



# CAPSTONE PROJECT – GYM LOCATION IN BARCELONA

IBM Data Science Professional Certificate

## Abstract

Exploration and Segmentation of Neighbourhoods in Barcelona by their relative fitness to host a newly created gym or fitness center.

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# 1. Introduction/Business Problem

**Gyms/fitness centers** are a type of business that is going up in popularity in recent years, as more and more people become aware of the benefits of getting and staying in shape. In many big metropolises as well as small towns there is a fierce competition between the different gyms/fitness centers, which can be an individual, small business (rare), or be a part of a brand or chain. There is competition for the best location, the best facilities, the best value for money for their users...

This project is set in the city of **Barcelona, Spain**. It is a famous Mediterranean city with a very distinctive Catalan culture. Its nice weather and beautiful landmarks attract millions of visitors from all over the world every year.

The city has an intense relationship with sport and fitness; you can see people practicing a sport at almost any time, be it swimming in the sea, jogging in one of the long avenues, playing football or, of course, weight-lifting in one of the city's many gyms.

One of the big questions to answer before deciding to start a gym/fitness center is: What are the best locations? The location of a gym or fitness center can determine its future success or failure to attract clients as much as other factors. So, this not a question with an easy, straightforward answer. One might look at locations in terms of municipalities, or districts, or neighbourhoods, or even in terms of streets within a neighbourhood. Of course, determining what makes a location suitable or fit for hosting a new gym/fitness center is very much up to the analyst.

This project was done to answer the question: **Which are the best and worst neighbourhoods in Barcelona to open or start a new gym/fitness center?** This question was answered based on the following three "common-sense" facts, in order of significance:

1. Assuming that all neighbourhoods are, more or less, the same demographically speaking, neighbourhoods with a smaller gym per population density ratio should be more interesting. Neighbourhoods that are packed with these types of businesses are not recommended because of the high competition that is already there.
2. A well-connected neighbourhood with many public transport stations, bike rentals, etc. nearby should be more interesting, as the potential clients of the gym/fitness center need to have easy access to it; if they do not, they stop going there, and therefore stop paying their membership.
3. A neighbourhood with many different services nearby, such as medical centers, food & drink stores, police stations, etc. should also be more interesting. The potential clients of the gym/fitness center might need quick medical assistance if they injury themselves, might want to grab a snack right before or after their workout session, or might need to report a theft/robbery immediately. The assumption here is that a client who has all these services right next or very close to the gym/fitness center will be a little more likely to stay/pay.

## 2. Data

### 2.1. Foursquare Location Data

The first group of datasets is obtained from the Foursquare location API service. In particular, the API endpoint **explore** was used to obtain venues data for every neighbourhood in the city. This data is used in the project to obtain the ratios and parameters that are later used in the clustering of the neighbourhoods.

### 2.2. Barcelona City Council Open Data

The Barcelona City Council has an open web service from which one can obtain different types of datasets: <https://opendata-ajuntament.barcelona.cat/>

This service offers a wide range of datasets related to the city, from demographical data to geographical data. The data of most if not all datasets found is up to date.

To work with in this project, two datasets were downloaded, cleaned, and pre-processed:

*these are snippets of the two datasets*

#### 1. Barcelona\_Neighbourhoods\_GeographicalData:

Year	District_Code	District_Name	Neighbourhood_Code	Neighbourhood_Name	Area (ha)	Latitude	Longitude
2019	1	Ciutat Vella	1	el Raval	110	41.38	216.861
2019	1	Ciutat Vella	2	el Barri Gotic	81.6	41.382.778	2.176.944
2019	1	Ciutat Vella	3	la Barceloneta	109.5	4.137.944	218.917
2019	1	Ciutat Vella	4	Sant Pere Santa Caterina i la Ribera	111	413.847	21.826
2019	2	Eixample	5	el Fort Pienc	92.9	41.395.675	2.183.703
2019	2	Eixample	6	la Sagrada Familia	104.2	41.403.561	2.174.347
2019	2	Eixample	7	la Dreta de l'Eixample	212	41.395.278	2.166.667
2019	2	Eixample	8	l'Antiga Esquerra de l'Eixample	122.8	41.390.061	2.155.061
2019	2	Eixample	9	la Nova Esquerra de l'Eixample	134.1	41.383.389	2.149
2019	2	Eixample	10	Sant Antoni	80.4	4.137.801	215.949
2019	3	Sants-Montjuic	11	el Poble Sec	458.5	4.137.278	21.625
2019	3	Sants-Montjuic	12	la Marina del Prat Vermell	1403.4	41.352.103	2.139.436

#### 2. Barcelona\_Neighbourhoods\_PopulationData:

Year	District_Code	District_Name	Neighbourhood_Code	Neighbourhood_Name	Sex	Year_registered	Number
2020	10	Sant Marti	71	Provencals del Poblenou	Dona	Menys d'1 any	637
2020	10	Sant Marti	72	Sant Marti de Provencals	Dona	Menys d'1 any	757
2020	10	Sant Marti	73	la Verneda i la Pau	Dona	Menys d'1 any	792
2020	1	Ciutat Vella	1	el Raval	Dona	D'1 a 5 anys	7395
2020	1	Ciutat Vella	2	el Barri Gotic	Dona	D'1 a 5 anys	3229
2020	1	Ciutat Vella	3	la Barceloneta	Dona	D'1 a 5 anys	2277
2020	1	Ciutat Vella	4	Sant Pere Santa Caterina i la Ribera	Dona	D'1 a 5 anys	3890
2020	2	Eixample	5	el Fort Pienc	Dona	D'1 a 5 anys	3893
2020	2	Eixample	6	la Sagrada Familia	Dona	D'1 a 5 anys	6276
2020	2	Eixample	7	la Dreta de l'Eixample	Dona	D'1 a 5 anys	5510
2020	2	Eixample	8	l'Antiga Esquerra de l'Eixample	Dona	D'1 a 5 anys	5426
2020	2	Eixample	9	la Nova Esquerra de l'Eixample	Dona	D'1 a 5 anys	6711
2020	2	Eixample	10	Sant Antoni	Dona	D'1 a 5 anys	4516
2020	3	Sants-Montjuic	11	el Poble Sec	Dona	D'1 a 5 anys	5112

### 3. Methodology

## 4. Results

## 5. Observations

## 6. Conclusions



## 7. References

