

Factors affecting Airbnb Rental Prices

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Abstract. Here, we explore the factors affecting Airbnb prices in Los Angeles County. We have the LA Airbnb Dataset from which we determine which factors significantly affect the prices and represent them visually in the form of maps, bar charts and piecharts so that a user can easily choose where they would want to reside when planning a trip.

Keywords: Airbnb, Visualization, Los Angeles County, d3, Leaflet, Choropleth, Bar Graph, Layout, Pie chart

1 Introduction

Tourism is a huge factor that contributes to any economy. So when we talk about accommodation in a foreign place, the first concern is the safety. Airbnb's popularity is increasing exponentially over time. Why is this trending among today's generation? One of the main reasons is because they offer a better price when compared to a conventional hotel, giving you same amenities and comfort. We aim to explore and present how crime and income in and around neighborhoods in the LA county affect the Airbnb rental price, using visualization techniques for each rental region.

1.1 Dataset

For this project, the Airbnb listing details such as number of houses in each zipcode, their ratings and price were obtained from insideairbnb.com. The crime and income data were obtained from LA county data portal. The data preprocessing steps included -

- Averaging airbnb rental price per zipcode
- Aggregating crime, income and price per LA county neighborhood. Each neighborhood can consist of multiple zipcodes

The preprocessed data was then joined with an LA county geojson.

1.2 Project Audience

Project audience constitutes not only tourists, people in need of office spaces or any guest looking to rent an Airbnb, but also Airbnb's Rental owners who can decide which property would obtain a good profit margin by attracting customers.

1.3 Related work

The paper "Explore the Spatial Relationship between Airbnb Rental and Crime" (2017), uses spatial analysis methods such as Kernel density estimation and geographically weighted regression to prove the correlation between crime and airbnb rental price. We drew our inspiration to represent rental locations in our visualization from the insideairbnb.com visualization tool.

2 Determination and analysis of factors

Safety is one of the main concerns when choosing a new place to live/travel. Thus crime rate is a very important factor for us. We notice in the *paper*¹ how crime rate correlates to Airbnb Rental prices. Thus, we can observe and check how our data showcases this correlation.

Now when we consider the average income of an individual, usually in an area where the average income of a household is low, the prices of the houses are low due to the relatively low standard of living. Thus, our assumption here is that income is directly correlated to the Airbnb Rental Prices.

3 Design considerations

3.1 Visualization wheel

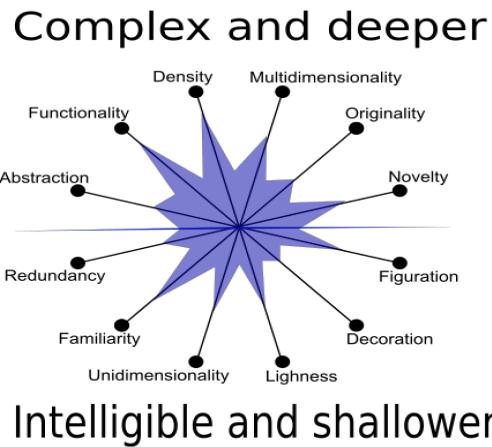


Fig1.Visualization Wheel

As exhibited in Fig-1, our design exhibits unidimensionality as various factors such as income and crime rate are displayed using choropleths and interactivity ensures multidimensionality. For our audience's understanding we have used familiar charts and avoided redundancy. Sticking to functionality has been our forte.

3.2 Color scheme

The color schemes are used according to the variable type being displayed in the visualization. The color ranges are checked for color blind friendliness and LCD friendliness.

- Crime and Income choropleth map - As the crime and income data are quantitative data we have used sequential single color hue varying from low to high to show gradient in the data. The two features crime and Income are represented using mutually exclusive colors for better readability
- Room type pie chart - As types of room is categorical data, complementary colors of equal bright hues are used
- Correlation plot - Similar to the choropleth map to aid users to quickly identify the feature and maintain consistency in the entire visualization

3.3 Interactivity

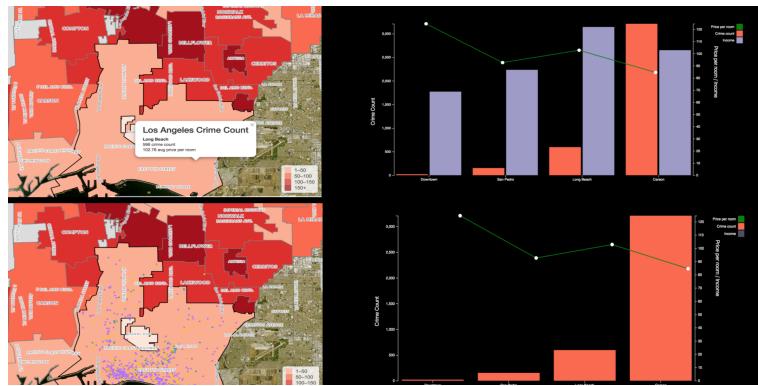


Fig.2 Interactivity

The main interactive component in our visualization is the map. Multiple interactive functionalities have been implemented to allow users to drill down into the information and analyze various components of data. We note from Fig-2 that:

- The users can choose up to 10 neighborhoods from map and a correlation plot showing price, income and crime is generated for the chosen neighborhoods
- When each neighborhood is clicked on the map detailed view of types of crime is presented in the form of bar chart
- The types of rooms in each neighborhood is presented as pie chart when a neighborhood is clicked on the map. We also include their markers on the map
- Quick tooltip aid is available for all charts

4 Implementation details

For implementing our visualizations, we have used D3 and leaflet javascript libraries. The leaflet library was used to implement the choropleth maps and its

interactivity with other components in our visualization.

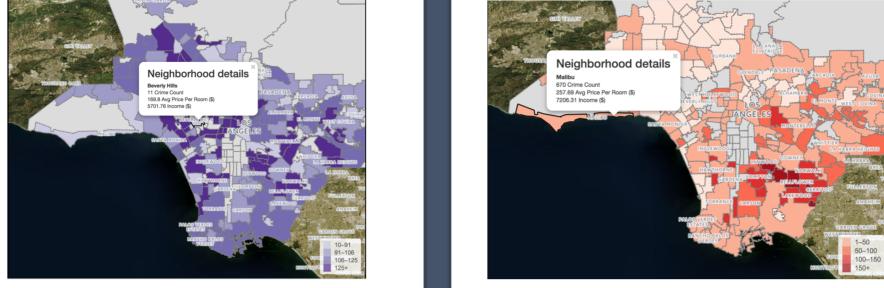


Fig 3. Choropleth map of crime and income

As we note from Fig-3, our main focus is the choropleth map that we use to showcase variations in crime rate and average income in various neighborhoods. As you hover, you can note the neighborhood's information in the pop-up. The grayed out areas are the ones for which information is not available in our data.

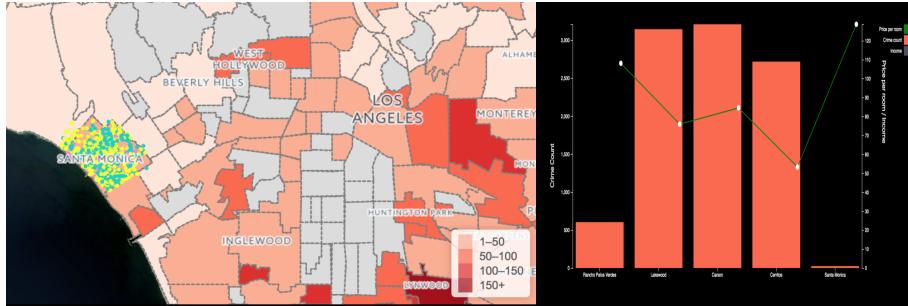


Fig.4 Addition to correlation plot on right for comparison

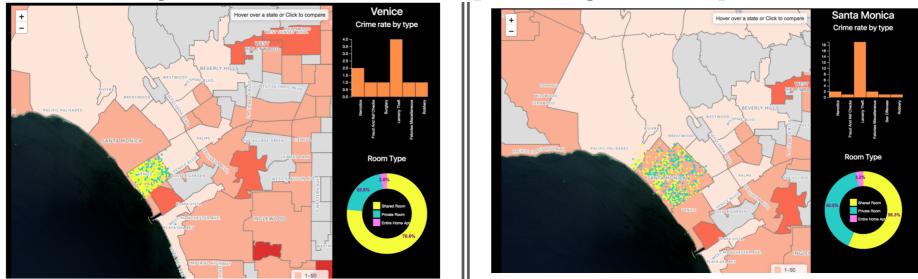


Fig.5 Pie chart with rental details and bar graph with crime types

As seen in fig.4 we click on each region, it gets added into the correlation bar graph which shows its relationship with the price of the Airbnb rental. Also in fig.5, the pie chart represents the various room types available in that area. You can also visually see their locations on the map. A bar chart on the right shows the type of crimes that occur in that particular neighborhood.

Upto 10 neighborhoods can be selected in the map, to be compared in the correlation bar graph. There is also an option to choose a specific factor by clicking on the legends to the right of the graph.

5 Future Scope

In the future, we can improvise by including a time-line and observing how crime and income along with factors like festivals/events have affected the price over the years with additional visualizations.

6 Conclusion

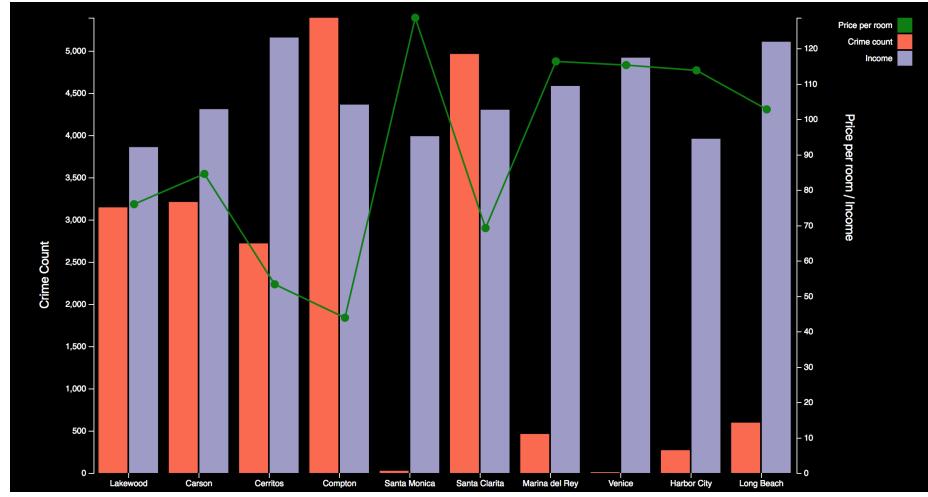


Fig.6 Correlation graph

Thus finally, from our visuals we can conclude that crime rate is negatively correlated and the average income is positively correlated to the price of Airbnb Rentals.

References

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