juárez	11286.0	0.901797	19.374891	-99.144686	0 Mexican Restaurant	Taco Place	Restaurant	BBQ Joint	Food Truck	Seafood Restaurant	Bakery	Sandwich Place	Argentinian Restaurant	Fast Food Restaurant	
75	Benito Juárez	6517.0	0.953706	19.381992	-99.153679	0 Mexican Restaurant	Taco Place	Restaurant	Food Truck	Bakery	Steakhouse	Burger Joint	Deli / Bodega	Creperie	Diner	
80	Cuauhtémoc	27843.0	0.961175	19.453077	-99.140780	0 Mexican Restaurant	Pizza Place	Bakery	Taco Place	Burger Joint	Restaurant	Café	Sandwich Place	Yucatecan Restaurant	Diner	
82	Cuauhtémoc	17435.0	0.938624	19.405831	-99.163304	0 Mexican Restaurant	Taco Place	Café	Argentinian Restaurant	Restaurant	Pizza Place	Seafood Restaurant	Moroccan Restaurant	Diner	Donut Shop	
84	Cuauhtémoc	40960.0	0.908487	19.448417	-99.157975	0 Mexican Restaurant	Restaurant	Bakery	Pizza Place	Burger Joint	Japanese Restaurant	Sandwich Place	Breakfast Spot	Creperie	Russian Restaurant	
93	Miguel Hidalgo	15585.0	0.922495	19.452860	-99.175462	0 Mexican Restaurant	Taco Place	Sushi Restaurant	Diner	Wings Joint	Food Truck	BBQ Joint	Restaurant	Food	Breakfast Spot	
95	Venustiano Carranza	46624.0	0.944809	19.415836	-99.106971	0 Mexican Restaurant	Taco Place	Bakery	Burger Joint	Wings Joint	Café	Latin American Restaurant	Pizza Place	Argentinian Restaurant	Donut Shop	

Cluster 1

Borough	Neighborhood	Population	SDI	Latitude	Longitude	Venue 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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	
20	Coyoacán	Romero de Tellería	14554.0	0.976714	19.340467	-99.175065	1	Diner	Paella Restaurant	Sushi Restaurant	Pizza Place	Yucatecan Restaurant	Falafel Restaurant	Deli / Bodega	Donut Shop	Eastern European Restaurant	Empanada Restaurant
26	Gustavo A. Madero	DM Nacional	13098.0	0.963382	19.477867	-99.094982	1	Pizza Place	Fried Chicken Joint	French Restaurant	Food Truck	Taco Place	Sushi Restaurant	Donut Shop	Fast Food Restaurant	Breakfast Spot	English Restaurant

Cluster 2

Borough	Neighborhood	Population	SDI	Latitude	Longitude	Venue 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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	
53	Kochimilco	Barrio 18	6070.0	0.928481	19.28061	-99.112285	2	Burger Joint	Deli / Bodega	Food Truck	Fast Food Restaurant	Diner	Donut Shop	Eastern European Restaurant	Empanada Restaurant	English Restaurant	Falafel Restaurant

Cluster 3

Borough	Neighborhood	Population	SDI	Latitude	Longitude	Venue 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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	
66	Bentito Juárez	Niños Héroes	8724.0	0.91388	23.235468	-106.390938	3	Seafood Restaurant	Pizza Place	Restaurant	Taco Place	English Restaurant	Creperie	Cuban Restaurant	Deli / Bodega	Diner	Donut Shop

Cluster 4

Borough	Neighborhood	Population	SDI	Latitude	Longitude	Venue 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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	
5	Coyoacán	Alejandría Popular Revolucionaria	13827.0	0.966873	19.315009	-99.119674	4	Taco Place	Food Truck	Mexican Restaurant	Wings Joint	Creperie	Fried Chicken Joint	Food Stand	Bakery	Food Court	Burger Joint
10	Coyoacán	Culhuacán CTM Sección V	7265.0	0.901320	19.318585	-99.104760	4	Taco Place	Mexican Restaurant	Burger Joint	Food Truck	Creperie	Restaurant	Bakery	Sandwich Place	Seafood Restaurant	Deli / Bodega
17	Coyoacán	Paseos de Taxqueña	17340.0	0.924431	19.345201	-99.124737	4	Taco Place	Food	Café	Mexican Restaurant	Pizza Place	Food Truck	Asian Restaurant	Restaurant	English Restaurant	Deli / Bodega
27	Gustavo A. Madero	Estralla	9176.0	0.933334	19.475067	-99.116756	4	Taco Place	Mexican Restaurant	Restaurant	Pizza Place	Bakery	Donut Shop	Sandwich Place	Sushi Restaurant	Gastropub	Bagel Shop
37	Iztacalco	INFONAVIT Iztacalco	17661.0	0.920745	19.384096	-99.106169	4	Taco Place	Mexican Restaurant	Food Truck	Restaurant	Diner	BBO Joint	Seafood Restaurant	Burger Joint	Yucatecan Restaurant	Donut Shop
40	Iztapalapa	Constitución de 1917	14359.0	0.901857	19.345915	-99.083740	4	Taco Place	Mexican Restaurant	Fast Food Restaurant	Seafood Restaurant	Bakery	Yucatecan Restaurant	Diner	Donut Shop	Eastern European Restaurant	Empanada Restaurant
48	Álvaro Obregón	Lomas de Páteros	16823.0	0.928780	19.368488	-99.198239	4	Taco Place	Mexican Restaurant	Seafood Restaurant	Pizza Place	Fried Chicken Joint	Sandwich Place	Burger Joint	Steakhouse	Fast Food Restaurant	Bakery
49	Álvaro Obregón	Olivar de Los Padres	11154.0	0.924846	19.337409	-99.219657	4	Taco Place	Mexican Restaurant	Food Truck	Pizza Place	Deli / Bodega	Restaurant	Bakery	Café	Diner	Donut Shop
52	Tlalpan	Narciso Mendoza	16885.0	0.970714	19.225559	-99.192031	4	Mexican Restaurant	Taco Place	Seafood Restaurant	Yucatecan Restaurant	Deli / Bodega	Diner	Donut Shop	Eastern European Restaurant	Empanada Restaurant	English Restaurant
59	Bentito Juárez	Independencia	10003.0	0.927241	23.221116	-106.413786	4	Seafood Restaurant	Bakery	Taco Place	Mexican Restaurant	Yucatecan Restaurant	Fast Food Restaurant	Diner	Donut Shop	Eastern European Restaurant	Empanada Restaurant

Cluster 5

Borough	Neighborhood	Population	SDI	Latitude	Longitude	Venue 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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	
3	Azcapotzalco	Nueva Santa María	15149.0	0.940920	19.463835	-99.168221	5	Mexican Restaurant	Taco Place	Café	Bakery	Burger Joint	Restaurant	Sushi Restaurant	Pizza Place	Breakfast Spot	Snack Place
4	Azcapotzalco	Unidad Cultural	8494.0	0.964198	19.471543	-99.167789	5	Taco Place	Mexican Restaurant	Pizza Place	Burger Joint	Fast Food Restaurant	Food Truck	BBQ Joint	Italian Restaurant	Latin American Restaurant	Sushi Restaurant
6	Coyoacán	Avante	9909.0	0.960692	19.328135	-99.134346	5	Taco Place	Restaurant	Comfort Food Restaurant	Mexican Restaurant	Food Truck	Bakery	Seafood Restaurant	Soup Place	Donut Shop	Sandwich Place
7	Coyoacán	Campestre Chuburná	12187.0	0.964632	19.461688	-99.135629	5	Taco Place	Mexican Restaurant	Restaurant	Pizza Place	Café	Food Truck	Dine	Food	Bakery	Bistro
15	Coyoacán	Del Carmen	10460.0	0.958596	19.354290	-99.161797	5	Mexican Restaurant	Taco Place	Café	Bakery	Japanese Restaurant	Pizza Place	Seafood Restaurant	Soup Place	French Restaurant	Falafel Restaurant
16	Coyoacán	Edición	8951.0	0.964672	19.358494	-99.133589	5	Mexican Restaurant	Taco Place	Restaurant	Snack Place	BBQ Joint	Diner	Comfort Food Restaurant	Café	Burger Joint	Pizza Place
19	Coyoacán	Prado Churubusco	10469.0	0.945474	19.354639	-99.126926	5	Taco Place	Mexican Restaurant	Pizza Place	Chinese Restaurant	Diner	Fried Chicken Joint	Café	Burrito Place	Burger Joint	Snack Place
21	Cuauhtémoc	Bosques de las Lomas	13786.0	0.925494	19.309055	-99.233769	5	Restaurant	Sushi Restaurant	Mexican Restaurant	Bakery	Salad Place	Seafood Restaurant	French Restaurant	Steakhouse	Pizza Place	Breakfast Spot
28	Gustavo A. Madero	Guadalupe Tepicay	7133.0	0.931456	19.467548	-99.120592	5	Taco Place	Mexican Restaurant	Fast Food Restaurant	Fried Chicken Joint	Restaurant	Bakery	Burger Joint	Creperie	Donut Shop	
31	Gustavo A. Madero	Lindavista Sur	7674.0	0.926662	19.488662	-99.135073	5	Taco Place	Mexican Restaurant	Restaurant	Seafood Restaurant	Pizza Place	Italian Restaurant	Café	Creperie	Food Truck	Fast Food Restaurant
32	Gustavo A. Madero	Nueva Industrial Vallejo	10026.0	0.947211	19.495133	-99.153811	5	Restaurant	Burger Joint	Mexican Restaurant	Pizza Place	BBQ Joint	Taco Place	Café	Yucatecan Restaurant	Diner	Donut Shop
36	Gustavo A. Madero	Tepetac Insurgentes	6526.0	0.953436	19.485081	-99.121913	5	Mexican Restaurant	Pizza Place	Seafood Restaurant	Bakery	Restaurant	Café	Food Truck	Chinese Restaurant	Fast Food Restaurant	Vegetarian / Vegan Restaurant
42	Iztapalapa	Paseos de Churubusco	7403.0	0.950065	19.386264	-99.085254	5	Mexican Restaurant	Taco Place	Italian Restaurant	Pizza Place	Argentinian Restaurant	Bakery	Breakfast Spot	Seafood Restaurant	Food Truck	Food Court
43	Iztapalapa	Unidad Modelo	6062.0	0.945316	19.365253	-99.123640	5	Mexican Restaurant	Taco Place	Sushi Restaurant	Restaurant	Seafood Restaurant	Food Court	Sandwich Place	Breakfast Spot	Café	Food
47	Álvaro Obregón	Jardines del Pedregal	13403.0	0.972588	19.319781	-99.207386	5	Pizza Place	Bakery	Taco Place	Restaurant	Sushi Restaurant	Falafel Restaurant	Cuban Restaurant	Deli / Bodega	Diner	Donut Shop
55	Bentito Juárez	Del Valle Centro	22008.0	0.967398	19.328263	-99.160712	5	Mexican Restaurant	Deli / Bodega	Pizza Place	Taco Place	Bakery	Japanese Restaurant	Japanese Restaurant	Restaurant	Café	Italian Restaurant
57	Bentito Juárez	Del Valle Sur	23574.0	0.967782	19.371522	-99.169886	5	Restaurant	Mexican Restaurant	Taco Place	Pizza Place	Bakery	Food Truck	Breakfast Spot	Sandwich Place	Italian Restaurant	Salad Place
58	Bentito Juárez	General Pedro María Anaya	6477.0	0.967979	19.361470	-99.158628	5	Taco Place	Food Truck	Restaurant	Fast Food Restaurant	Mexican Restaurant	Café	Snack Place	Brazilian Restaurant	Food Court	Italian Restaurant
60	Bentito Juárez	Letrán Valle	9815.0	0.962871	19.376082	-99.155022	5	Mexican Restaurant	Taco Place	Food Truck	Restaurant	Café	Bakery	Deli / Bodega	Pizza Place	Restaurant	Vegetarian / Vegan Restaurant
62	Bentito Juárez	Nápoles	12106.0	0.961608	19.393770	-99.176602	5	Mexican Restaurant	Pizza Place	Taco Place	Restaurant	Japanese Restaurant	Bakery	Seafood Restaurant	Café	Food Truck	Breakfast Spot
63	Bentito Juárez	Narvarte Oriente	27300.0	0.95154	19.393267	-99.150258	5	Taco Place	Mexican Restaurant	Café	Pizza Place	Burger Joint	BBQ Joint	Middle Eastern Restaurant	Buffet	Sushi Restaurant	Fried Chicken Joint
64	Bentito Juárez	Narvarte Poniente	24750.0	0.956239	19.392226	-99.157707	5	Mexican Restaurant	Taco Place	Café	Bakery	Seafood Restaurant	Restaurant	Pizza Place	Diner	Burger Joint	Vegetarian / Vegan Restaurant
67	Bentito Juárez	Portales Norte	20924.0	0.929072	19.369152	-99.149670	5	Mexican Restaurant	Café	Restaurant	Taco Place	Food Truck	Seafood Restaurant	Pizza Place	Burger Joint	Food Stand	Wings Joint
69	Bentito Juárez	San José Insurgentes	5958.0	0.967095	19.366527	-99.185483	5	Mexican Restaurant	Taco Place	Food Truck	Tapas Restaurant	Sandwich Place	Seafood Restaurant	Bakery	Italian Restaurant	German Restaurant	Buffet
72	Bentito Juárez	Santa Cruz Atoyac	8600.0	0.938847	19.367974	-99.164299	5	Bakery	Mexican Restaurant	Pizza Place	Donut Shop	Restaurant	Taco Place	Fast Food Restaurant	Italian Restaurant	Salad Place	Japanese Restaurant

Finally, using the crime information in Mexico City, a heat map of the regions of the city where there is more high-impact crime was obtained. Where the reddest part groups the most frequent events in the area while the blue regions and in some transparent areas there are minimal or no criminal events. The first result shows the map with all the events in the 18 categories, excluding only low-impact crimes. (Fig 5)

5. Discussion

From the heat map we can see that there are more crimes on the main avenues. In the east, avenues such as Ignacio Zaragoza, Ermita Iztapalapa and surroundings of the Benito Juárez International Airport. In the center, the first painting of Mexico City. Calzada de Tlalpan avenue, which runs from the center to the south of the city. In the southwest, the area of Mixcoac, Avenida Revolución and Vasco de Quiroga. In the northwest, the Mexico-Tacuba avenue and some areas of the Anahuac neighborhood. Having sources of danger at the subway exits throughout the city. A lower crime rate is shown in the southern part of the country's capital.

Further reading, you can find in this exercise the classification of the Neighborhood group considering the crime data with their respective locations.

6. Conclusion

The crime heat map of Mexico City was successfully obtained, together with the classification of neighborhoods in Mexico City based on the restaurants and food businesses that operate in each locality. Depending on the needs of the reader, the map can be used to determine the place that best fits their needs. For example, some neighborhoods that are in low crime areas, with well-being populations and above-average po-

pulations can be highlighted. From the Cluster 0 the Neighborhoods: San Jerónimo Lídice, Militar Marte and Jardín Balbuena. Thus, the neighborhoods in Cluster 5 can also be highlighted: Avante, Educación and Prado Churubusco. In Cluster 4: Olivar de los Padres, Walks in Taxqueña, Narciso Mendoza.