Futures of Cordoba

Applied Data Science Capstone Project

This is the final project for the completion of the IBM Data Science Professional Certificate.

The current idea for this project is considerably different from the one that was being considered before. That change has been caused by the considerable effect that the global COVID-19 Pandemic is causing right now and by the possibility that my country, Spain, will enter a recession again. For that reason, the starting point of that project is a very personal one. However, this will not prevent me from taking a point of view as objective as possible. If there is any inconsistency in the project, it would be of great help to know it so that it can be corrected.

Table of Contents

Introduction

The story

When I was 16 years old I lived through the changes created by the last great global financial crisis, which hit Spain extremely hard in 2011. I remember a change in the lifestyles of all people I knew, including myself. There is an image of all the businesses in main streets of my city, Cordoba, shut down that made a tremendous contrast with what I had been experiencing until that moment and that I now consider opulence. What was until then a normal commodity became a luxury item, and some basic needs became a commodity. Public healthcare was semi-privatised in some regions and thousands of young people who had abandoned their studies to go to work got stranded in a situation of unemployment or working in the black economy. Spain has never recovered from the said recession.

That crisis made deep changes in how people lived and how people acted towards most aspects of our life. Yet, it is very difficult to reach a certain level of information or data about the specific changes that happened in a certain place.

The objective

The only aim of this project is to gather and explain analysed data related to the economic activity of the city of Cordoba now with the only purpose of making it available for the possibility of repeating and comparing the same analysis after the COVID-19 Pandemic.

The target

The target of this project are the people with interest in tracking changes in tourism related economics in the city of Cordoba.

Córdoba

The city that is going to be studied is Cordoba (Córdoba),located in the southern Spanish region of Andalusia and with a population close to 330,000 people. (Ayto. Córdoba, 2019).

History

Cordoba has a long history, having existed at least since the eight century BC. In the year 711 AD. it became the capital of what would become the Al-Andalus empire, growing to a population close to one million inhabitants. Many of the historic places that have been bringing tourists to the city until now have their origin in that historic period. After the decadence of the empire and its collapse the city was conquered by the northern Kingdom of Castilla in 1236 (Turismo de Córdoba, s.f.).

It is remarkable to know that, almost 800 years after that, the economy of the city has been running, in part, thanks to the people that come to visit the historic places of that period. The _Mezquita-catedral de Córdoba_ alone was visited by almost two million people in 2019 (Europa Press, 2019).

Gastronomics

Another important economic motor of the city is Gastronomics. Some of the most famous foods of Spain have its origin in the region. Which is why it is also an influential factor in tourism (Luque, A., 2020).

The Spring festivals

The moment in which the quarantine was declared makes it possible that it will be coincident with some of the most important festivities of the city, which are concentrated in April and May. Those festivities are responsible for bringing thousands of people to Córdoba, and some of the most important of those events have already been canceled or delayed (Ávalos, R. 2020).

It is accepted that tourism is a fundamental axis for the economy of the city. That tourism has been notably affected by the current pandemic, which is expected to cause loses running to millions of euros for the local economy (Cordópolis, 2020). How that situation will shape the local economy in the next few years is yet to be seen.

Data

The data for this study have been selected to shape a portrait of a part of the economic activity of the city that is very related to tourism, taking advantage of the kinds of businesses that can be pointed out using Foursquare API.

Urban organization

The city of Cordoba is divided in ten districts, 8 of which are in the central urban area. Those districts are divided in neighbourhoods (Barrios) of different populations and areas.

> **Cordoba City Hall** (2019). *Datos estadísticos extraídos por: Barrios, Distritos - sección, Entidades, Genéricas y Niveles de Estudio.* Extracted from: https://www.cordoba.es/la-ciudad/cifras-estadisticas/estadisticas-de-poblacion

The distribution of the city in neighbourhoods and districts will be used as an asset for the analysis of the data, as it is a form of an already existing division.

Because, after many tries, the automatic extraction of the coordinates of the different neighbourhoods has not been successful, a decision has been made of creating a self made database of the coordinates using the online tool Convertidor de Coordenadas GPS. The resulting table is shown below:

Table of Districts, neighbourhoods and Coordinates of Cordoba

	Distrito	Barrio	Latitude	Longitude
0	Centro	San Basilio	37.875000	-4.783330
1	Centro	Huerta del Rey - Vallellano	37.878191	-4.784656
2	Centro	Mezquita	37.879432	-4.779865
3	Centro	San Francisco - Ribera	37.881721	-4.774905
4	Centro	Santiago	37.882216	-4.769474

Foursquare API

Foursquare registers an important quantity of businesses that might be related to tourism such as hotels and restaurants in different venues. That makes Foursquare an interesting tool for studying those businesses that might be affected in the close future by the current pandemic and the possible economic recession. In order to study that, a sample of those activities is going to be extracted from Foursquare using as sample points the reference centers of each neighbourhood of the city.

Foursquare Developers: https://developer.foursquare.com/

With the data mentioned before it is expected to obtain a portrait of the economic activity that might be affected by a shortage of tourism in the near future, and to mark a reference that can be used in the future to detect changes in some of those activities.

Methodology

This project is directed towards sampling the economic activity of the city of Cordoba taking advantage of the kind of data that Foursquare collects.

In the first part, needed libraries and prepared data are going to be called. That data is what has been defined above as the *Table of Districts, neighbourhoods and Coordinates of Cordoba*.

Once it is done, and to take advantage of the division of the city into districts, dataframes with the total of neighbourhoods and dataframes with the neighbourhoods of each districts, the number of venues businesses sampled will be measured and compared, to look for areas with a higher concentration than the average of measured areas. This is expected to give a portrait of the economic activity of the city that is related to tourism.

After it is done, a process of clustering using the k-means algorithm to analyse the similarity and dissimilarity of the neighbourhoods of Cordoba. The number of clusters will be determined using the Elbow Method. The resulting clusters will be analysed and compared.

Once the analysis process is finished, the results will be discussed and a conclusion, if possible, will be portrayed.

Analysis

1. Importing libraries

First, it is needed to import the following libraries, which are going to be used for the development of the project.

2. Importing the Table of Districts, neighbourhoods and Coordinates of Cordoba

3. Sorting and dividing the table with the information of the neighbourhoods

A dataframe with the neighbourhoods of each district is created, and another with all the information together.

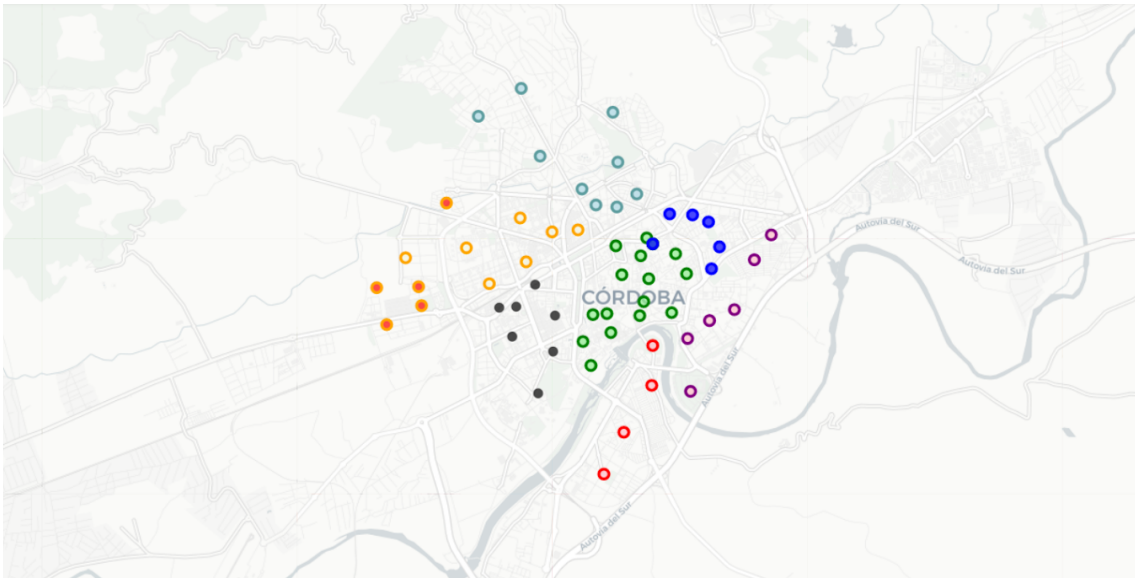
The head of every dataframe is shown to prevent future errors. For example:

Centro District

	Distrito	Barrio	Latitude	Longitude
0	Centro	San Basilio	37.875000	-4.783330
1	Centro	Huerta del Rey - Vallellano	37.878191	-4.784656
2	Centro	Mezquita	37.879432	-4.779865
3	Centro	San Francisco - Ribera	37.881721	-4.774905
4	Centro	Santiago	37.882216	-4.769474

4. Mapping the neighbourhoods divided in the official districts

A map is created that shows the neighbourhoods divided in the eight official districts of the city.



5. Obtaining information about each neighbourhood venues

Using the Foursquare API, samples of the venues of the city are extracted using the centers of the neighbourhoods as central points, with a radius of 500 meters and a limit of 100 venues per neighbourhood.

6. Overview of the venues

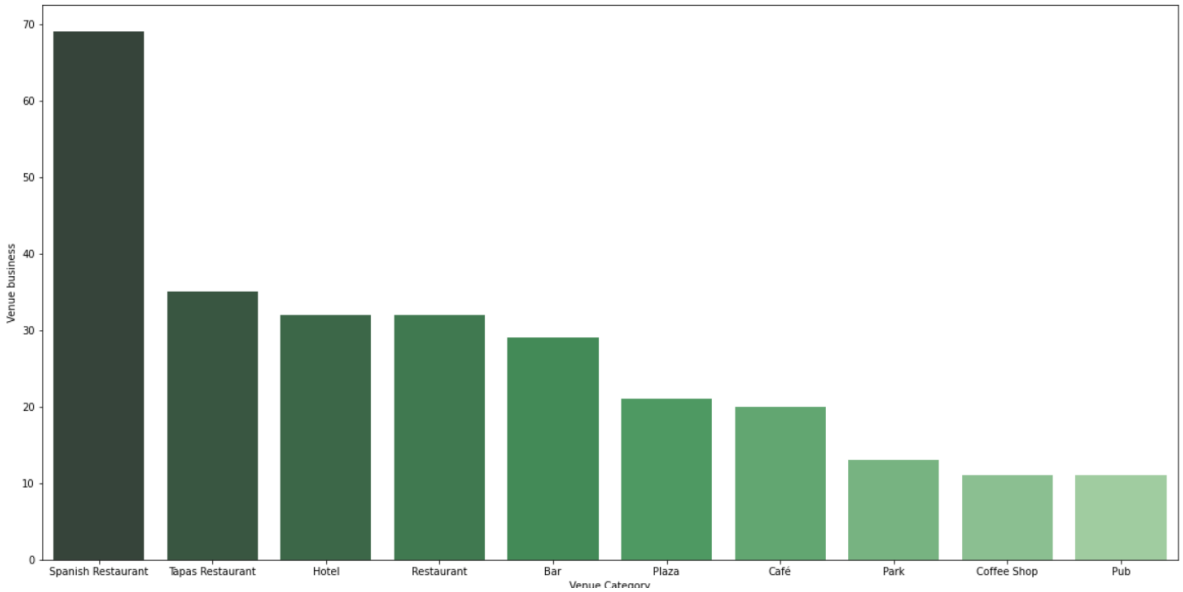
Below, the dataframes extracted are shown.

	Barrio	Neighborhood Latitude	Neighborhood Longitude	Venue business	Venue Latitude	Venue Longitude	Venue Category
0	San Basilio	37.875000	-4.783330	Taberna La Viuda	37.875299	-4.785129	Tapas Restaurant
1	San Basilio	37.875000	-4.783330	Jardines del Alcazar	37.876389	-4.782486	Garden
2	San Basilio	37.875000	-4.783330	Alcázar de los Reyes Cristianos	37.876939	-4.781733	History Museum
3	San Basilio	37.875000	-4.783330	Caballerizas Reales	37.876629	-4.783090	Museum
4	San Basilio	37.875000	-4.783330	Mesón Bodega San Basilio	37.876526	-4.783781	Spanish Restaurant
...	...	...	...	...	...	...	...
1437	Fidiana	37.892752	-4.752284	Alain Afflelou Óptico	37.893336	-4.747732	Optical Shop
1438	Fidiana	37.892752	-4.752284	MASLIFE: Telefonía y móviles	37.893284	-4.747583	Mobile Phone Shop
1439	Fidiana	37.892752	-4.752284	Deza Av.Libia	37.891468	-4.756820	Department Store
1440	Fidiana	37.892752	-4.752284	Plaza Cañero	37.889369	-4.755339	Plaza
1441	Fidiana	37.892752	-4.752284	Carrefour	37.893748	-4.747575	Supermarket

1442 rows × 7 columns

7. Analysis of the most common venues of the city

The next bars plot is a representation of the 10 most common venue businesses in the samples taken from Foursquare sorted in descending order.



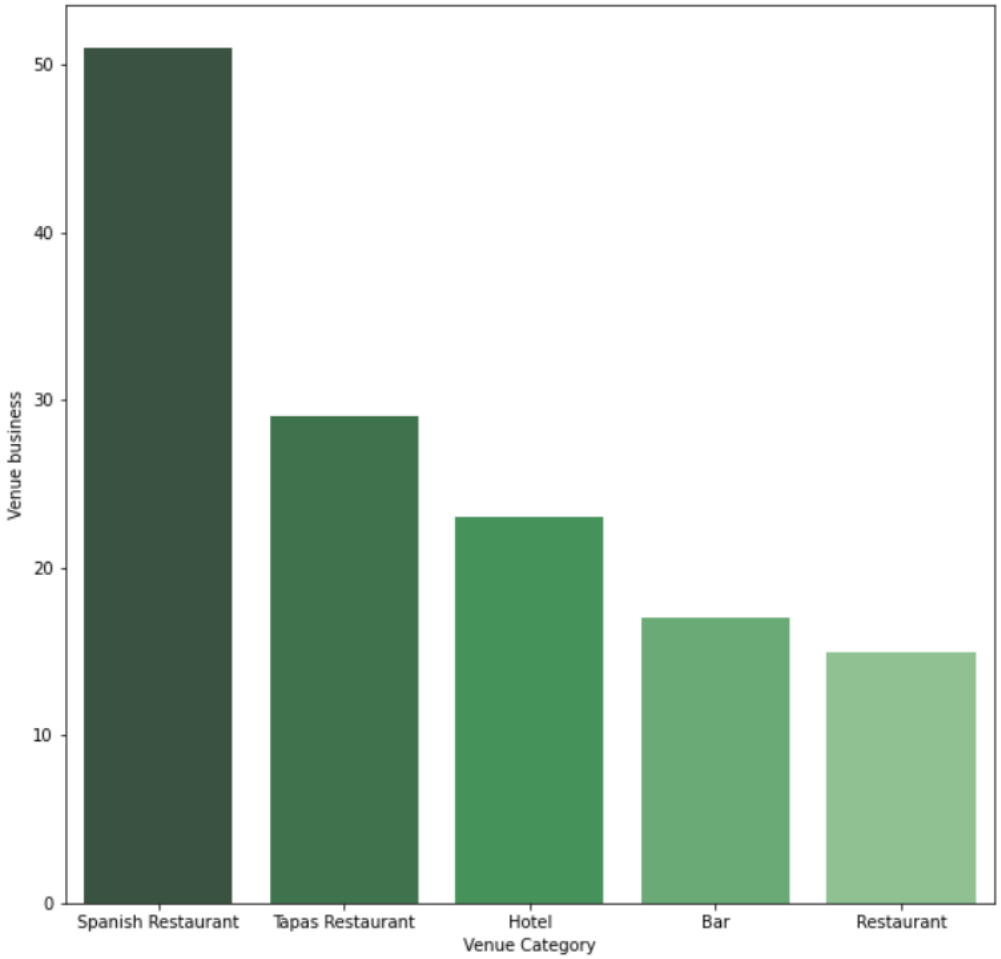
It can be noted that the most common venue business category is the *Spanish Restaurant*, followed by the *Tapas Restaurant*, and the number four is *Restaurant*. All of those places are, at the moment it is being written, closed to prevent the spread of the pandemic.

The second most common venue business category is the *Hotel*. Hotels are currently empty in the city and that situation is not expected to change.

8. Analysis of the most common venue businesses of each district

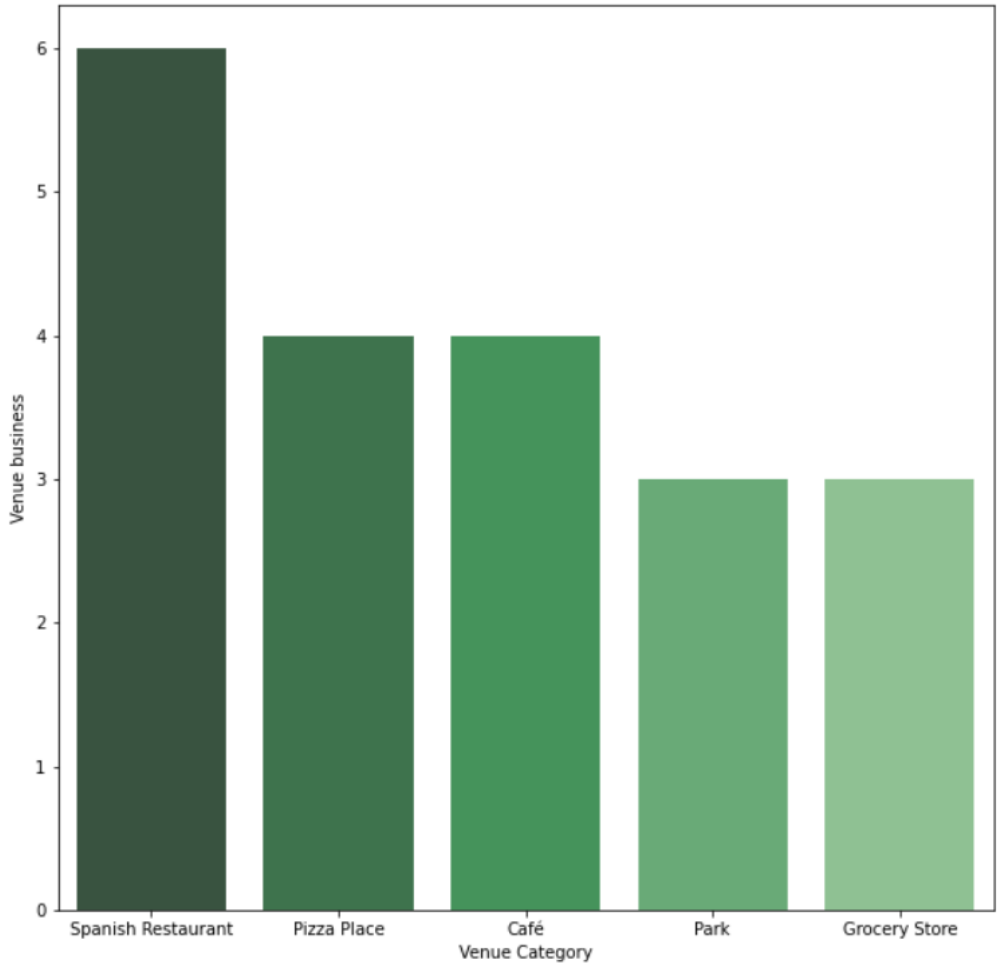
Now, the top 5 venue businesses category of each District is shown in bars plots.

Top 5 Centro District venue business category



As it is shown, the top of venues in the Centro District is similar to the top of the total of the city. It can be noted that two thirds of the hotels extracted by Foursquare appear to be in that District. The same happens with the *Spanish Restaurant* category.

Top 5 Levante District venue business category

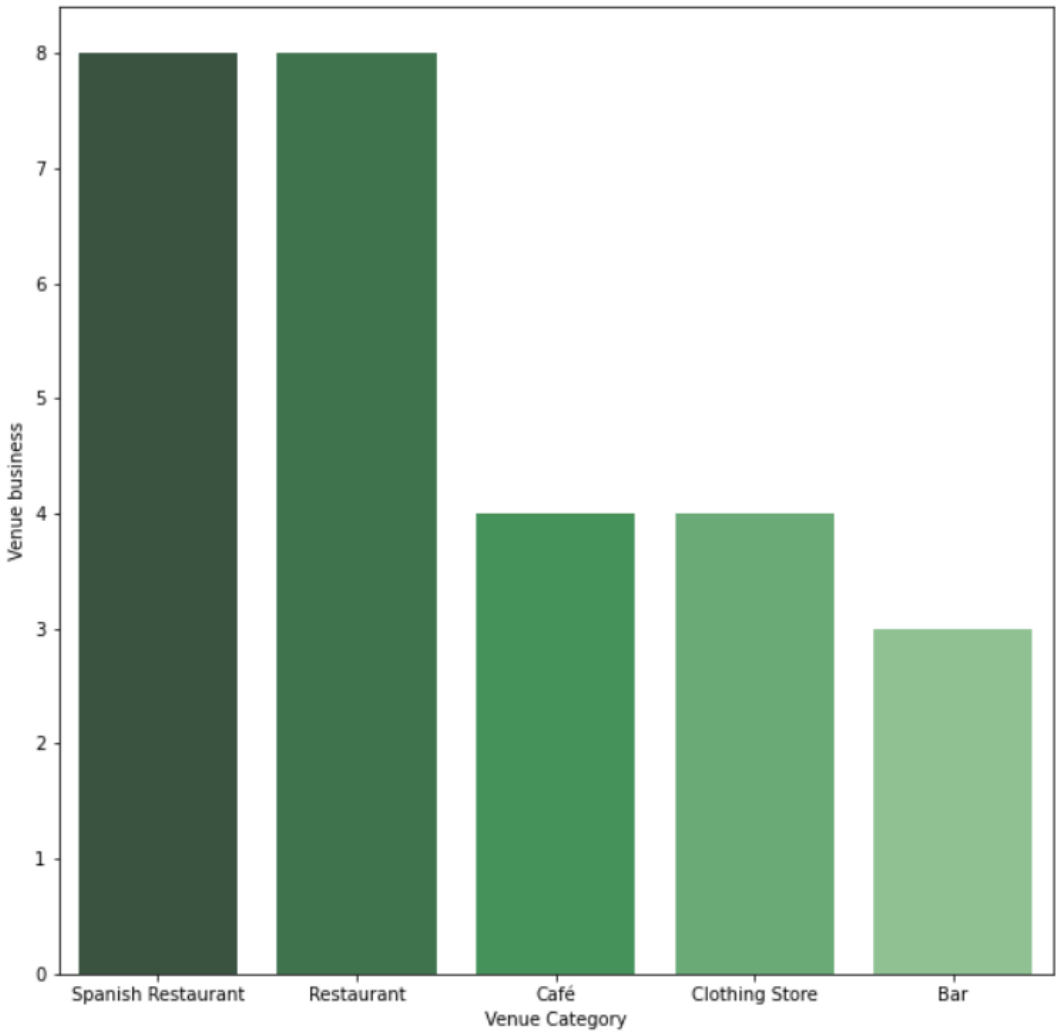


In the Levante District, the frequency of businesses falls considerably. New categories like *Pizza Place* and *Grocery Store* appear in the ranking. That is descriptive of the characteristics of that District.

With no *Hotel* category in the ranking, there is probably a lower affluence of tourism in Levante than in Centro District.

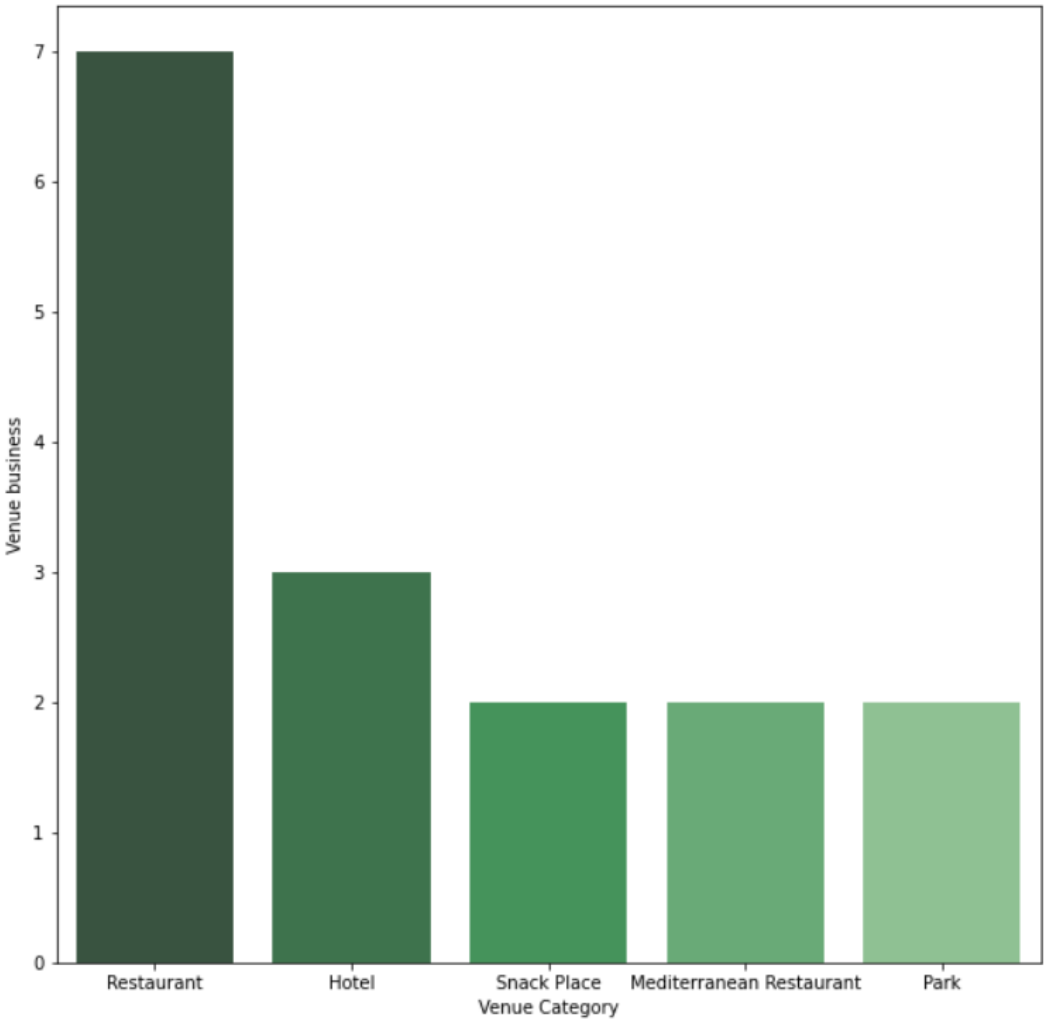
Top 5 Noroeste District venue business category

Noroeste District draws a picture similar to Levante District. *Spanish Restaurant* is again the most frequent followed by *Restaurant*.

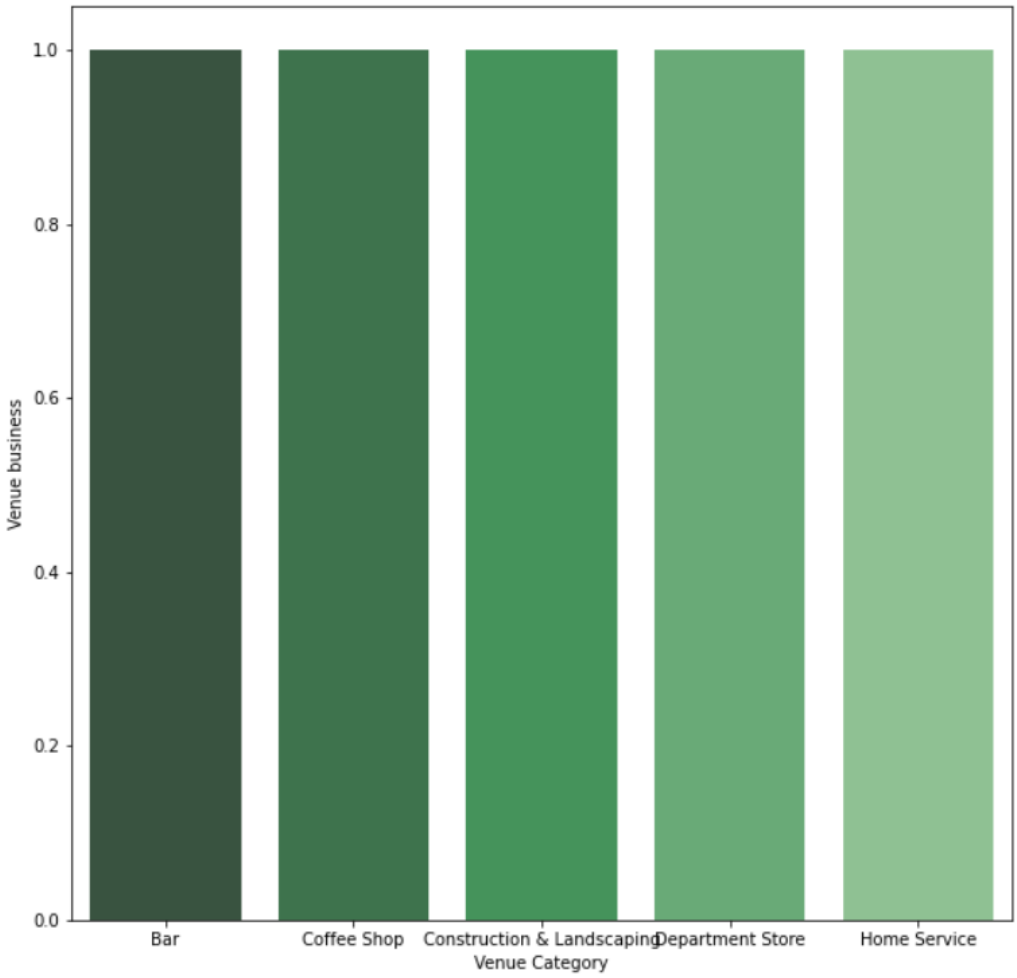


Top 5 Nortesierra District venue business category

Nortesierra district has again a lower frequency than Centro District, but the *Hotel* category is in the ranking. Again, the most frequent category is *Spanish Restaurant*.

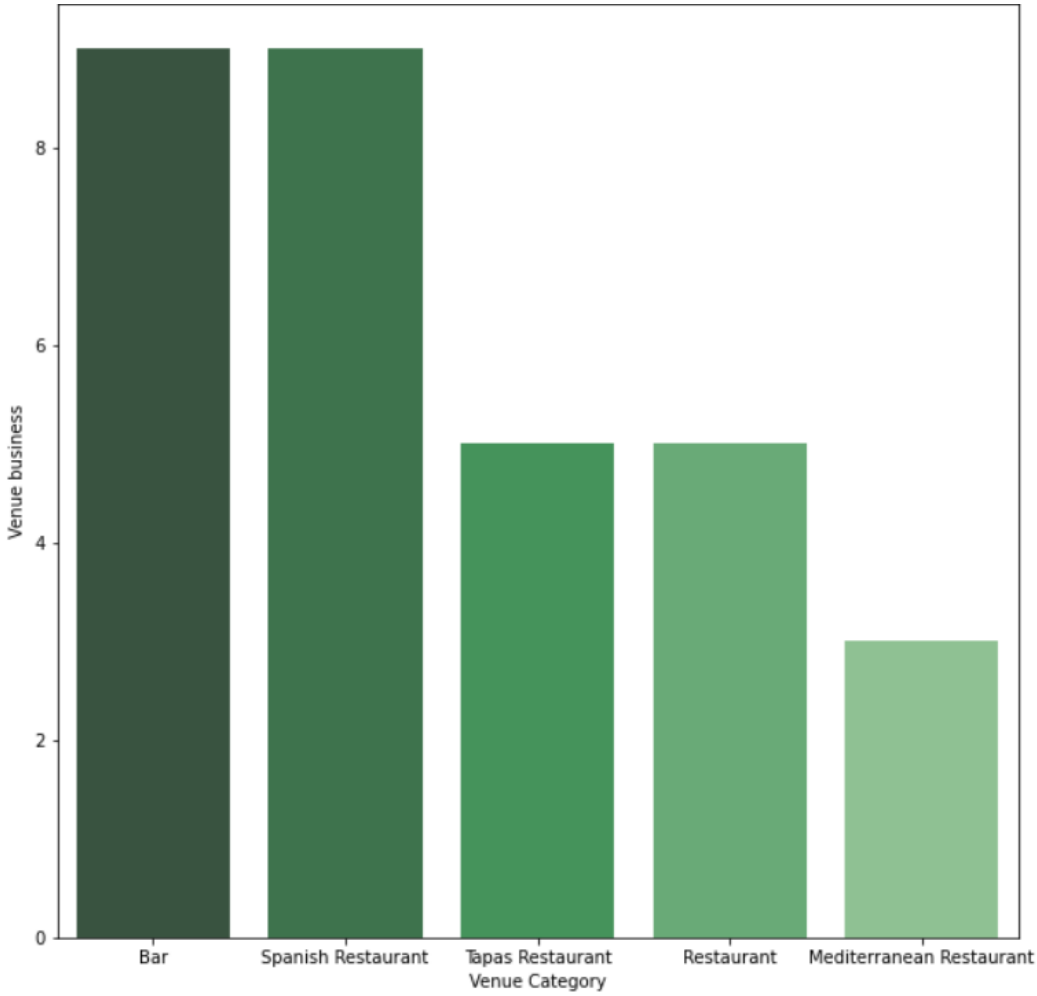


Top 5 Poniente-Norte District venue business category



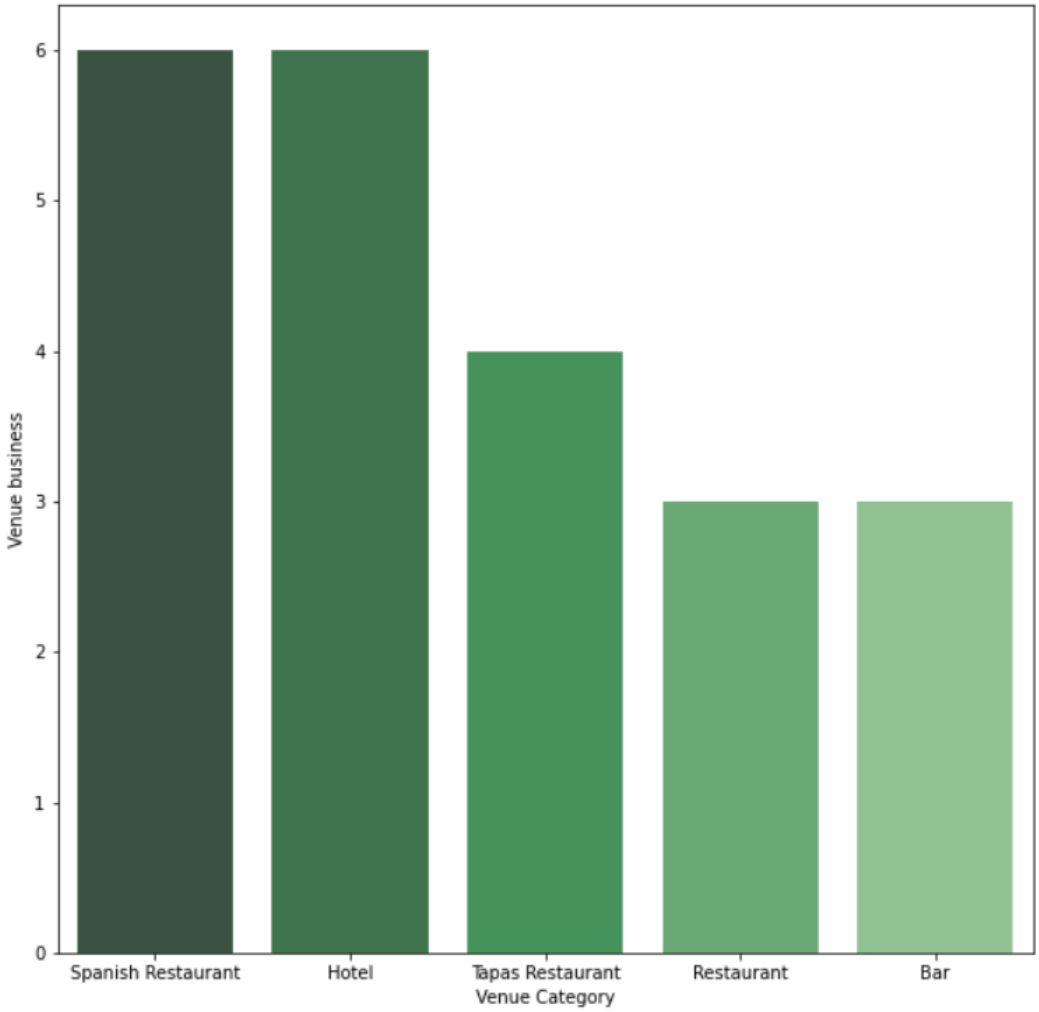
The case of Poniente-Norte District is interesting, because it draws a very particular distribution, with low frequency and high variety of categories. Unlike the cases before, there are no *Spanish Restaurant* or *Hotel* categories in the ranking.

Top 5 Poniente-Sur District venue business category



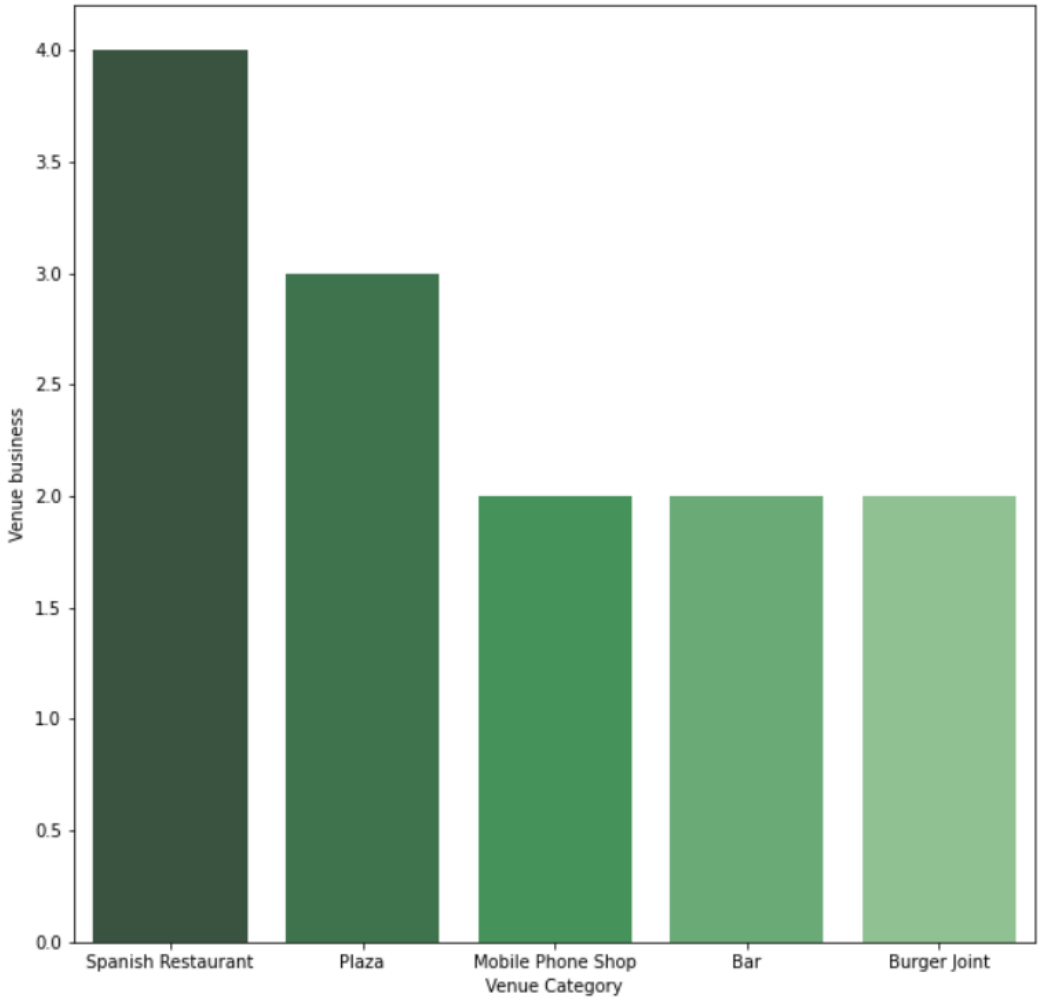
The Poniente-Sur District has also a low frequency of venues, and the most common category is the *Bar*. Hotels are not present in this top, and *Spanish Restaurant is the second, with the same number of cases as the Bar* category.

Top 5 Sur District venue business category



The Sur District is a very interesting case, because that District includes one neighbourhood that is close to the touristic center and has probably an economy of businesses related to that center and, at the same time, includes very depressed and unattended neighbourhoods that rank in the top of the poorest neighbourhoods of Spain (Tahiri, J. 2019).

Top 5 Sureste District venue business category



Sureste District starts the ranking with *Spanish Restaurant* category, followed by *Plaza*. *Mobile phone shop* and *Burger Joint* enter in the ranking for the first time.

9. Level of venues businesses concentration per neighbourhood

In this step I will compare the neighbourhoods on the basis of the number of venue businesses extracted using Foursquare. That decision was made considering the extreme difference in venue frequency observed in step 8.

	Barrio	Neighborhood Latitude	Neighborhood Longitude	Venue business	Venue Latitude	Venue Longitude	Venue Category
0	San Basilio	37.875	-4.78333	Taberna La Viuda	37.875299	-4.785129	Tapas Restaurant
1	San Basilio	37.875	-4.78333	Jardines del Alcazar	37.876389	-4.782486	Garden
2	San Basilio	37.875	-4.78333	Alcázar de los Reyes Cristianos	37.876939	-4.781733	History Museum
3	San Basilio	37.875	-4.78333	Caballerizas Reales	37.876629	-4.783090	Museum
4	San Basilio	37.875	-4.78333	Mesón Bodega San Basilio	37.876526	-4.783781	Spanish Restaurant

The dataframe with the venues extracted from Foursquare is sorted. It is printed to make sure that the dataframe has been sorted correctly.

The next step is to print the ten neighbourhoods with the highest number of venue businesses and the ten neighbourhoods with the lowest number of venue businesses.

Neighbourhoods with the highest concentration of venue businesses

We retrieve the 10 neighbourhoods with more concentration of business. The majority of those neighbourhoods and, in particular, the top 5, are in the center of the city or very close to it, normally having a strong affluence of tourism

	Barrio	Venue business
15	El Salvador y la Compañia	100
29	La Trinidad	100
46	San Francisco - Ribera	100
32	Mezquita	100
49	San Miguel-Capuchinos	78
50	San Pedro	72
3	Campo de la Merced - Molinos Alta	59
27	Huerta del Rey - Vallellano	49
8	Ciudad Jardin	46
54	Santiago	39

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Neighbourhoods with the lowest concentration of venue businesses

The table with the top 10 neighbourhoods with the less number of venue businesses is interesting. It gathers a number of deprived neighbourhoods such as *Palmeras*, but includes at the same time *El Brillante*. That neighbourhood is known for leading the highest rent per person in the city. That might be due to the urban characteristics of that neighbourhood, that is mainly residential and counts with extremely large chalets, which may have affected the gathering of information due to the limited radius used.

	Barrio	Venue business
11	El Brillante	5
10	El Arenal	5
16	Electromecanicas	5
13	El Naranjo	4
51	San Rafael de la Albaida	4
30	Las Margaritas	4
33	Miralbaida	3
39	Parque Azahara	2
38	Palmeras	2
24	Huerta de Santa Isabel	1

The rent of *El Brillante* is seven times higher than the rent of *Palmeras* (Alba, A.,09/13/2019).

10. Heatmap of the concentration of venues in Cordoba

In order to have a general understanding of the concentration of venues in the city, a Heatmap will be created. On that heatmap, hotels are going to be added to show the location of those.

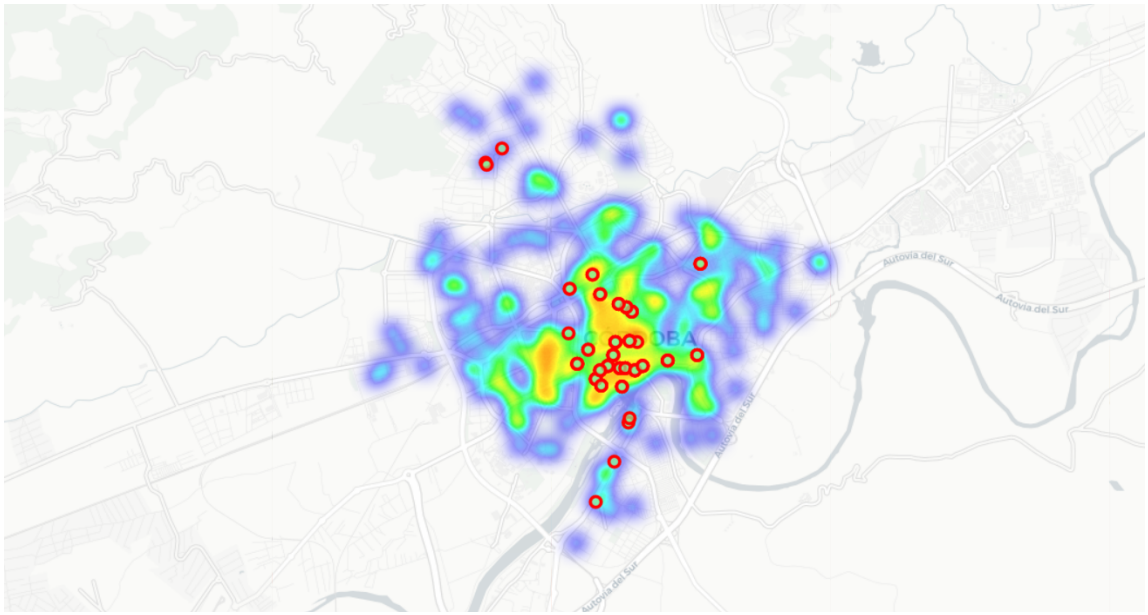
The purpose of that is giving an overview of where the hotels located in the general map of venues, to offer a better understanding of the importance of tourism in the city.

	Barrio	Neighborhood Latitude	Neighborhood Longitude	Venue business	Venue Latitude	Venue Longitude	Venue Category
5	San Basilio	37.875000	-4.783330	Las Casas De La Juderia Hotel Cordoba	37.878403	-4.782219	Hotel
13	San Basilio	37.875000	-4.783330	Hotel NH Collection Amistad Córdoba	37.879213	-4.783054	Hotel
20	Huerta del Rey - Vallellano	37.878191	-4.784656	Las Casas De La Juderia Hotel Cordoba	37.878403	-4.782219	Hotel
23	Huerta del Rey - Vallellano	37.878191	-4.784656	Hotel NH Collection Amistad Córdoba	37.879213	-4.783054	Hotel
42	Huerta del Rey - Vallellano	37.878191	-4.784656	Hotel Eurostars Palace	37.881092	-4.785859	Hotel
...	...	...	...	...	...	...	...
1353	Fray Albino	37.872344	-4.772809	Nh Guadalquivir	37.874245	-4.777607	Hotel
1371	Campo de la Verdad - Miraflores	37.877767	-4.772762	Hotel Madinat	37.880250	-4.776829	Hotel
1386	Campo de la Verdad - Miraflores	37.877767	-4.772762	Hotel Minotel Maestre	37.880811	-4.775666	Hotel
1402	El Arcangel	37.878655	-4.766763	Hotel Averroes	37.882232	-4.767048	Hotel
1410	Santuario	37.881069	-4.762855	Hotel Averroes	37.882232	-4.767048	Hotel

95 rows × 7 columns

In order to do that, a dataframe with the information of the hotels is extracted from the main dataframe of venues.

Next, a map of Cordoba is created and the hotels are marked with red circles.



11. Clustering of the neighbourhoods

In this step, Machine Learning tool K-means will be used for clustering the neighbourhoods from their venues characteristics. That classification can be compared with the classification of Districts and can also be used for a better understanding of the economics of the city.

Before doing the ML clustering, information on the most common venue business category for each neighbourhood is going to be generated.

In the next table the ten most common venue business categories of each neighbourhood can be seen.

	Barrio	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	Arruzafilla	Clothing Store	Restaurant	Japanese Restaurant	Spanish Restaurant	Pizza Place	Sports Bar	Supermarket	Tapas Restaurant	Sporting Goods Shop	Grocery Store
1	Asomadilla	Restaurant	Pizza Place	Park	Café	Mediterranean Restaurant	Electronics Store	Spanish Restaurant	Winery	Food	Cupcake Shop
2	Camping	Pizza Place	Spanish Restaurant	Fast Food Restaurant	Snack Place	Brewery	Mediterranean Restaurant	Café	Cocktail Bar	Restaurant	Department Store
3	Campo de la Merced - Molinos Alta	Hotel	Pub	Spanish Restaurant	Bar	Pizza Place	Park	Tapas Restaurant	Bakery	Restaurant	Café
4	Campo de la Verdad - Miraflores	Spanish Restaurant	Tapas Restaurant	Hostel	Restaurant	Art Museum	Bar	Breakfast Spot	Hotel	Mediterranean Restaurant	Pub
...	...	...	...	...	...	...	...	...	...	...	...
57	Tablero	Hospital	Italian Restaurant	Beer Store	Coffee Shop	Convenience Store	Gym / Fitness Center	Gastropub	Bakery	Bar	Supermarket
58	Valdeolleros	Restaurant	Café	Mediterranean Restaurant	Pizza Place	Soccer Field	Gym	Electronics Store	BBQ Joint	Field	Fast Food Restaurant
59	Vista Alegre	Tapas Restaurant	Pizza Place	Restaurant	Basketball Stadium	Bar	Supermarket	Paella Restaurant	Sandwich Place	Indian Restaurant	Wine Bar
60	Viñuela - Rescatado	Café	Ice Cream Shop	Basketball Court	Gym	Grocery Store	Department Store	Park	Pizza Place	Coffee Shop	Restaurant
61	Zumbacon - Gabilan	Hotel	Restaurant	Soccer Field	Park	Dance Studio	Spanish Restaurant	Supermarket	Electronics Store	Winery	Fast Food Restaurant

62 rows × 11 columns

It might be useful to know the frequency of the most common categories in every neighbourhood. Below, are four examples of that venue business category frequency.

```
----San Lorenzo----
                venue  freq
0  Spanish Restaurant  0.22
1               Café  0.09
2         Coffee Shop  0.09
3              Plaza  0.09
4    Tapas Restaurant  0.09
```

```
----Palmeras----
          venue  freq
0  Coffee Shop   0.5
1         Park   0.5
2      Airport   0.0
3        River   0.0
4          Pub   0.0
```

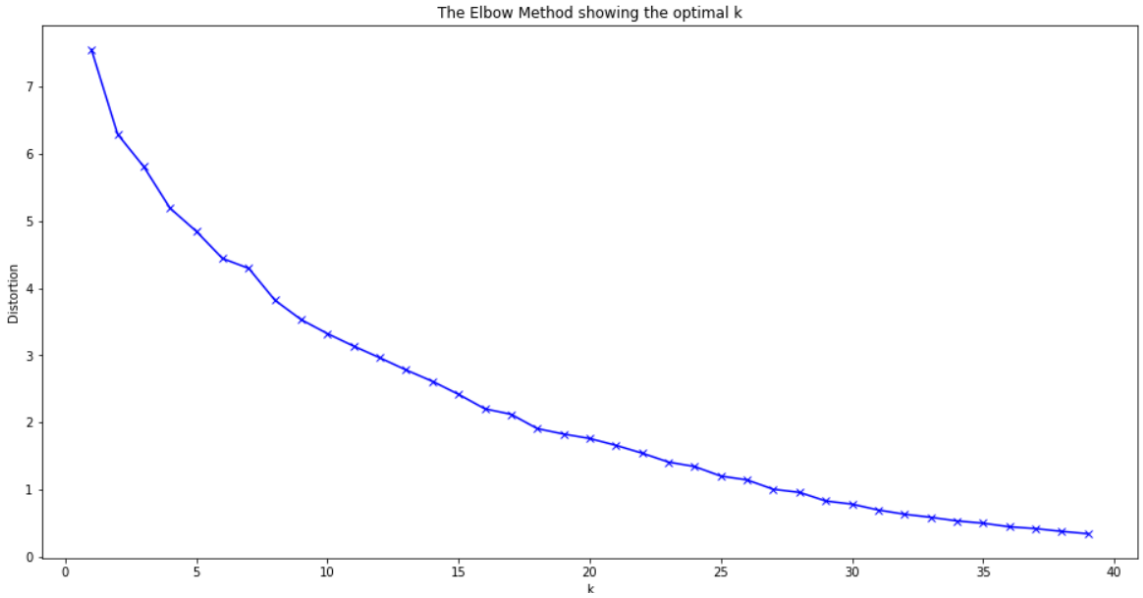
```
----Noreña----
                    venue  freq
0                   Café  0.19
1             Restaurant  0.12
2        Tapas Restaurant  0.12
3      Spanish Restaurant  0.12
4  Mediterranean Restaurant  0.06
```

```
----Mezquita----
                venue  freq
0  Spanish Restaurant  0.22
1              Hotel  0.11
2    Tapas Restaurant  0.07
3              Plaza  0.06
4         Restaurant  0.06
```

From the frequency information, it can be seen that *El Naranjo* has very particular venue categories, compared to the other neighbourhoods. That might have an influence in the K-means clustering.

K-Means clustering of neighbourhoods

In order to decide a number of clusters for the clustering, the *Elbow method* is going to be applied. Knowing that the number of neighbourhoods is high, a wide range of *K* is going to be taken into account.



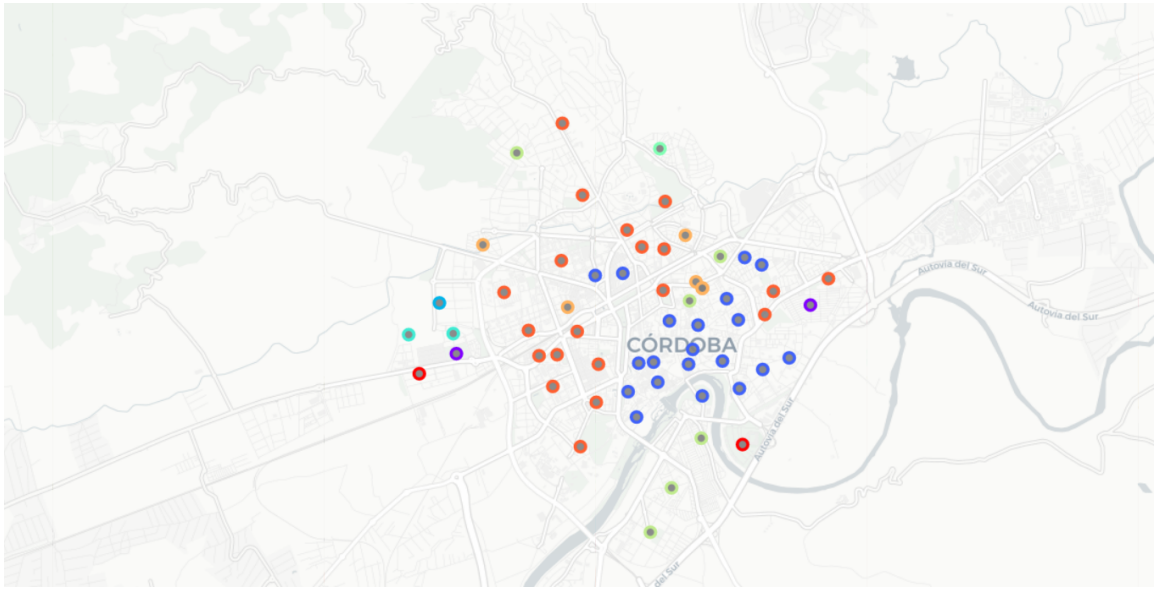
From the elbow method, it can be seen that there is not an extreme change of tendency in any step. There is a slight change between 5 and 10. Knowing that the number of official districts is 8 and that it might be interesting knowing what neighbourhoods are different enough to fit their own category, k=9 is chosen.

Clustering array given k=9:

```
array([1, 1, 1, 1, 4, 3, 1, 4, 1, 4, 2, 1, 0, 7, 8, 4, 3, 0, 1, 8, 4, 4,
       8, 1, 5, 1, 4, 4, 0, 4, 0, 1, 4, 6, 4, 1, 1, 0, 6, 2, 1, 1, 1, 4,
       4, 4, 4, 0, 4, 4, 4, 0, 8, 1, 4, 4, 8, 1, 0, 1, 1, 8], dtype=int32)
```

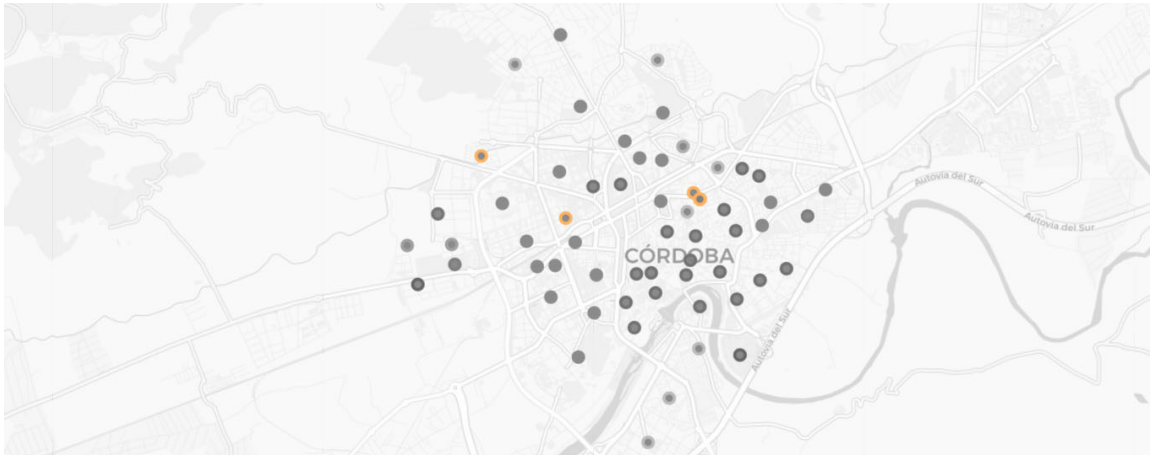
Once the clustering is done, a map is created with the information of the distribution of the neighbourhoods in clusters.

Map of neighbourhoods clusters



Now that we have the clusters of the city, it will be useful to consider the most common categories of each neighbourhood in the cluster for a better understanding of the clustering.

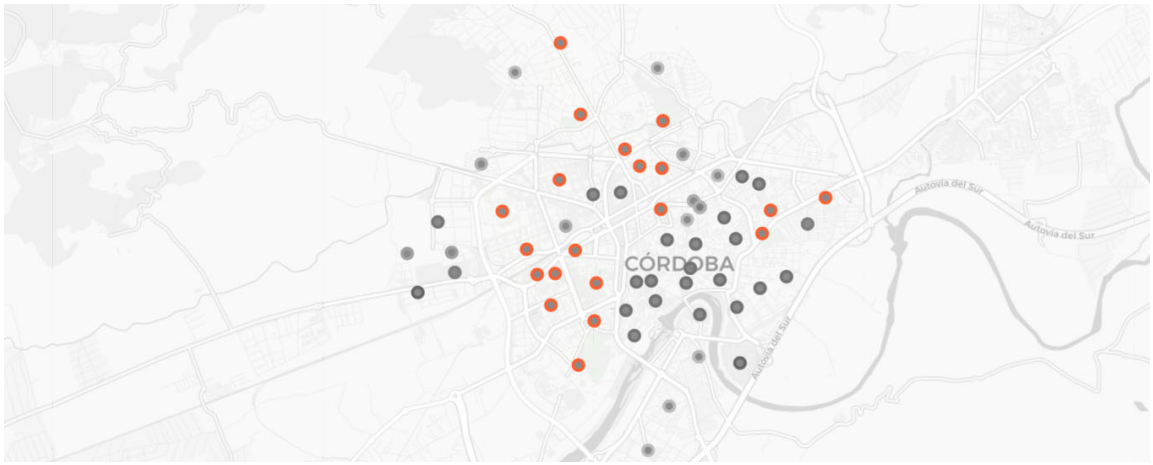
Cluster 1



It can be observed that there is a prevalence of *Pizza Places* as one of the most common categories of venue business, usually followed by Restaurant and *Ice Cream Shop*. That cluster covers neighbourhoods that are out of the path of tourism in the city, being the

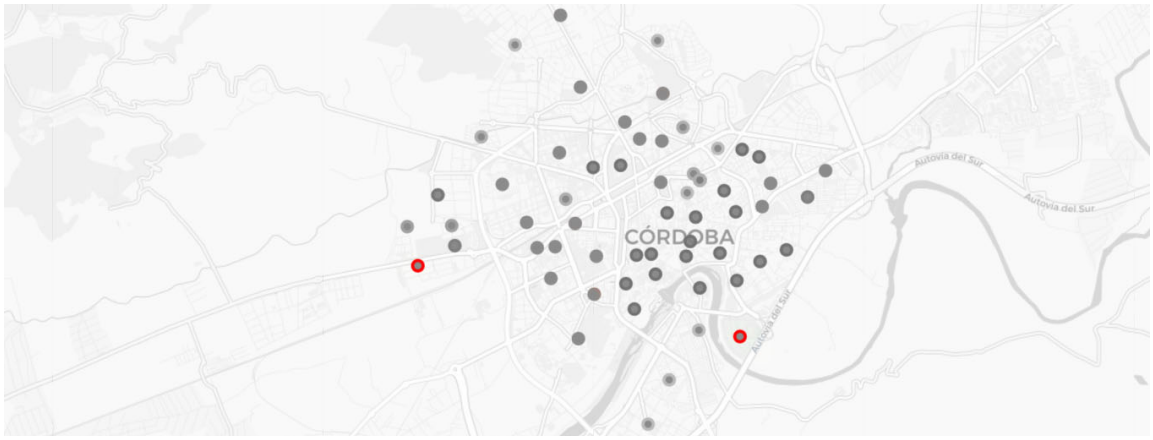
Hotel category not present in the ten most common category for any of its neighbourhoods.

Cluster 2: Urban modern residential areas



The Cluster 2 gathers the areas of the city that are residential and that have a recent construction. It is out of the main touristic area, covered by *Cluster 4*. A high presence of Restaurants can be noted, as well as Cafés. There is a higher concentration of places with foreign food like *Japanese Restaurant* than in other places.

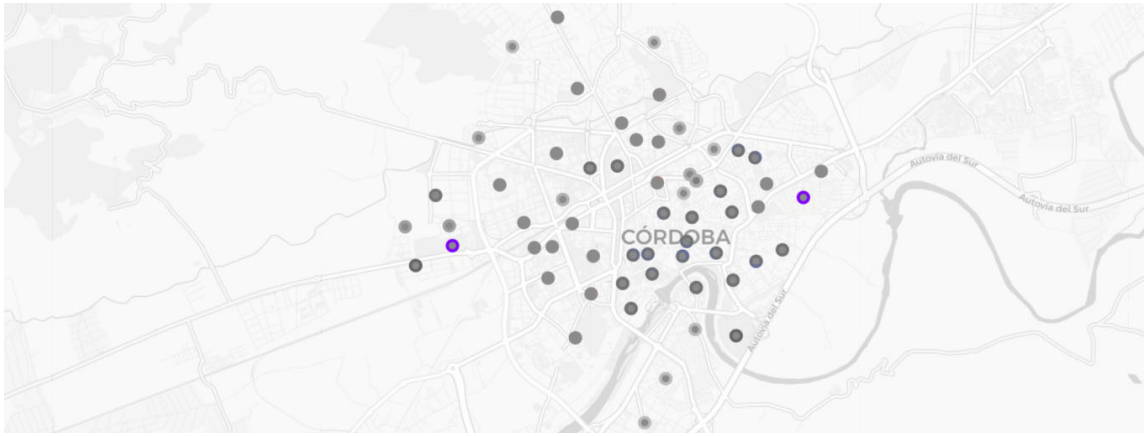
Cluster 3: low activity



This cluster is composed of 2 neighbourhoods with a low activity of business. They rank *Bar* as one of the most common categories and have a series of categories that are highly unrelated to tourism.

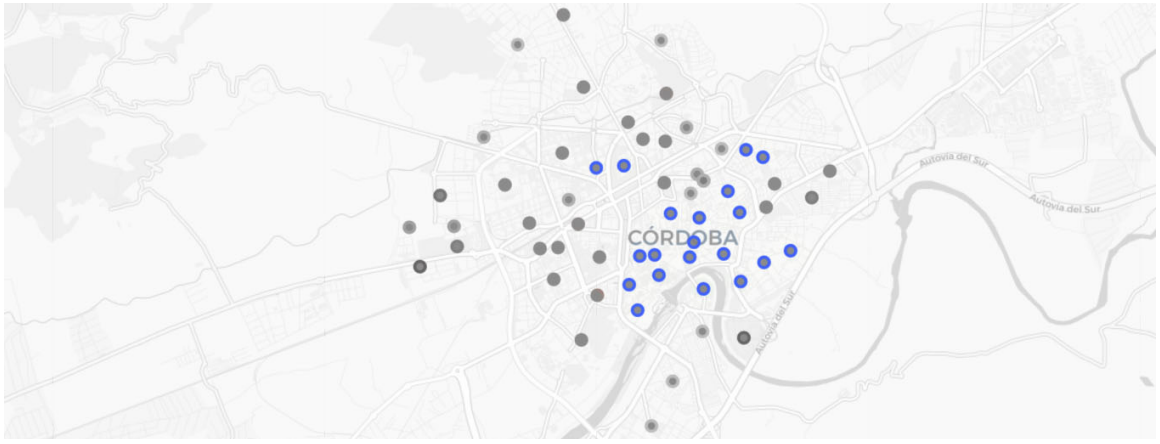
In the case of *El Arenal,* there is an exception to that situation during the festival of *Feria de mayo* in May. That festival holds a high affluence of visitors during a short period of time. That festival is very likely to be suspended as part of the restrictions caused by the COVID-19 pandemic.

Cluster 4: Cañero and Electromecánicas



This cluster is composed of two neighbourhoods that are at the limit of the urban area of the city, each in one extreme of the city. There are no *Spanish Restaurant* or *Hotel* categories in any of them

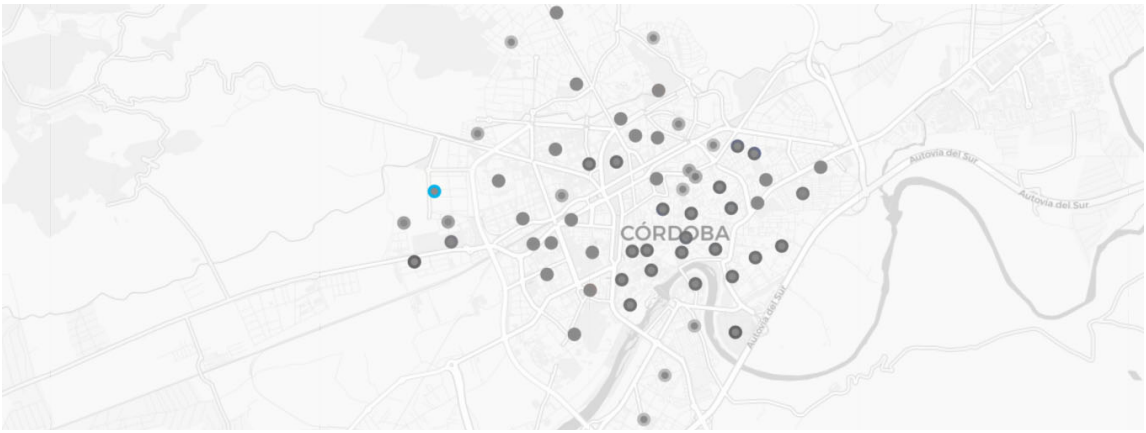
Cluster 5: touristic and economic areas



This cluster has a high presence of *Hotels* and *Spanish Restaurants* mainly followed by other kinds of restaurants and food locals.

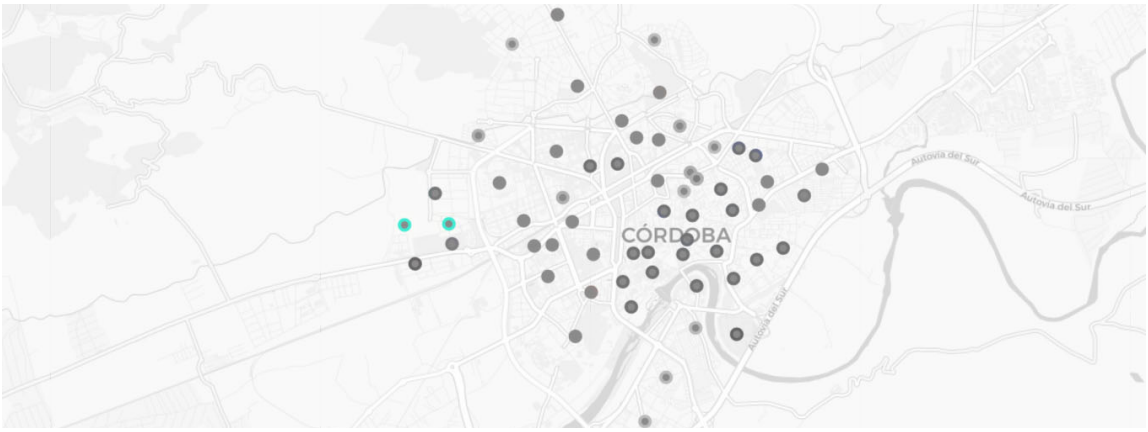
Very touristic areas, such as *Mezquita* are included in this category, but it also includes shopping areas like *Arcangel*.

Cluster 6: Huerta de Santa Isabel



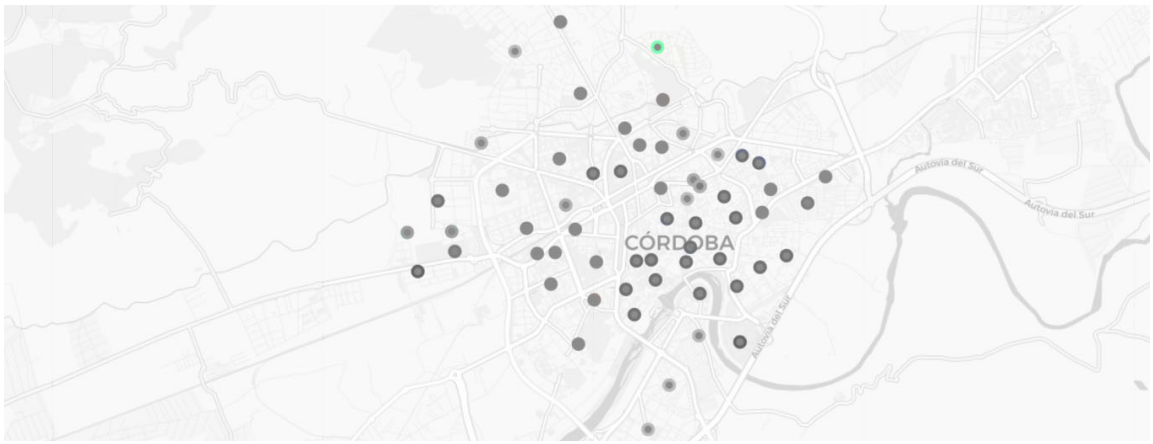
This cluster includes only one neighbourhood, *Huerta de Santa Isabel. It can be seen that the ranking of this neighbourhood is very particular. It has no presence of Spanish Restaurant*, but it does have presence of categories such as *Cupcake Shop* and *Dance Studio*.

Cluster 7: Palmeras and Miralbaida



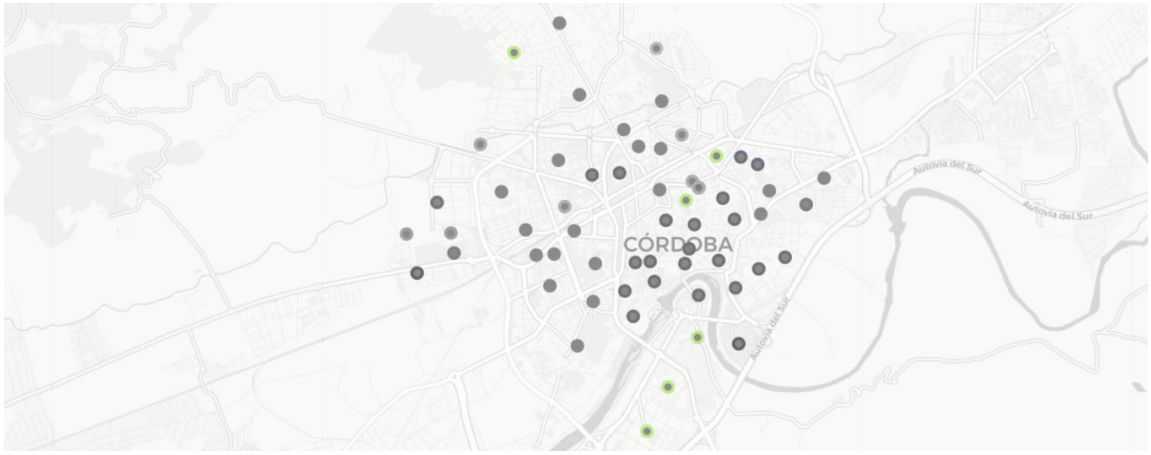
Palmeras and *Miralbaida* do not seem to count with *Hotel*, *Spanish Restaurant* or *Restaurant* businesses sampled. *Coffee Shop* is the most common category type in both cases, followed by the *Park* category.

Cluster 8: El Naranjo



El Naranjo neighbourhood counts with a set of most common venue categories that is very particular, with an important presence of categories related to physical activity.

Cluster 9



This cluster gathers neighbourhoods with a high presence of *hotels*. It is very interesting to notice that it mixes neighbourhoods from the southern area that are considered underprivileged with the case of *El Patriarca*, a wealthy neighbourhood composed of luxurious chalets.

None of those neighbourhoods are at the center of the city, but some of them like *Santa Marina* are very close, which may be a reason why there seem to be hotels in that area.

Results and Discussion

From the clustering, it is obvious that the central part of the city has a very particular economy depending on tourism, that is mainly composed of hotels and restaurants.

The study of the frequency of venue businesses made in the city and the districts show a strong concentration of activity at the center of the city. That might be caused by the higher affluence of tourists.

That difference is also notable in the heatmap representation, that makes the concentration of activity at the Centro District even more obvious. The main areas of activity also seem to be approximately coincident with the situation of the areas with the highest concentration of hotels. It would be useful to know if the data gathering process of Foursquare is reliable enough to take this data into account in a more formal process.

Based on the results of the clustering process, it seems that the division of the city in Districts is approximated to the division in the economical activity that the city has, with some notable exceptions.

Notwithstanding, the data collected here seems to be solid and might be useful for the target of comparing it with the situation in the same city a year after the COVID-19 pandemic and the likely recession, to be able to see the changes that take place in the venues samples of each area of the city.

Conclusion

It is clear that there is an important quantity of economic activity in the city of Cordoba that depends currently from tourism. That activity is highly concentrated in the city central area.

Given that all this activity is, at the moment of writing this notebook (03/27/2020), totally paralized by the current pandemic and that the most attractive festivities for tourism either have been cancelled of delayed or are very likely to be in the near future, the risk of recession for the economics of the city seem to be high.

Further conclusions will have to be taken when the same model is executed again, to seek for differences in a period or a year from that moment.

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Github repository: https://github.com/David-Sanchez-Simoni/FuturesofCordova

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