

# BATTLE OF NEIGHBORHOODS IN MADRID

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## 1. Introduction

The goal of this report is to identify the best neighborhood to set the headquarters of a new start-up company in the city of Madrid. This start-up is a spin-off of the Spanish National Research Council, located in the north of Madrid. For this reason, it is desired to locate the headquarters close to this research center since there will be constant collaborative work going on between the research center and the new spin-off.

In spite of this limitation, we have some freedom to choose the neighborhood the offices will be located at within the city. In order for our employees to have the best quality of life possible, we would like the new offices to be close to some facilities like gyms or sports centers, supermarkets / grocery stores, shops, coffee shops and restaurants. In addition, good transportation connection is also important, so that employees can attend to work by public transportation. Finally, it would be ideal to be located close to a hotel so that visitors from clients / other companies can stay.

## 2. Data

The complete list of neighborhoods of Madrid can be found in this [Wikipedia page](#). The table in the Wikipedia page contains a list of all the districts in Madrid and the neighborhoods that belong to each district, as well as other irrelevant data. The data imported from the Wikipedia table needs to be processed in order to gather the useful information clearly in a dataframe.

Once the data is ready, the geographical coordinates of each neighborhood will be used to obtain information about the venues in it. Since venue categories can be very specific, the ones that are of interest for our problem will be grouped:

- Restaurants
- Coffee and tea shops
- Fitness centers / sports venues
- Grocery stores
- Transportation (bus stops, train stations, etc.)
- Hotels
- Stores

The neighborhood coordinates will also be used to obtain the distance to the research center the spin-off is originating from.

### 3. Methodology

First of all, the *wikipedia* library is used to import the data from a Wikipedia table. This table contains a list of all the districts in Madrid and the neighborhoods that belong to each district, as well as other irrelevant data. So the first step is to remove the columns that are not of interest for our business problem. Next, each neighborhood is put separately into a dataframe. Now the districts are an attribute of the neighborhoods and not the other way around. The geographical coordinates of each neighborhood are obtained using the Geocoder Python package and are added to the dataframe. In addition, the distance between each neighborhood and the original research center, the Spanish National Research Council Headquarters, is added to the dataframe. The *geodesic* library is used to compute the distance between to places given their geographical coordinates.

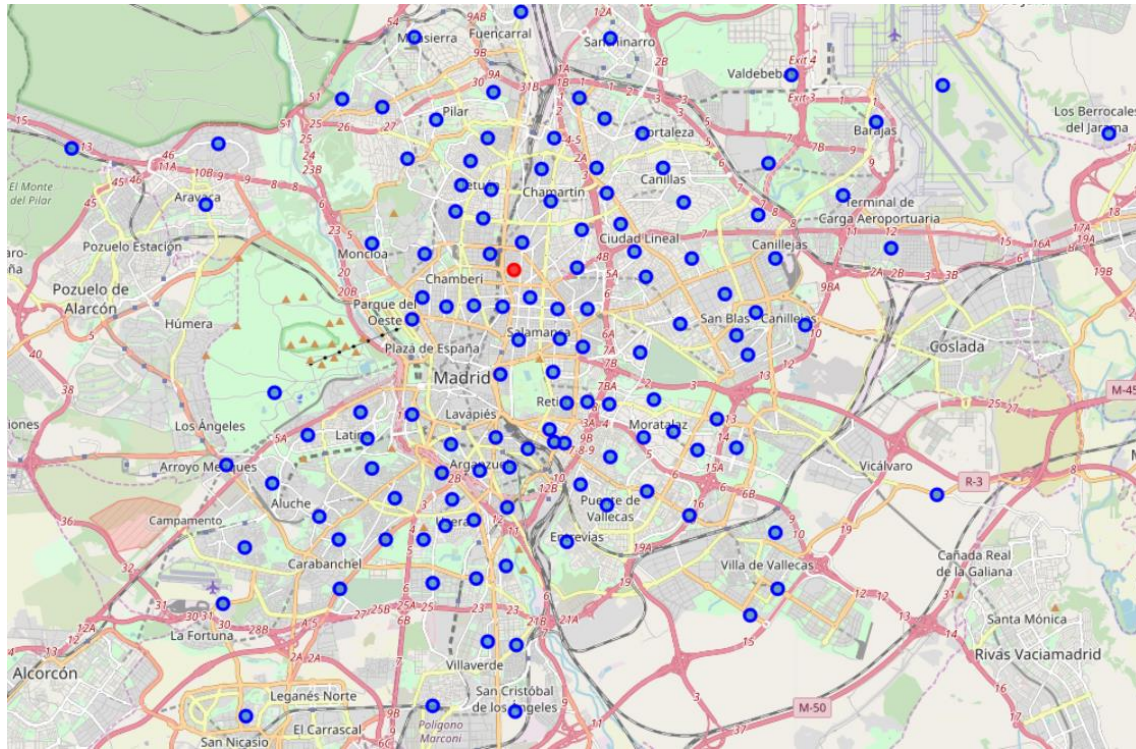
Once the data is ready, *Foursquare* is used to obtain information about the first 100 venues within a 500m radius of each neighborhood in Madrid. Some of the venue categories found are too specific and makes getting insights from the data difficult. Thus, the venue categories that are of interest for us are grouped as stated in the Data section of the report. For example, venue categories such as Spanish restaurant, burrito place, steakhouse or noodle shop are labeled as Restaurants. The venues that are irrelevant to us such as parks or pubs are ignored.

Next, the amount of venues of each venue category is computed within each neighborhood. The neighborhoods are sorted according to increasing distance to the research center.

Finally, only the neighborhoods that have at least one venue of each type are kept, so that the neighborhood chosen meets all the requirements.

### 4. Results

The following table shows the location of the neighborhoods in Madrid (blue circles) as well as the headquarters of the Spanish National Research Council (red circle). There are 225 neighborhoods in Madrid, which constitute 21 districts.



**Figure 1** Location of the neighborhoods in Madrid (blue circles) and the Spanish National Research Council headquarters (red circle).

After all the processing, only 5 neighborhoods are found to meet all the requirements for the location of the new offices, that is, there is at least one venue of each type. The following table shows these neighborhoods.

	Neighborhood	Coffee & Tea	Fitness Center	Grocery Store	Hotel	Restaurant	Store	Transport	Distance
0	Bellas Vistas	2	1	10	1	20	5	2	2.10
1	San Juan Bautista	1	1	5	1	17	4	2	2.96
2	Palos de Moguer	3	3	8	2	38	3	2	4.26
3	Adelfas	3	4	9	1	18	4	3	4.56
4	Acacias	2	4	3	1	24	2	2	4.69

**Table 1** Amount of venues of each category and distance to the Spanish National Research Center headquarters for the neighborhoods that meet all the requirements.

## 5. Discussion

Out of the 125 neighborhoods in Madrid, only 5 have been found to contain venues of all the types required, which were listed in the Data section of this report. The neighborhood *Bellas Vistas* is the one closest to the research center the company is originating from.

In all of the neighborhoods the most abundant venues are restaurants. Even if there will be a space for eating lunch brought from home in the office, having options for eating out in case of need is important, but not the most important factor for making the choice.

*Adelfas* is the neighborhood with the best connections with public transportation, having 3 venues related to transportation. All the other neighborhoods have 2 connection spots. This

factor is very important since it is not very common to own a car in Madrid, and having more connection points nearby makes getting there easier.

All the neighborhoods have only one accommodation option nearby, except for *Palos de Moguer*, which has two. Having more than one option to choose from makes it more likely to find a free room when needed. However, we are planning on negotiating a reduced price with a nearby hotel to accommodate visitors, so having just one hotel close to the office would be enough.

As for the presence of coffee shops, fitness centers and grocery stores, just the presence of at least one is enough. Having more of them nearby is a plus but not a must for making the choice. The same happens with different kinds of shops: the more the better, but having a large amount of them is not essential.

Taking all these factors into account, the choice of the location for the new offices of the spin-off company is between *Bellas Vistas* (closest to research center) and ***Adelfas*** (better connection with public transportation). We recommend placing the office in the latter neighborhood because, even though there will be work being done together with researchers at the Spanish National Research Council, displacement from one workplace to the other are not expected to happen daily, so we have considered the ease to get to work to be the determining factor. Moreover, having more connecting points makes it more likely to be able to go to the research center and back by public transportation as well.

## 6. Conclusion

After analysing the different types of venues in all the neighborhoods in Madrid and the distance between them and the research center the company is originating from, we have concluded that *Adelfas* is the best location for the new office because there are restaurants, coffee shops, fitness centers and different kinds of stores nearby, but more importantly because it is better connected by public transportation than the other candidate neighborhoods.