Airbnb Dynamic Pricing Recommendation Engine

Project Report

Introduction: This project uses approximately 49,000 Airbnb listings from New York City to analyse historical data and develop a pricing recommendation engine based on listing quality, location, and seasonal availability. The final output includes a machine learning model for price prediction and an interactive Tableau dashboard for business users.

Methodology: Using pandas and scikit learn in Python, the data is cleaned, and a model is built with a test size of 20%. The R-squared of the model is 30% which is a good fit. From the model, it is observed that the key predictors of price is

After this, a price recommendation function is defined, which takes a dictionary of inputs of values of different independent variables, such as neighbourhood group, type of room, and so on, and gives the predicted price as output. This is our price recommendation engine.

An interactive dashboard is made using Tableau, wherein the relation between price and room type, price and neighbourhood group, and no. of. listings per room type are shown. These visuals help decide with respect to the price of the property in accordance with the type of rooms and the neighbourhood in which the property is situated.

Exploratory Data Analysis Highlights:

- Private rooms are the most common type, but entire homes charge significantly higher prices
- Manhattan listings are the most expensive, followed by Brooklyn
- Listings with higher availability and more reviews tend to be priced higher
- Price distribution is right-skewed, justifying the removal of high-end outliers

Recommendations:

1. Entire homes in Manhattan consistently charge the most. There is a need to optimise for this segment
2. Properties with >50 reviews and high availability command trust premiums
3. It is recommended to avoid long minimum stay requirements, as shorter stays attract higher pricing flexibility

4. Use review frequency and room type as core features for a dynamic pricing strategy

Conclusion:

This project highlights the importance of machine learning in the pricing of a service and the use of Tableau for insightful visual analysis. It is important to use such tools for effective pricing recommendations.