Paris Airbnb EDA

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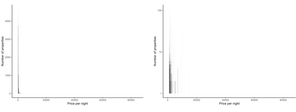
Introduction

This is a Quarto document exploring information on the Airbnb's in Paris, France. The code in this document uses R programming (R Core Team 2022) and the package tidyverse (Wickham et al. 2019). This also uses considerable amounts of advice and code suggestions from the 'Telling Stories With Data' by Rohan Alexander (Alexander 2023).

Paris Airbnb EDA

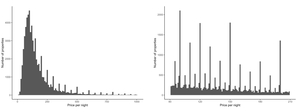
First we need to download the data. We do this from http://insideairbnb.com/, "Data," "Get the Data," and scrolling down to Paris. I use the "Detailed Listings data" data set saved as a link (Airbnb 2023).

First we notice the prices were incorrectly determined to be characters and turn them into numbers. Next, we can examine the distribution of the price.



(a) Distribution of untouched prices *(b) Same distribution using the*

Figure 1: Distribution of the Paris Airbnb Prices



(a) Distribution of prices under $1000 *(b) A closer look at the prices between $90 and $210 showing the grouping of common price tactics.*

Figure 2: Distribution of the Paris Airbnb Prices under $1000

As we can the distribution of prices, Figure 1, is similar to what we would expect of this type of data set. We can see over all the entries, a very large portion of the prices are below $1000 with some outliers going up to around $80000. As we look closer the distribution of prices, below $1000 in Figure 2, they fall into a normally, right-skewed distribution. Further, the prices display a peak around the prices ending in zero and five. This is representative of normal grouping of prices based in order to attract customers.

Now we will look at the date range and see how many rows have a value.

Table 1: Number of Dates as NA

Number of Dates Inputted as NA
17891

This data set spans over 14 years from first listed review in May of 2009 to the last listed review in December in 2023. Unfortunately, there is 17,891 Table 1 entries with NA for any variable of a date type, which is almost 25% of the entire data set.

Now we will examine the super host status. We can see there are 90 rows with a value of NA for reviews variables, whereas the rest are correctly inputted as Boolean values. This is almost nothing compared to the 74,329 entries. Further, we can add a column where instead of TRUE/FALSE we have 0/1.

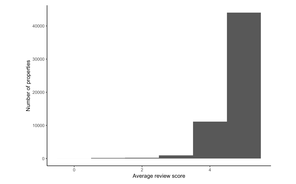
Table 2: All Listings Where Superhost is Correctly Inputted

(a) The last column displays a binary variable, 0/1 for not Superhost or Superhost. There are 74,239 entries here.

host_id	host_is_superhost	host_is_superhost_binary
3631	FALSE	0
7903	FALSE	0
439130	FALSE	0
2626	TRUE	1
22155	FALSE	0
429406	FALSE	0

Now we have only rows where there is information about super host status, Table 2.

In order to further examine the reviews for the listed Airbnb's we will have to ignore those reviews with NA entries. Those rows with no entries in the first_review or last_review also have no entries for any review variables. This means to examine the reviews of the listings we would have to ignore close to 25% of the entries since they are listed as NA under any review variable.



(a) This displays all the reviews from 0.0 to 5.0 of the listings with reviews. There are roughly 25% of the entries without reviews missing.

Figure 3: The Review Rating For All Entries With Reviews

Upon looking at those listings with reviews in Figure 3, a very large portion of the reviews fall into the high 4's and 5.0 ratings.

We may be also interested in the relationship between being a super host and other factors. Perhaps response time plays a large role so we look at this closer. First we notice the more than 20,000 NAs are incorrectly inputted as N/A which R does not recognize.

Table 3: Count of the Different Response Time for All Entries

(a) This shows the values of N/A corrected to NA and then the total count of all reponse types.

host_response_time	n
a few days or more	1269
within a day	5371
within a few hours	6909
within an hour	22538
NA	20362

Looking at Table 3, now every entry is of one of 5 desired factors, and NA is the correct type. Seeing that there is over 20,000 NAs for host_response time, we can look specifically at those reviews and see if they behave differently. Since the do have values for ratings, we can also look at their distribution as compared with other hosts with an inputted response time, Figure 4.

(a) This displays all the reviews ratings for hosts with NA inputted as a reponse time. *(b) This displays all entires including NA responses for host response time and their corresponding rating.*

Figure 4: The Review Rating and Accuracy For Hosts Without Response Time

Next we can look at the number of properties a host with listed response times owns. In this case more than 30,000 hosts have only one listing, and keep in mind we lost almost 25% due to no reponse time Figure 5. There seems to be nothing wrong with the distribution of those with more than one listing.

(a) This displays distribution of hosts with any number of listigs. *(b) This displays the hosts with strictly more than 5 listings.*

Figure 5: Total Number of Listings and Hosts

Lastly, we will try and see if there is any relationship between being a Super Host and other factors, in particular host repose time. I will have to drop listings where the price is above $1000 in order to be able to look closer at the relationships between these factors Figure 6. The remaining listings above $1000 are outliers and can skew the data is unusual ways.

(a) This displays teh distribution of price and review rating while denoting the status of the host being a superhost or not. In this figure we only examine listings below $1000.

Figure 6: All Reviews and Superhost Status

Here we see there is a much smaller proportion of Superhosts to hosts. The superhosts are concentrated near the 5.0 score. The small amount of blue compared to red is the proportion of Superhosts - we can see this exact proportion in Table 4. Further with Table 5 we can look to see if there is a closer relationship between Superhost status and reponse time.

Table 4: Proportion of Superhosts

(a) This shows that only 16% of hosts with a listed host status are super hosts.

host_is_superhost	n	proportion
FALSE	62570	0.84
TRUE	11669	0.16

Table 5: Proportion of Superhosts by Reponse Time

(a) This shows that 68% of superhosts repond within an hour.

	host_is_superhost	
host_response_time	FALSE	TRUE
a few days or more	5% (1,245)	0% (24)
within a day	17% (4,386)	10% (985)
within a few hours	18% (4,724)	22% (2,185)
within an hour	60% (15,688)	68% (6,850)

The final part fo this EDA and looking for a relationship between Superhost status and response time, we can produce a linear model, Table 6.

Table 6: A Generalized Linear Model Regressing Superhost Status Against Reponse Time and Review Rating

	(1)
(Intercept)	−18.322
	(0.375)
host_response_timewithin a day	2.304
	(0.210)
host_response_timewithin a few hours	3.039
	(0.209)
host_response_timewithin an hour	3.202
	(0.208)
review_scores_rating	3.003
	(0.064)
Num.Obs.	36087
AIC	38273.8
BIC	38316.3
Log.Lik.	−19131.922
RMSE	0.42

References

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