

IN PROGRESS

Out[3]: [Click here to toggle on/off the raw code.](#)

1. Introduction

Airbnb is easily one of the most successful start-ups in recent memory. Airbnb's business model has been a disruptive force in the short-term rental market and was valued at \$31 billion prior to the Corona Virus epidemic ([source](#)%)202D%20Airbnb%20Inc's%20new,the%20matter%20said%20on%20Tuesday.&text=Airt However in a recent article in April(just after massive lockdowns swept the world), the industry titans valuation has plummeted to nearly half ([source](#)).

In this analysis, I will be exploring the Airbnb rental market in San Francisco from 7/1/2018 through 6/7/2020. I intend to develop a better understanding about the impact COVID-19 is having on the SF market.

1.1 Intent

1.2 Objectives

- Conduct an analysis of the impact COVID-19 has had on daily gross rental income in the San Francisco area since the lockdown began on 3/19/2020. Forecast 2020 Q2, Q3, and Q4 losses if lockdown conditions remain the same for the rest of the year.
- Create a per night rental price predictor for Airbnb properties in San Francisco. Extract out the most pertinent features that predict prices best.

1.3 Impact

I hope to use the information gained from the analysis to provide the following:

- Project losses for the year will help company leadership manage expectations for profit and table/prioritize certain projects over others.
- Provide first-time hosts a guide of features/services to consider including in their Airbnb listing to increase the likelihood of interests from tourists as well as justify a higher rental price. Developing a good price predictor will also provide renters a range of acceptable prices to list their property for(as compared to similar properties in SF)

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3. Data Overview

3.1 About the Data

Airbnb Listings data was acquired from Inside Airbnb(no affiliation with Airbnb). Inside Airbnb is an independent, non-commercial set of tools and data that allows you to explore how Airbnb is really being used in cities around the world.

By analyzing publicly available information about a city's Airbnb's listings, Inside Airbnb provides filters and key metrics so you can see how Airbnb is being used to compete with the residential housing market.

3.2 Preview Data

Cleaned Data Shape: (126258, 48)

| | accommodates | amenities | availability_30 | availability_365 | availability_60 | average_daily_rate |
|---|--------------|--|-----------------|------------------|-----------------|--------------------|
| 0 | 3 | TV, Cable TV ,Internet,Wifi,Kitchen, Pets liv... | 0 | 77 | 0 | 0 |
| 1 | 2 | TV,Internet,Wifi,Kitchen, Free street parking... | 30 | 365 | 60 | 0 |
| 2 | 5 | TV,Internet,Wifi,Kitchen,Heating, Family/kid ... | 30 | 90 | 60 | 0 |
| 3 | 6 | TV, Cable TV ,Internet,Wifi,Kitchen, Free par... | 0 | 20 | 5 | 0 |
| 4 | 3 | TV, Cable TV ,Internet,Wifi, Paid parking off... | 4 | 131 | 19 | 0 |

3.3 Data Overview - Metrics

Data Description

Out[12]:

| | count | mean | std | min |
|--|----------|---------------|--------------|--------------|
| accommodates | 126258.0 | 3.217230e+00 | 1.947620e+00 | 1.000000 |
| availability_30 | 126258.0 | 9.534984e+00 | 1.049743e+01 | 0.000000 |
| availability_365 | 126258.0 | 1.430715e+02 | 1.260210e+02 | 0.000000 |
| availability_60 | 126258.0 | 2.290179e+01 | 2.104954e+01 | 0.000000 |
| availability_90 | 126258.0 | 3.827428e+01 | 3.168983e+01 | 0.000000 |
| bathrooms | 126258.0 | 1.341998e+00 | 8.540870e-01 | 0.000000 |
| bedrooms | 126258.0 | 1.354290e+00 | 9.212903e-01 | 0.000000 |
| beds | 126258.0 | 1.768339e+00 | 1.206100e+00 | 0.000000 |
| calculated_host_listings_count | 126258.0 | 1.164335e+01 | 3.751799e+01 | 1.000000 |
| calculated_host_listings_count_private_rooms | 105994.0 | 2.726702e+00 | 7.322385e+00 | 0.000000 |
| calculated_host_listings_count_shared_rooms | 105994.0 | 4.762628e-01 | 2.893476e+00 | 0.000000 |
| cleaning_fee | 126258.0 | 8.963388e+01 | 7.931858e+01 | 0.000000 |
| extra_people | 126258.0 | 1.860098e+01 | 3.113538e+01 | 0.000000 |
| guests_included | 126258.0 | 1.797233e+00 | 1.407876e+00 | 1.000000 |
| host_has_profile_pic | 126258.0 | 9.942895e-01 | 7.535227e-02 | 0.000000 |
| host_id | 126258.0 | 4.915301e+07 | 6.890265e+07 | 28.000000 |
| host_identity_verified | 126258.0 | 5.709816e-01 | 4.949379e-01 | 0.000000 |
| host_is_superhost | 126258.0 | 5.115636e-01 | 4.998682e-01 | 0.000000 |
| host_response_rate | 126258.0 | 8.534871e+01 | 3.282895e+01 | 0.000000 |
| id | 126258.0 | 1.709399e+07 | 1.140872e+07 | 958.000000 |
| instant_bookable | 126258.0 | 3.895436e-01 | 4.876487e-01 | 0.000000 |
| is_location_exact | 126258.0 | 8.863676e-01 | 3.173655e-01 | 0.000000 |
| latitude | 126258.0 | 3.776334e+01 | 2.287561e-02 | 37.704170 |
| longitude | 126258.0 | -1.224327e+02 | 2.740284e-02 | -122.513065 |
| maximum_nights | 126258.0 | 1.747421e+04 | 6.043664e+06 | 1.000000 |
| minimum_nights | 126258.0 | 1.072605e+01 | 1.590519e+01 | 1.000000 |
| monthly_price | 19067.0 | 4.177245e+03 | 2.740558e+03 | 700.000000 |
| number_of_reviews | 126258.0 | 6.153323e+01 | 8.585735e+01 | 0.000000 |
| price | 126258.0 | 2.130139e+02 | 3.284934e+02 | 10.000000 |
| require_guest_phone_verification | 126258.0 | 5.468168e-02 | 2.273588e-01 | 0.000000 |
| require_guest_profile_picture | 126258.0 | 4.589016e-02 | 2.092477e-01 | 0.000000 |
| requires_license | 126258.0 | 9.941865e-01 | 7.602461e-02 | 0.000000 |
| review_scores_rating | 126258.0 | 9.570775e+01 | 6.869996e+00 | 20.000000 |
| reviews_per_month | 126258.0 | 2.048854e+00 | 2.088294e+00 | 0.000000 |
| security_deposit | 126258.0 | 3.419327e+02 | 6.260590e+02 | 0.000000 |
| weekly_price | 20939.0 | 1.297547e+03 | 9.815052e+02 | 250.000000 |
| zipcode | 126258.0 | 9.411478e+04 | 1.315900e+01 | 94013.000000 |

4. Impact of COVID 19 on Gross Rental Revenue

4.1 Methodology

4.2 Results

4.3 Decision Recommendations

5. Airbnb Rental Prices in San Francisco

5.1 Methodology

5.2 Base Model Decision Tree

5.3 Tuned XGBRegressor Price Predictor

5.4 Decision Recommendations

6. Conclusion

6.1 Takeaways