Cambridge (Massachusetts) AirBnB analysis

The city of Cambridge (Massachussetts) has been chosen for the AirBnB analysis.

Overview.

The city of Cambridge is located in the North-East of the USA and it is part of the Boston metropolitan area. The city is known for the presence of two of the most famous university: Harvard University and the Massachusetts Institute of Technology.

Cambridge offers in total 694 AirBnBs that are scattered all over its 12 neighbourhoods. Nevertheless, by plotting the different AirBnB location on the map of the city is possible to see that most of these hosts are located in the central area of the city. This phenomenon could have two different explanation. First, from the same plot is clear that the places with less hosts are characterised by the presence of parks or lake, hence there is less space for buildings. The distribution of the inhabitants among the different neighbourhood confirms this hypothesis. Another explanation could be the fact that in the centre of Cambridge are presents the majority of museum and also the two, previously mentioned, universities.

Retrieve data on neighbourhoods (city data portal).

From the [Cambridge open data portal](#) is possible to download a dataset that contain demographic information of the city divided by neighbourhood.

Cambridge has a total population of 110 893 inhabitants, the neighbourhood that contribute the most of this population is North Cambridge. This Neighbourhood has 13 951 inhabitant that is the 12.58% of the overall population. On the other hand, the neighbourhood with the highest density population is Riverside that present 61.2 People per Acre. This high value is counterbalanced by the Cambridge Highlands that has only 7 People per Acre. Another interesting aspect is the comparison between Riverside and North Cambridge. These two neighbourhoods have a population as percentage of the total that is similar, respectively, 11.1% and 12.58% but North Cambridge extends on an area that is twice the area of Riverside.

Identify which are the neighbourhoods with the highest prices in AirBnB.

In order to understand the district with the highest prices it has been averaged the prices of the AirBnB per district.

East Cambridge with a mean price of 229.02 dollars is the most expensive district followed by Cambridge Highlands (181.40 dollars) and in the third place there is Mid Cambridge (174.80).

Interesting is to compare these data with the number of AriBnB present in the neighbourhood. East Cambridge and Mid Cambridge are the two districts that have the greatest number of hosts, respectively 102 and 111. On the other hand, Cambridge Highlands results to be the one with the less, only 5 AirBnB.

The number of AirBnB presents on the territory reflects the distribution of the population, this could suggest some sort relation between the two variables.

On the other side East Cambridge could be the most expensive neighbourhood because of its position. Indeed, it is the closest district to the city of Boston. Mid Cambridge could be one of the most expensive districts due to its central position and, as can be seen later, due to the presence of many museum. Cambridge Highlands as well as Area 2/MIT results to be quite expensive neighbourhood, this could be due to the presence of only few and relatively "luxury" AirBnB. Indeed, by checking the AirBnB offer for these two locations is possible to notice that the majority of the accommodation falls under the category of entire home/apartment, hence more expensive.

Identify which are the districts with the greatest number of tourist activities.

This point has been carried on by an Overpass Turbo query and asking for point that are museum, art places or in general places that are interest for the tourist.

The middle town is the location of most of the tourist attraction and in particular Mid Cambridge and Agassiz are the two neighbourhood with the highest number of place of interests.

As previously discovered, Mid Cambridge is the place that has the highest number of AirBnB accommodation and one of the neighbourhoods with the highest number of inhabitants. Opposite situation for Agassiz that indeed has a low presence of AirBnB as well as a not so high population and neither high prices.

Find the 3 AirBnB hosts closest to a museum (on walking distance).

Even in this case the location of all the museum present in the city has been retrieved with Overpass Turbo and the walking distance has been calculated by using the walking network of the city.

After having added to the location of the AirBnB and of the Museums the nearest point on the walking network graph, for each accommodation has been selected the closest museum by walking distance.

At the end the AirBnB that has the closest museum is "Phil's Apartment at Harvard – Harvard Room" that has the "Artgur M. Sackler Museum" 6.2 minutes far. The other two apartment are both 10.5 minutes apart from MIT museum.

Of the three hosts, identify which one has the greatest number of services (supermarkets, pharmacies, restaurants) in an area of 300m.

This task was carried on by using a function of the OSMnx library that allows to retrieve all the entities that are in a given radio of a point.

As a result the "One Bedroom close to MIT" has the highest number of services available (21), and the second one, "Furnished suite, Windsor" has 16 services. Interesting by looking at the data is possible to see that almost all these services are restaurants.

Analyse and test spatial autocorrelation of price.

The analysis of the autocorrelation of prices has been made by considering the mean prices of AirBnB accommodation per neighbourhood.

After having computed different spatial weight matrices, given different definition of neighbourhood, procedure done for checking for consistency, no autocorrelation has been detected.

This outcome could have been hinted by the choropleth map that show the distribution of the prices. Moreover, as it already been said, interesting is the case of East Cambridge, area that shows the highest prices among all. Interesting should be investigating the spatial autocorrelation of AirBnB prices using also data from Boston and in general of all the Boston metropolitan area.