

Deep Trip to California

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³ [Deep Trip to California](#)

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Abstract. The paper presents an analysis of Airbnb housing availability in California from different aspects of location, room type and price using advanced visualization created by D3.js.

Keywords: Airbnb · Travel · Visualization · Analysis · California.

1 Introduction

When you come to California for traveling or business, finding a place to stay during the trip may be the biggest problem for you, especially if you are on a limited budget or you have some other preferences. Intending to deal with this issue, we collect open-source data released by Airbnb and show the analysis result by visualizing data in different ways by D3.js. To enhance the user experience, we built a responsive web application involving VUE.js and Bootstrap to introduce some ways of interaction between users and our app.

2 Data

We obtained our data directly from [Inside Airbnb](#), an open data released from Airbnb. There are tons of data available in different cities around the world. In this project, we focus on the data in a few cities in California. There are different datasets available, such as listing, reviews calendar. To maximize the visual effect, we only select features such as room type, price, city, house description, etc. Then, we converted the file into geoJSON.

3 Approach

3.1 Design consideration

In most situations, price is the most important deciding factor when we book a room. Therefore, the comparison of price with other features is the primary purpose of our project.

The usual approach is to show statistical graphs reflecting all data. But we aim to highlight the users' selection to make an obvious comparison. Therefore, we invented a new way of interaction. When a user selects one house, the comparable information will highlight on the statistical graphs.

3.2 Technical consideration

Since we have over 70,000 Airbnbs in our dataset, it takes some time for Vue to read and process them. Therefore, to improve the user experience, we optimized the web by loading the data once instead of reading separately and avoided the implementation of some functions. For example, the number of top of the barplot is fixed calculation efficiency.

We chose VUE.js as the Web framework since it contained detailed documentation and was very easy to understand and implement a project. To achieve a responsive web application, we used a Bootstrap table and design all maps and graphs responsively.

3.3 Development and Evaluation

We first prepossessed our data into the format we need and used python to analyze them, trying to find some patterns. Then we drew a bubble using MapBox, designed four statistical graphs by D3.js, and finally integrated them to form a web application involving VUE.js.

We evaluated our system from a few aspects. Firstly, our web has a high speed of response. Except for web initialization, all other interactions performed fast. What's more, our app provides detailed housing information. For example, when you hover over one point on the map, you can see the information about that Airbnb house, and when you mouse over some parts of statistical graphs, you can know the detailed statistics result as well. Finally, the outlook of our app is pretty, and the layout is reasonable.

4 System

4.1 Layout

The layout of our system is shown below: The left part is a bubble map, and we focus on the California area. On the right-hand side, there are two areas. The one above is the filter, and the one below is the area where you can see the statistics graphs.

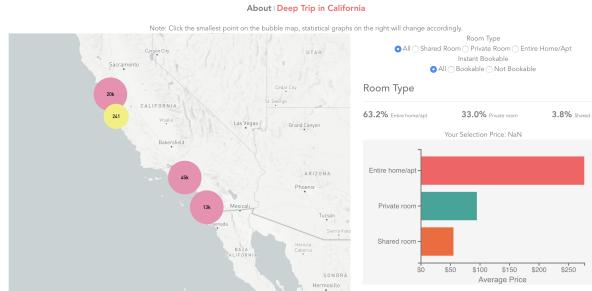


Fig. 1. Layout

4.2 California Map

We drew a map with all the hotel's spot using MapBox. Also, the spots were summarized by the bubble-like clusters that can easily show the hotel availability around the area. Users can click to zoom in, and the information is shown on the single spot while hovering. Also, user can click on the single spot to see further comparison on bar plot and histogram.

4.3 Bar plot

The bar plot shows the average price of the houses concerning different room types. As for the function part, when you click a point on the bubble map, a line corresponding to that point occurs in Barplot, so that you can quickly tell the distribution of your selected point over the whole dataset.

4.4 Histogram

The histogram shows the average price distribution of the houses. As for the function part, when you click a point on the bubble map, the bar corresponding to that point is highlighted in a histogram, so that you can quickly tell the distribution of your selected point over the whole dataset.

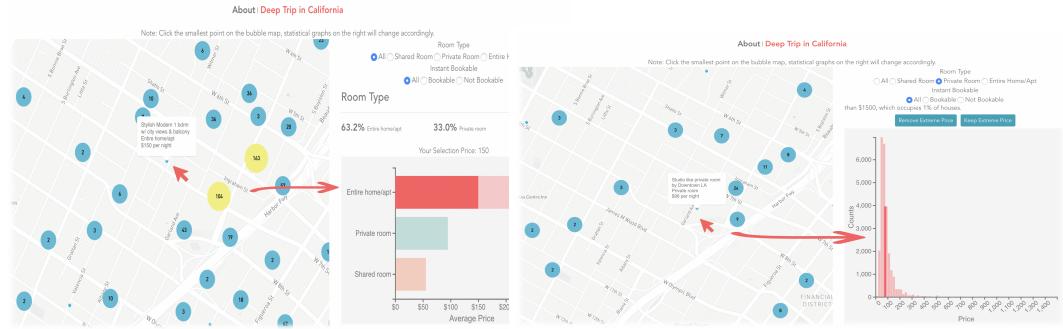


Fig. 2. Bar Plot

Fig. 3. Histogram

4.5 Bubble plot

The bubble plot is about showing popular places are by looking at the available days and the number of reviews. As for the legend, the bubble size declares the amount of house, and the color bars show a different price range. As for the function, we can see a larger circle in the below chart. It is because you pick up that point on the map.

4.6 Circular bar

The plot we extract words that described hotels and see how hotel descriptions are going to affect the price. The distribution of house types and their corresponding average price. The bar represents the number of houses in that type of house style.

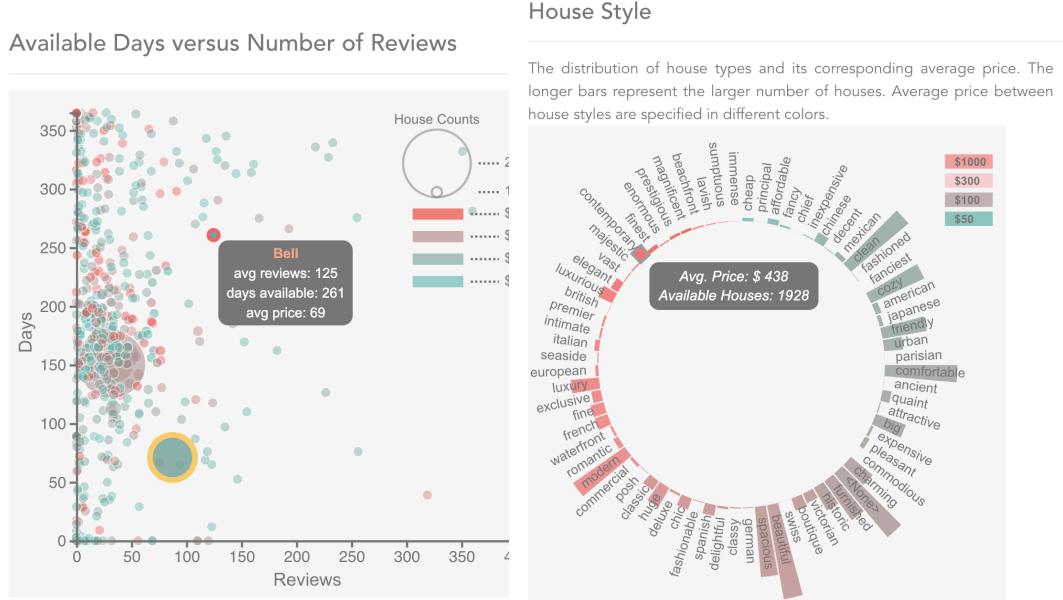


Fig. 4. Bubble Plot

Fig. 5. Circular Bar

4.7 Map

We draw a map using D3.js to show the density of house distribution.

5 Related work

We learned from a demo below about its layout and some functionalities. The way it works is that you can choose the features you care about, and the web can help give information about them, like this map and this statistics graph. We have this filter like the demo as well. But what we have done is a little different. We introduce a new way of interaction between users and our app. You pick up a point which is an Airbnb house on the map, and the statistics graphs on the right will change depending on what you choose.

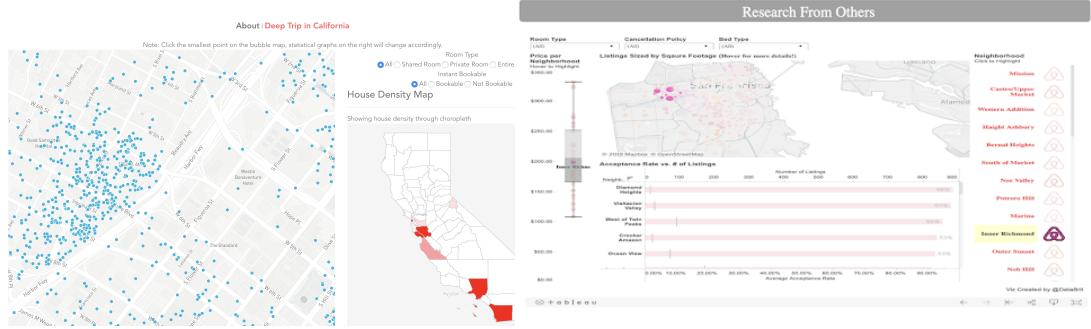


Fig. 6. House Density Map

Fig. 7. Other Demo

6 Future work

Due to the time limitation, we have ideas that haven't fulfilled. For example, we mainly look from the view of customers. Therefore, we compare price and room type to provide customers to make their decision. On the other hand, we want to analyze the dataset on the hosts' perspective of hosts or who in running Airbnb as a business. We could provide a big picture of the market. To be more specific, they would like to know the key to run a successful Airbnb, such as what kind of description is more attractive, more comfortable to get an eye from the customers.

7 Conclusion

Through this project, we discover the basic environment of the house renting market in the California area. We learn a lot of Web technologies and data visualization techniques as well. But in our project, all processing data is done on the client. The speed of the web response may be slow sometimes. Maybe we could improve it by developing a separate backend server involving such as Springboot. I think by using the backend server, we can easily manipulate our data in the backend to speed up web response.

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