

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. You can download the Administrative Division Boroughs and Neighborhoods of Mexico City from this web site supported by the federal District government.
https://datos.cdmx.gob.mx/explore/dataset/coloniascdmx/download/?format=geojson&timezone=America/Mexico_City&lang=es
- **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/
- **Population.** The Social Development Index dataset include this information grouped by neighborhoods.
- Foursquare: to search for food and restaurants venues category “4d4b7105-d754a06374d81259”

- 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

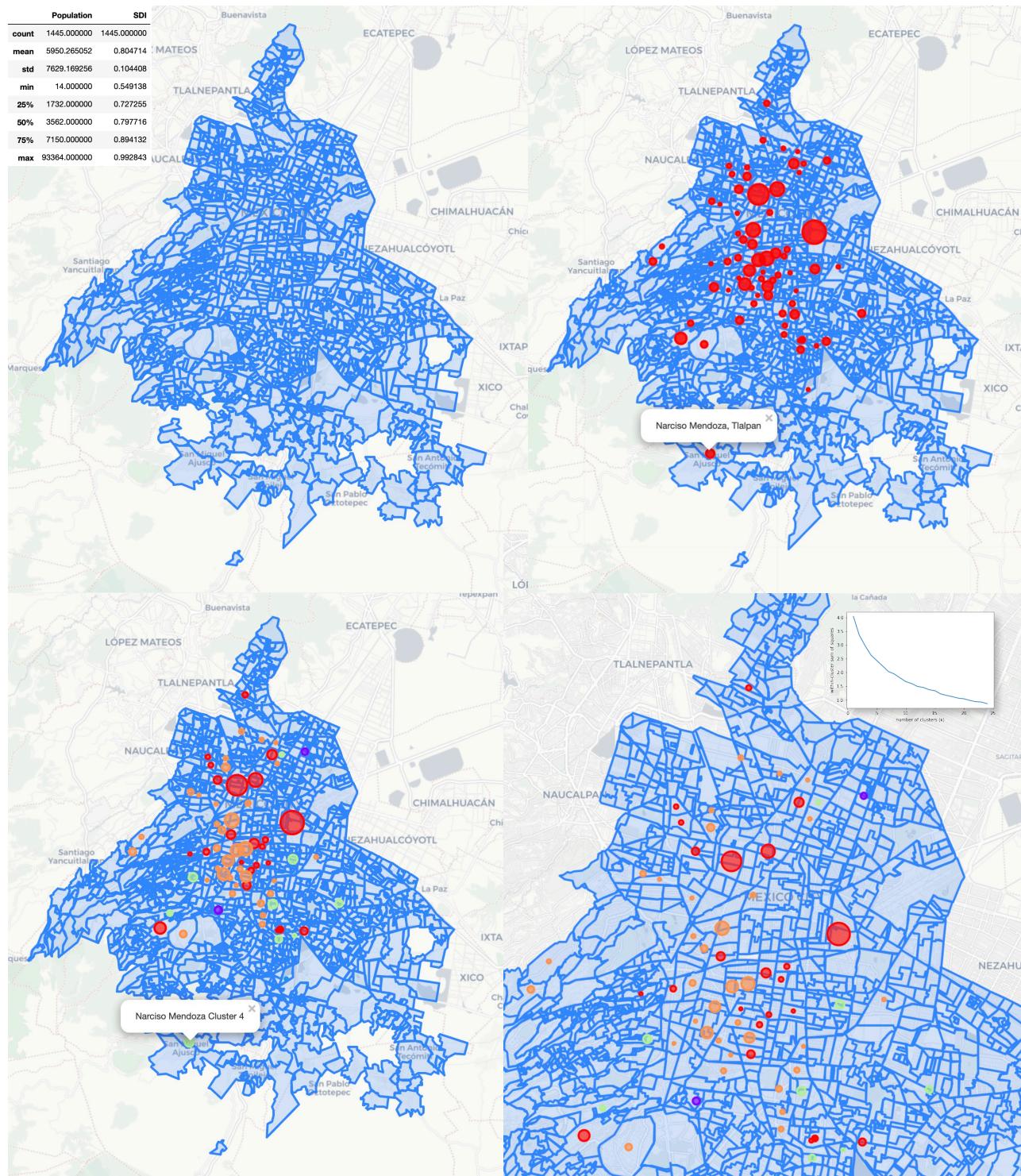
3. Methodology.

- 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 greater than 0.9 and a Population greater 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 300m radius was appointed 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.

La estadística descriptiva de la población en Ciudad de México según los datos obtenidos por el gobierno de México se muestran en la tabla 1. La población considerada en este ejercicio constituye un 25% de la población total de la ciudad, ubicados en 95 colonias mayormente localizadas en la región centro norte de la ciudad. Los resultados se muestran en un mapa folium con las divisiones administrativas de las co-



ionias y delegaciones que forman la ciudad de Mexico (fig. 1). Se sobre ponen las marcas de las colonias cuya población es mayor al promedio de 5950 personas y SDI es mayor que 0.9 donde el radio de los circulos representa el tamaño de la población (fig.

2). Utilizando la técnica de agrupación de aprendizaje automático podemos clasificar en grupos los resultados devueltos por Foursquare para las colonias seleccionadas.

Por medio de la técnica del codo se determinaron usar 6 grupos. Los grupos se superponen al mapa de divisiones administrativas de la Ciudad de México para su ubicación (fig 3 y 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	Claveria	9570.0	0.950583	19.465957	-99.182139	0 Mexican Restaurant	Taco Place	Pizza Place	Snack Place	Restaurant	Burger Joint	Seafood Restaurant	BBQ Joint	Bakery	Wings Joint
1	Azcapotzalco	Del Recreo	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	Culhuacán CTM Sección VI	8313.0	0.946338	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	Culhuacán CTM Sección VII	6653.0	0.927984	19.323641	-99.118299	0 Mexican Restaurant	Taco Place	Burger Joint	Seafood Restaurant	Argentinian Restaurant	Bakery	Sushi Restaurant	Breakfast Spot	Soup Place	Yucatecan Restaurant
13	Coyoacán	Culhuacán CTM Sección VIII	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	Acueducto de Guadalajara	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	Industrial	19044.0	0.939801	19.474986	-99.125778	0 Mexican Restaurant	Taco Place	Restaurant	Wings Joint	Bakery	Snack Place	Café	Breakfast Spot	Fried Chicken Joint	Gastropub
38	Iztacalco	Militar Marte	7111.0	0.954493	19.381014	-99.128638	0 Mexican Restaurant	Taco Place	Pizza Place	Restaurant	Burger Joint	Café	Seafood Restaurant	Yucatecan Restaurant	Diner	Donut Shop
39	Iztacalco	Viaducto Piedad	10940.0	0.921418	19.401302	-99.131585	0 Mexican Restaurant	Taco Place	Chinese Restaurant	Bakery	Pizza Place	Japanese Restaurant	Fried Chicken Joint	Restaurant	Café	Fast Food Restaurant
41	Iztapalapa	Lomas Estrella	14701.0	0.927584	19.322113	-99.095729	0 Mexican Restaurant	Taco Place	Sushi Restaurant	Fast Food Restaurant	Food Truck	Pizza Place	BBQ Joint	Fried Chicken Joint	Restaurant	Steakhouse
44	La Magdalena Contreras	San Jerónimo Lídice	22859.0	0.947456	19.352057	-99.228424	0 Mexican Restaurant	Pizza Place	Food Truck	Salad Place	Bakery	Taco Place	Middle Eastern Restaurant	English Restaurant	Deli / Bodega	Diner
46	Álvaro Obregón	Cristo Rey	7007.0	0.922726	19.388996	-99.201274	0 Taco Place	Mexican Restaurant	Burger Joint	Bakery	Soup Place	Restaurant	Food	Breakfast Spot	BBQ Joint	Food Stand
54	Benito Juárez	Álamos	19120.0	0.949552	19.398194	-99.141743	0 Mexican Restaurant	Taco Place	Seafood Restaurant	Breakfast Spot	Café	Diner	Food Truck	Restaurant	Bakery	Burger Joint
61	Benito Juárez	Moderna	9952.0	0.924809	19.393518	-99.134495	0 Mexican Restaurant	Taco Place	Burger Joint	Sushi Restaurant	Chinese Restaurant	Restaurant	Seafood Restaurant	Café	Bakery	Breakfast Spot
65	Benito Juárez	Nativitas	10265.0	0.922305	19.379443	-99.140199	0 Mexican Restaurant	Taco Place	Restaurant	Burger Joint	Argentinian Restaurant	Bakery	English Restaurant	Snack Place	Yucatecan Restaurant	Diner
68	Benito Juárez	Portales Sur	15991.0	0.940498	19.361699	-99.148914	0 Mexican Restaurant	Taco Place	Restaurant	Bakery	Burger Joint	Seafood Restaurant	Snack Place	Pizza Place	Fast Food Restaurant	Food Court
70	Benito Juárez	San Pedro de los Pinos	12007.0	0.961792	19.391152	-99.185010	0 Mexican Restaurant	Bakery	Seafood Restaurant	Bistro	Snack Place	Burger Joint	Restaurant	Taco Place	BBQ Joint	Comfort Food Restaurant
71	Benito Juárez	San Simón Tlaxcalteca	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	Vértiz Narvarte	6517.0	0.953726	19.381992	-99.153679	0 Mexican Restaurant	Taco Place	Restaurant	Food Truck	Bakery	Steakhouse	Burger Joint	Deli / Bodega	Crêperie	Diner
80	Cuauhtémoc	Nonoalco Tlatelolco	27843.0	0.961775	19.453077	-99.147080	0 Mexican Restaurant	Pizza Place	Bakery	Taco Place	Burger Joint	Restaurant	Café	Sandwich Place	Yucatecan Restaurant	Diner
82	Cuauhtémoc	Roma Sur	17435.0	0.933624	19.405833	-99.163304	0 Mexican Restaurant	Taco Place	Café	Argentinian Restaurant	Restaurant	Pizza Place	Seafood Restaurant	Monocan Restaurant	Diner	Donut Shop
84	Cuauhtémoc	Santa María La Ribera	40960.0	0.904847	19.448417	-99.157975	0 Mexican Restaurant	Restaurant	Bakery	Pizza Place	Burger Joint	Japanese Restaurant	Sandwich Place	Breakfast Spot	Crêperie	Russian Restaurant
93	Miguel Hidalgo	Popotla	15585.0	0.922495	19.452860	-99.157462	0 Mexican Restaurant	Taco Place	Sushi Restaurant	Diner	Wings Joint	Food Truck	BBQ Joint	Restaurant	Food	Breakfast Spot
95	Venustiano Carranza	Jardín Baileya	46624.0	0.948089	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	Romería de Terceros	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	Xochimilco	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	Benito 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

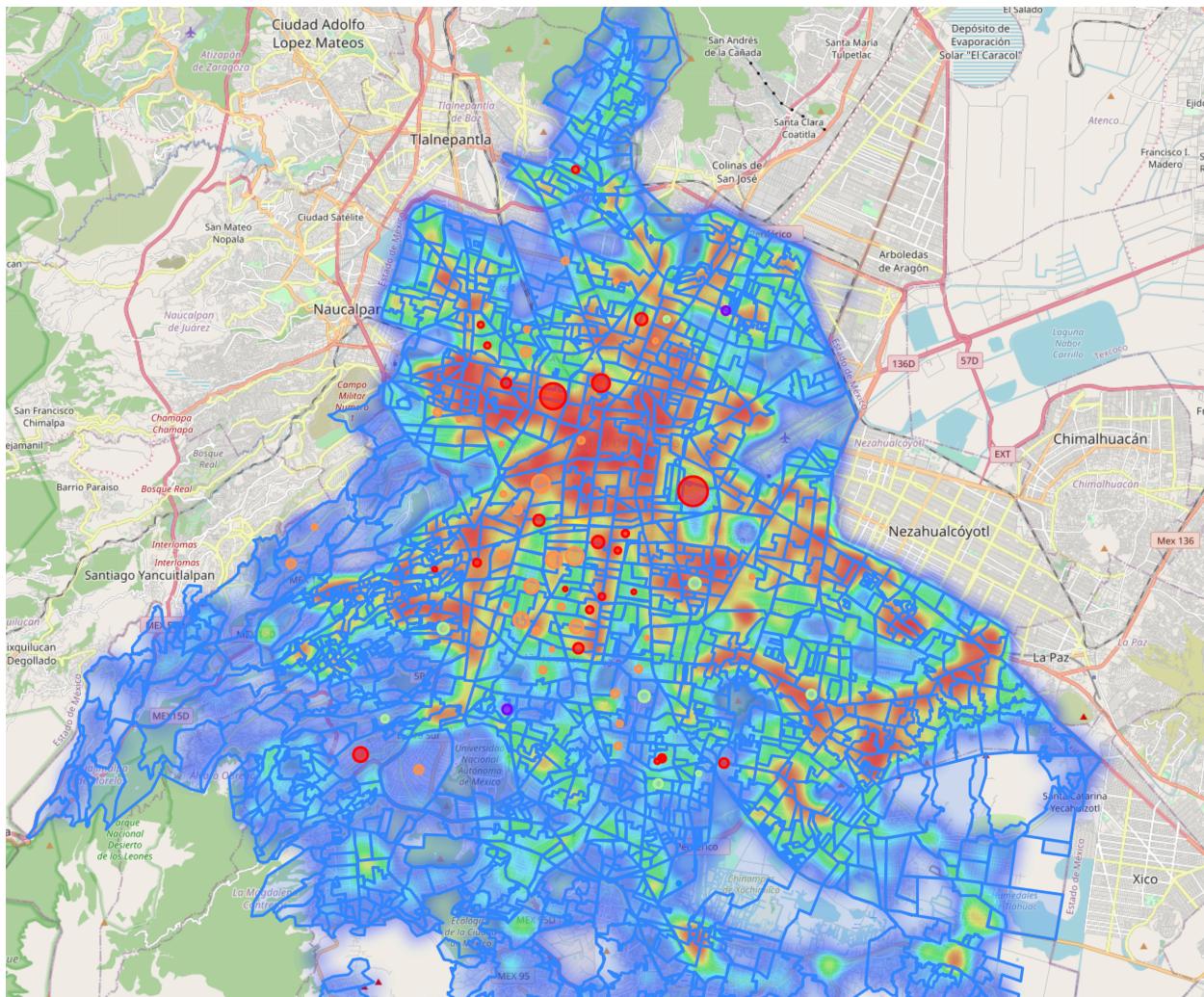
Cluster 4

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	Alianza Popular Revolucionaria	13627.0	0.966873	19.315009	-99.19674	4	Taco Place	Food Truck	Mexican Restaurant	Wings Joint	Creperie	Fried Chicken Joint	Food Stand	Bakery	Food Court	Burger Joint
10	Coyoacán	Culturas en CTM Sector IV	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	0.924451	19.345201	-99.124737	4	Taco Place	Food	Café	Mexican Restaurant	Pizza Place	Food Truck	Asian Restaurant	Restaurant	English Restaurant	Del / 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	19.349515	-99.063740	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 Plateros	16823.0	0.927280	19.368548	-99.19829	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	0.924848	19.374309	-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	19.225359	-99.201831	4	Mexican Restaurant	Taco Place	Seafood Restaurant	Yucatecan Restaurant	Deli / Bodega	Diner	Donut Shop	Eastern European Restaurant	Empanada Restaurant	English Restaurant
59	Benito Juárez	Independencia	10003.0	0.927241	23.221116	-106.413796	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	19.46335	-99.168221	5	Mexican Restaurant	Taco Place	Café	Bakery	Burger Joint	Restaurant	Sushi Restaurant	Pizza Place	Breakfast Spot	Snack Place
4	Azcapotzalco	Unidad Culiacán	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	Campesino Churubusco	12187.0	0.964632	19.346188	-99.135629	5	Taco Place	Mexican Restaurant	Restaurant	Pizza Place	Café	Food Truck	Diner	Food	Bakery	Bistro
15	Coyoacán	Del Carmen	10460.0	0.95859	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	Educación	8951.0	0.964672	19.335844	-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	19.390555	-99.237369	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	BBQ Joint	Creperie	Donut Shop
31	Gustavo A. Madero	Lindavista Sur	7874.0	0.926662	19.488602	-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	-99.153581	5	Restaurant	Burger Joint	Mexican Restaurant	Pizza Place	BBQ Joint	Taco Place	Café	Yucatecan Restaurant	Diner	Donut Shop
36	Gustavo A. Madero	Tepicay Insurgentes	6526.0	0.935436	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	0.97258	19.319781	-99.207378	5	Pizza Place	Bakery	Taco Place	Restaurant	Sushi Restaurant	Falafel Restaurant	Café	Diner	Donut Shop	
55	Benito Juárez	Del Valle Centro	22068.0	0.967398	19.332963	-99.166072	5	Mexican Restaurant	Deli / Bodega	Pizza Place	Taco Place	Argentinian Restaurant	Bakery	Japanese Restaurant	Restaurant	Café	Italian Restaurant
57	Benito 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	Benito Juárez	General Pedro María Anaya	6477.0	0.967979	19.361470	-99.158662	5	Taco Place	Food Truck	Restaurant	Fast Food Restaurant	Mexican Restaurant	Café	Snack Place	Brazilian Restaurant	Food Court	Italian Restaurant
60	Benito Juárez	Letrán Valle	9815.0	0.962871	19.376082	-99.155022	5	Mexican Restaurant	Taco Place	Food Truck	Café	Bakery	Deli / Bodega	Pizza Place	Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant
62	Benito 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	Benito Juárez	Narvarte Oriente	27300.0	0.951354	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	Benito Juárez	Narvarte Poniente	24750.0	0.958239	19.392226	-99.157707	5	Mexican Restaurant	Taco Place	Café	Bakery	Seafood Restaurant	Restaurant	Pizza Place	Diner	Burger Joint	Vegetarian / Vegan Restaurant
67	Benito Juárez	Portales Norte	20924.0	0.929072	19.369152	-99.149570	5	Mexican Restaurant	Café	Restaurant	Taco Place	Food Truck	Seafood Restaurant	Pizza Place	Burger Joint	Food Stand	Wings Joint
69	Benito Juárez	San José Insurgentes	5958.0	0.967095	19.366527	-99.155483	5	Mexican Restaurant	Taco Place	Food Truck	Tapas Restaurant	Sandwich Place	Seafood Restaurant	Bakery	Italian Restaurant	German Restaurant	Buffet
72	Benito 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

Utilizando la información de crímenes en la ciudad de México se pudo lograr un mapa de calor de las regiones de la ciudad en donde hay mayor criminalidad de alto impacto. Donde la parte mas roja agrupa los eventos mas frecuentes en la zona mientras las regiones azules y en algunas zonas transparentes hay minimo o nulos eventos criminales. Como primer resultado se muestra el mapa con todos los eventos de las 18 categorías excluyendo únicamente los delitos de bajo impacto. (Fig 5)



5. Discussion

Del mapa de calor podemos observar que hay mayor numero de crimenes sobre las avenidas principales. En el oriente avenidas como Ignacio Zaragoza, Ermita Iztapalapa y alrededores del aeropuerto internacional Benito Juárez. En el centro, el primer cuadro de la ciudad de México. Las avenidas Calzada de Tlalpan, la cual recorre del centro hacia el sur de la ciudad. En el sur poniente el área de Mixcoac, Avenidas Revolución y Vasco de Quiroga. En el norponiente la calzada Mexico-Tacuba y algunas zonas de la colonia Anáhuac. Teniendo focos de peligro a la las salidas del tren subterraneo. Se muestra menor indice delictivo en la zona sur de la capital del país.

6. Conclusion

Se pudo obtener con éxito el mapa de calor de criminalidad de la ciudad de México unido a la clasificación de colonias y barrios de la ciudad de México con base a los restaurantes y negocios de comida que funcionan en cada localidad. Dependiendo de las necesidades del lector se puede usar el mapa para determinar el lugar que mejor se ajuste. Por ejemplo, pueden destacarse algunas colonias que se encuentran en zonas de baja criminalidad, con población en situación de bienestar y población por encima de la media. Del Cluster 0 las colonias: San Jerónimo Lídice, Militar Marte y Jardín Balbuena. Así también se pueden destacar las colonias en el Cluster 5: Avante, Educación y Prado Churubusco. En el Cluster 4: Olivar de los Padres, Paseos de Taxqueña, Narciso Mendoza.