Characterize Listings and Predict Price

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airbnb

Problem Statement

Cluster Airbnb Listings

What are the different kinds of properties?
What characterizes them?

Predict Airbnb Listing Price

Can we predict the price of a listing?

Data Overview

Property

property name, neighborhood, coordinates, license

Listing

room type, availability, price, review frequency

Host

host name, host id, number of listings

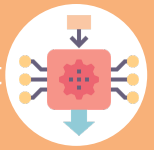
Why Do We Care?

Price Prediction

Is a tough challenge, especially for similar listings with minute differences

Traditional Model Limitation

Price prediction is a widely performed activity, but most applications still rely on traditional models (mostly linear regression), which has limited prediction power



Empower Hosts

Empower hosts to understand the key characteristics that make 2 properties similar and provide them a guidance on price setting

Methods

01

Stable Regression

- Train-validation split

02

Holistic Regression

- L1 regularization
- Sparsity
- Minimizing regularized squared residual errors
- Training R^2 17.5%, testing R^2 17.98%

03

XGBoost

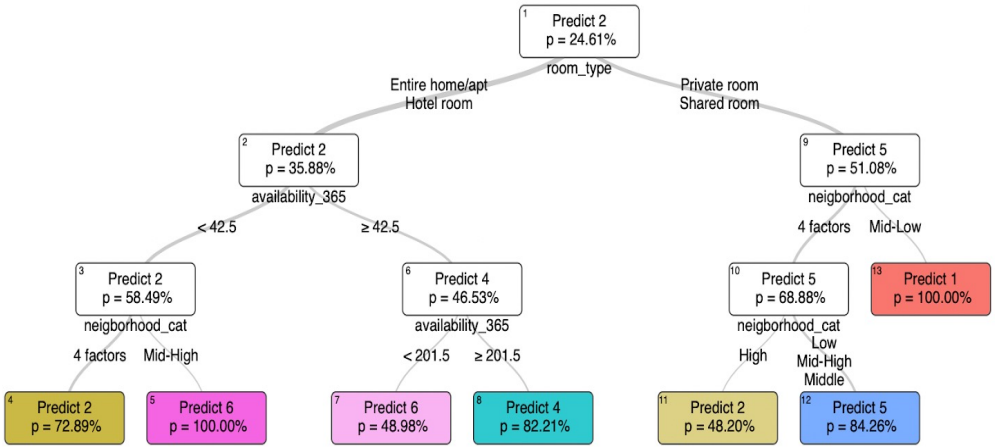
- Overall XGBoost
- Training R^2 52.8%, testing R^2 38.3%

04

Cluster + OCT

- K-means cluster k = 6
- XGBoost on each cluster
- OCT to characterize each cluster
- Avg cluster training R^2 42.17% avg cluster testing R^2 27.89%

Key Insights



- **Cluster 1:** Private/shared rooms in moderate neighborhood
- **Cluster 2:** Private or shared listings in most expensive neighborhoods; most reserved hotels/apartments in all neighborhoods other than mid-high
- **Cluster 3:** All other listings
- **Cluster 4:** Entire homes or hotel rooms that are mostly available
- **Cluster 5:** Private/shared rooms in moderately expensive or in low-cost neighborhoods (complement of cluster 1)
- **Cluster 6:** Hotel rooms/homes; most bookings in mid-high neighborhoods, mostly available in other neighborhoods