

Competition analysis of Mexican restaurants in Medellin, Colombia

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1. Introduction

The city of Medellín is one of the cities most visited by tourists in Colombia, according to statistics published in the portal of SITUR, (https://www.situr.gov.co/estadisticas/df_pais_turista_col/general/), the percentage of foreign tourists Mexican of the period covered by the year 2015 to what goes of 2019, represents the first three positions in terms of largest number of visitors.

The following study has as target audience, entrepreneurs in the restaurant sector specializing in Mexican food with an interest in settling in the city of Medellín.

Support in the data, the study could determine the neighborhood (comunas) with less competition for a Mexican food restaurant, so you'd have to apply several criteria.

2. Data

Use a public dataset with the location of each tourist spot of the city of Medellín, is shared through the portal of the city of Medellín.

This dataset contains the geographic location of each tourist spot information and its classification by District (commune). It has the following columns that will help us to better describe the data. Column description.

Column	Descripción
X	Latitude
Y	Longitude
OBJECTID	Identificator of the site name
NOMBRESITIO	Name of the touristic spot
LABEL	Common Name
IMPERDIBLE	Flag tourist point name to determine if it is unmissable visit
TIPOATRACTIVO	Classification of the type of attraction
CODCOM	Identifier of the district (comuna)
COM_CORR	Name of the district (comuna)

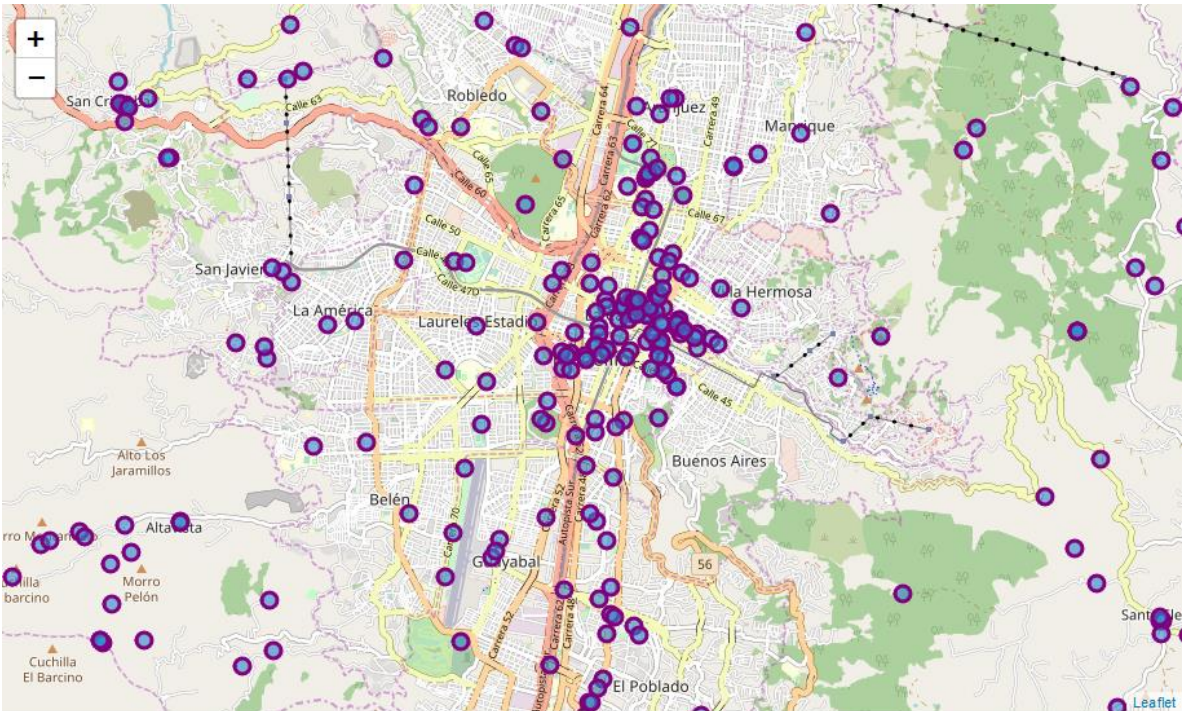
The Foursquare Api will help us find the each tourist spot nearby restaurants.

Through a map will display the result of the analysis and the data is kept in a dataframe.

3. Data Exploratory Analysis

Close to every tourist spot in the city, they will locate the 15 nearest within a radius of 500 meters, then is to group information by each commune (district), taking care to not go to see duplicates, due to two touristic spots could share the same information.

This is a view of the touristic spots of the Medellin City.



As a database, is used a GitHub repository in my study.

I used python folium library to visualize geographic touristic sports of Medellin. I used latitude and longitude values to get the visual view.

Use the Foursquare API to locate nearby Mexican restaurants 500 meters away and find the location between the commune (district) and the restaurant by latitude and longitude.

This is a dataset’s head of the relationship.

	Comuna	Comuna Latitude	Comuna Longitude	Restaurant	Restaurant Latitude	Restaurant Longitude	Restaurant Category
0	Museo Casa Gardeliana	6.269579	-75.554634	El Monchito	6.270411	-75.557643	Mexican Restaurant
1	Monumento a Carlos Gardel	6.269665	-75.554652	El Monchito	6.270411	-75.557643	Mexican Restaurant
2	CCial. Bosque Plaza	6.268893	-75.565334	Taconazo	6.265693	-75.565063	Burrito Place
3	Ruta N	6.265316	-75.566283	Taconazo	6.265693	-75.565063	Burrito Place
4	Ruta N	6.265316	-75.566283	Comida mexicana del paisa	6.264579	-75.569366	Taco Place

Then a frequency table is made where a category of Mexican restaurant appears near each tourist point.

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----Hospital Universitario San Vicente Fundacion----
      Restaurant  Freq
0  Comidas Mexicanas de la U.de.A  0.25
1      Los Burritos del Coste  0.25
2      Comida mexicana del paisa  0.25
3          Taconazo  0.25
4          Alitacos  0.00

```

This example are the restaurants nearby to the Hospital Universitario San Vicente Fundación.

	Comuna	1st Most Common Restaurant	2nd Most Common Restaurant	3rd Most Common Restaurant	4th Most Common Restaurant	5th Most Common Restaurant
0	Academia Antioqueña de Historia	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güero Taquería
1	Aeroparque Juan Pablo II	Taquería El Sol de Mexico	Órale	El Jitomate	Donde Hernán	Eat Burrito
2	Antiguo Colegio de San Ignacio	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güero Taquería
3	Antiguo Instituto Pedro Justo Berrio y Parroqu...	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
4	Asociacion Pequeno Teatro	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güero Taquería

Next dataset group the restaurants nearby the touristic spot.

They will create 5 clusters using the algorithm of learning machine K-means, to find the neighborhood (comunas) where there is less competition for a Mexican restaurant using the last dataset.

This is dataset's head.

	X	Y	OBJECTID	NOMBRESITIO	LABEL	IMPERDIBLE	TIPOATRACTIVO	COD_COMUNA	COM_CORR	Cluster Labels	1st Most Common Restaurant	2nd Most Common Restaurant
5	-75.554634	6.269579	221	Museo Casa Gardeliana	Museo Casa Gardeliana	NO	Edificacion para la cultura	3	Manrique	0	El Monchito	Órale
6	-75.554652	6.269665	227	Monumento a Carlos Gardel	Monumento a Carlos Gardel	NO	Estatua	3	Manrique	0	El Monchito	Órale
11	-75.565334	6.268893	24	Centro Comercial Bosque Plaza	CCial. Bosque Plaza	NO	Arquitectura para el comercio	4	Aranjuez	2	Taconazo	Órale
13	-75.566283	6.265316	62	Ruta N	Ruta N	NO	Edificacion para la ciencia	4	Aranjuez	0	Taconazo	Comida Mexicana de la U.de.A
14	-75.568775	6.267040	63	Universidad de Antioquia	Universidad de Antioquia	NO	Edificacion para la educacion	4	Aranjuez	0	Taconazo	Comida Mexicana de la U.de.A

4. Results.

The following map has the graphic representation of the application of the kmeans method. The 5 colors represent the 5 clustered clusters.

This is the cluster 1's dataset.

	Y	LABEL	IMPERDIBLE	TIPOATRACTIVO	COD_COMUNA	COM_CORR	Cluster Labels	Common Restaurant	Common Restaurant	Common Restaurant	Common Restaurant	Common Restaurant
56	6.252909	Casa Sede Montesacro ? PREVER	NO	Funeraria	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
70	6.252792	Parque Bolivar	NO	Elemento del espacio publico	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
76	6.251351	Ed. Naviera Colombiana	NO	Edificacion para la educacion	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
77	6.250828	Ed. Palace	NO	Arquitectura para el comercio	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
97	6.251381	Plazuela Nutibara	NO	Elemento del espacio publico	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
99	6.250068	Parque de Berrio	NO	Elemento del espacio publico	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
129	6.252116	Plaza Botero	SI	Elemento del espacio publico	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
130	6.250087	Iglesia La Candelaria	SI	Templo	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
132	6.251754	Palacio de la Cultura	SI	Edificacion para la cultura	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
133	6.252036	Hotel Nutibara	SI	Arquitectura para el comercio	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit
136	6.252502	Catedral Basílica	SI	Templo	10	La Candelaria	1	Señor Taco Camino Real	Delirio Exquisito	Don Anibal	Donde Hernán	Eat Burrit

This is the cluster 2's dataset.

Y	LABEL	IMPERDIBLE	TIPOATRACTIVO	COD_COMUNA	COM_CORR	Cluster Labels	1st Most Common Restaurant	2nd Most Common Restaurant	3rd Most Common Restaurant	4th Most Common Restaurant	5th Most Common Restaurant	
11	6.268893	CCial. Bosque Plaza	NO	Arquitectura para el comercio	4	Aranjuez	2	Taconazo	Órale	Delirio Exquisito	Donde Hernán	Eat Burrito
15	6.268117	Casa de la Musica	NO	Edificacion para la cultura	4	Aranjuez	2	Taconazo	Órale	Delirio Exquisito	Donde Hernán	Eat Burrito
17	6.268292	Esquina de las Mujeres	NO	Elemento del espacio publico	4	Aranjuez	2	Taconazo	Órale	Delirio Exquisito	Donde Hernán	Eat Burrito
20	6.268345	Parque de los Deseos	SI	Escenario para la recreacion y el deporte	4	Aranjuez	2	Taconazo	Órale	Delirio Exquisito	Donde Hernán	Eat Burrito
21	6.268650	Planetario	SI	Edificacion para la ciencia	4	Aranjuez	2	Taconazo	Órale	Delirio Exquisito	Donde Hernán	Eat Burrito
23	6.265735	Museo Cementerio San Pedro	SI	Funeraria	4	Aranjuez	2	Taconazo	Órale	Delirio Exquisito	Donde Hernán	Eat Burrito
24	6.269402	Jardin Botanico	SI	Edificacion para la ciencia	4	Aranjuez	2	Taconazo	Órale	Delirio Exquisito	Donde Hernán	Eat Burrito

This is the cluster 3's dataset.

54	6.246527	CCial. El Punto de La Oriental	NO	Arquitectura para el comercio	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Órale	El Jitomate	Donc Herná
61	6.245732	Placita de Florez	NO	Arquitectura para el comercio	10	La Candelaria	3	The Mexican House	Lupita Peruana & Mexicana	Órale	El Jitomate	Donc Herná
62	6.247602	Teatro Pablo Tobon Uribe	NO	Edificacion para la cultura	10	La Candelaria	3	The Mexican House	Lupita Peruana & Mexicana	Órale	El Jitomate	Donc Herná
63	6.248263	Palacio de Bellas Artes	NO	Edificacion para la cultura	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
64	6.247554	Asociacion Pequeno Teatro	NO	Edificacion para la cultura	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
69	6.247277	Tranvia de Ayacucho	NO	Obras de ingenieria e infraestructura	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
71	6.248374	Avenida La Playa	NO	Elemento del espacio publico	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
72	6.246506	Ed. Paraninfo Universidad de Antioquia	NO	Edificacion para la cultura	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
73	6.246019	Antiguo Colegio de San Ignacio	NO	Edificacion para la educacion	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
79	6.248799	Biblioteca Comfenalco Hector Gonzalez Mejia	NO	Edificacion para la cultura	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
87	6.249297	Parque El Periodista	NO	Elemento del espacio publico	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer
88	6.246029	Iglesia San Ignacio de Loyola	NO	Templo	10	La Candelaria	3	Señor Taco Camino Real	The Mexican House	Lupita Peruana & Mexicana	Órale	El Güer Taquer

This is the cluster 4's dataset.

	Y	LABEL	IMPERDIBLE	TIPOATRACTIVO	COD_COMUNA	COM_CORR	Cluster Labels	1st Most Common Restaurant	2nd Most Common Restaurant	3rd Most Common Restaurant	4th Most Common Restaurant	5th Most Common Restaurant
46	6.248383	Zona Comercial del Hueco	NO	Arquitectura para el comercio	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
47	6.247542	CCial. Gran Plaza	NO	Arquitectura para el comercio	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
49	6.245423	Parque San Antonio	NO	Elemento del espacio publico	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
50	6.245022	Museo del Agua EPM	NO	Edificacion para la cultura	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
67	6.247222	Metro de Medellin	NO	Obras de ingenieria e infraestructura	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
68	6.251100	Iglesia San Juan de Dios	NO	Templo	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
74	6.249451	CCial. Palacio Nacional	NO	Arquitectura para el comercio	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán
100	6.249362	Banco de La Republica	NO	Edificacion para la cultura	10	La Candelaria	4	Don Anibal	Ketaco Comida Mexicana	Señor Taco Camino Real	El Jitomate	Donde Hernán
105	6.244499	Parroquia San Antonio	NO	Templo	10	La Candelaria	4	Ketaco Comida Mexicana	Don Anibal	El Viejo y El Pancake	El Trio	Donde Hernán

5. Discussion.

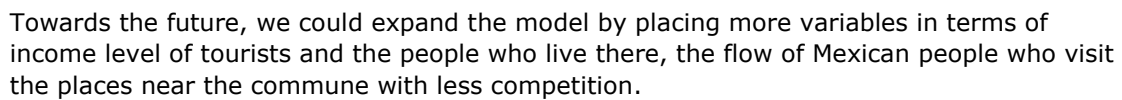
The terms of competition, the classification of the first cluster, identifies that group 0 in red is the group of communes (districts) with the greatest competence.

Cluster 1 shows us that in all its tourist points there are only 5 restaurants near each point. The same happens for cluster 2. The restaurants Don Hernan, Delirio Exquisito and Eat Burritos are found in both clusters, indicating that probably the communes (districts) Aranjuez and La Candelaria would be good prospects to not have the minimum competition.

But in cluster 3 is the commune La Candelaria included also, increasing the competition that we had previously visualized.

And Cluster 4 shows us other additional restaurants for the community of La Candelaria.

Taking as a reference the results of the clusters, the area where one could find less competition for the entrepreneur would be the area on this map.



And we can expand it in terms of local rental costs, and other factors that affect the possible investment in a Mexican restaurant.