**Report**

1. **Introduction – problem, audience**

Two main cities in Spain, Barcelona and Madrid, have always been competitors, it is often very hard to choose which city should you visit to get more “sense” of the Spain. Naturally, every tourist will come to a question: “Which city has more to offer? How are the different?”.

In this project I will explore city centers of both Barcelona and Madrid to help answer this question and help tourist to make their decision. The result should provide a better understanding of city center life and compare two rival cities.

Please note, this project ignores some obvious facts, like Barcelona has a beach and Madrid doesn’t, Madrid is cheaper option than Barcelona, Barcelona is much more crowded place than Madrid, Barcelona has Gaudi architecture and Madrid has Prado museum and so on.

**Problem:** Choosing which city to visit.

**Audience:** Tourists

1. **Data – what data is used to solve the problem, source of data**

To solve this problem, I will use **two datasets of Barcelona and Madrid city center districts and their neighborhoods (scrapping data from Wikipedia).**

**Dataset for Madrid:** <https://es.wikipedia.org/wiki/Anexo:Distritos_de_Madrid>

For my analysis I will select a few districts (and their neighborhoods) besides Madrid center, these districts surround center and will give me more data to work with and get a better understanding of city venues:

1. Centro
2. Arganzuela
3. Retiro
4. Salamanca
5. Chamartin
6. Tetuan
7. Chamberi

Total area of these districts is around 41,74 km2.

**Dataset for Barcelona:** <https://es.wikipedia.org/wiki/Distritos_de_Barcelona>

List of districts of Barcelona for analysis:

1. Ciutat Vella
2. Eixample
3. Sants – Montjuic
4. Sant Marti

Total area of these districts is around 44,1 km2.

**Foursquare API** will be used to explore neighborhoods, find most popular venues, examine their variety, segment and cluster them and then compare them to get a clearer picture of two city centers lives.

Results of this project will help to answer the questions: Which has more to offer? Are they different or similar? Which one should I visit?

1. **Methodology**

**Clustering**

In this project I will use segmentation and clustering (ML method) to analyze neighborhoods of Madrid and Barcelona (their most popular venues): city centers and surrounding districts. Then I will search for insights, explore clusters and answer questions how they are similar or dissimilar, how Madrid and Barcelona clusters differ from one another?

First, I will create two dataframes for each city, they will include names of the districts, neighborhoods and their latitude and longitude. Then, using the Foursquare API we will get most common venues of these neighborhoods. Finally, we will segment the neighborhoods and explore their clusters.

1. **Results**

**Madrid:** 6 clusters

A picture containing text, map

Description automatically generated

**Cluster 0 (Red):** 15 neighborhoods out of 42

This cluster is the largest one and mainly consists of restaurants, bars and coffee shops. It’s important to notice that there also are a lot of historic sites, museums and art galleries and parks. Location: closer to city center.

|  |  |
| --- | --- |
| Restaurants/food | 66 |
| Bars, breweries | 22 |
| Coffee shops, bakeries, ice cream shops | 18 |
| Historic sites, plazas, museums, art galleries, theaters | 10 |
| Parks | 5 |
| Other (supermarkets, stores, hotels, etc.) | 29 |

**Cluster 1 (Violet):** 8 neighborhoods out of 42

This cluster consists of vast majority of restaurants, there are some coffee shops, hotels and shopping malls. No historic sites or parks.

|  |  |
| --- | --- |
| Restaurants/food | 51 |
| Hotels | 6 |
| Stores (jewelry, clothing, etc.) | 5 |
| Coffee shops, bakeries, ice cream shops | 8 |
| Other (supermarkets, nightclubs, bars, etc.) | 10 |

**Cluster 2 (Blue):** 7 neighborhoods out of 42

This cluster includes restaurants, coffee shops, bars same as Cluster 0, but the difference is that it also has a lot of supermarkets and grocery stores. You can see from the map, that this cluster is further away from city center, this probably means that a lot of local people actually live there and this cluster is not so crowded with tourists as Cluster 0.

No historic sites or parks.

|  |  |
| --- | --- |
| Restaurants/food | 28 |
| Bars | 9 |
| Supermarkets, grocery stores | 9 |
| Coffee shops, bakeries, ice cream shops | 12 |
| Other (gyms, stores, plazas) | 12 |

**Cluster 3 (Light Blue):** 4 neighborhoods out of 42

3 neighborhoods of this cluster are in a city center and one further away. It consists of restaurants, historic sites, museums, bars and hotels. It differs from Cluster 0 – it has more hotels, fewer coffee shops, parks, but has great concentration of art galleries and museum.

|  |  |
| --- | --- |
| Restaurants/food | 14 |
| Bars | 5 |
| Hotels | 4 |
| Historic sites, plazas, museums, art galleries, theaters | 7 |
| Other (coffee shops, parks, supermarkets) | 10 |

**Cluster 4 (Green):** 8 neighborhoods out of 42

Part of this cluster is in a city center, the other is a bit further. It mainly consists of restaurants, coffee shops, bars and museums, art galleries and plazas. The difference from Cluster 0 is that the proportion of cultural sites is much bigger here.

|  |  |
| --- | --- |
| Restaurants/food | 37 |
| Bars | 10 |
| Coffee shops, bakeries, ice cream shops | 13 |
| Historic sites, plazas, museums, art galleries, theaters | 10 |
| Other (hotels, parks, supermarkets) | 10 |

**Cluster 5 (Orange):** 1 neighborhood out of 42

“Green” neighborhood – park, fountain, monument, art museum, restaurants.

**Barcelona:** 5 clusters

**A picture containing text, map

Description automatically generated**

**Cluster 0 (Red):** 1 neighborhood out of 25

“Beach” neighborhood – beach, restaurants, bars and coffee shops.

**Cluster 1 (Violet):** 12 neighborhoods out of 25

This is the largest cluster; it locates mostly in the city center. The dominant venue here is restaurant, but cluster also has a lot or bars, coffee shops and hotels.

We can also notice that there aren’t many museums, art galleries or historic sites in a contrast to Madrid. Instead, Barcelona has more bars and restaurants to offer.

|  |  |
| --- | --- |
| Restaurants/food | 59 |
| Bars, breweries | 25 |
| Coffee shops, bakeries, ice cream shops | 14 |
| Hotels | 9 |
| Other (supermarkets, stores, historic sites, etc.) | 13 |

**Cluster 2 (Blue):** 9 neighborhoods out of 25

This cluster is further away from city center. It also has a lot of restaurants, coffee shops, hotels and bars.

|  |  |
| --- | --- |
| Restaurants/food | 47 |
| Bars, breweries | 6 |
| Coffee shops, bakeries, ice cream shops | 16 |
| Hotels | 7 |
| Other (supermarkets, stores, historic sites, etc.) | 14 |

**Cluster 3 (Green):** 1 neighborhood out of 25

Restaurants and stores

**Cluster 4 (Orange):** 3 neighborhoods out of 25

The last cluster is the most remote from the city center. It also consists mainly of restaurants, coffee shops and some hotels.

You can notice, that Barcelona clusters mostly differ by their location, but consists of more or less the same venues: restaurants, coffee shops, bars and hotels.

|  |  |
| --- | --- |
| Restaurants/food | 10 |
| Coffee shops, bakeries, ice cream shops | 5 |
| Hotels | 2 |
| Other (supermarkets, stores, bars, etc.) | 13 |

1. **Discussion – observations and recommendations**

From this analysis we can make some useful of insights:

* Clusters of Barcelona mostly differ by their location, but consist of the same venues: restaurants, coffee shops, bars and hotels.
* As it was mentioned before, there is a difference between Madrid and Barcelona due to their location – Barcelona has a “beach” and “harbor” clusters.
* In contrast, Madrid clusters differ not by their location, but their content. So, we can say that Madrid has more diverse neighborhoods than Barcelona.
* Madrid has a lot more plazas, museums and art galleries to offer.
* Madrid also seem to have more parks than Barcelona.
* Barcelona has a large variety of restaurants and bars, their proportion is much bigger here, than in Madrid clusters.

1. **Conclusion**

This analysis allows us to distinguish two main cities of Spain: Madrid and Barcelona, and we can deliver its results to the audience. Those insights should make it easier to decide which city you should visit in accordance to your preference. If you prefer to explore museums and art galleries during your trips and enjoy a walk in a park – Madrid is the right choice. Madrid neighborhoods are very diverse, so you can find everything you might need – a hotel, restaurant, coffee shops, grocery store, bar, nightclub and so on. The neighborhoods of Barcelona consist of the same venues, but offer a larger choice of restaurants and bars, so it should be your choice if you’re seeking to explore local food and drinks. Also, if you are looking for a vacation by the beach or your goal is to see some Gaudi architecture, the answer is obvious, and this analysis did not cover these facts.