

Airbnb Dynamic Pricing Recommendation system

Project Overview

This project builds a machine learning-powered pricing engine for Airbnb listings. It also prepares cleaned data and visuals for business analysis in Power BI and Tableau. The model uses **Random Forest Regression** to predict listing prices based on features like room type, reviews, location, and availability. This empowers hosts to set competitive, data-driven nightly rates.

Dataset and Preprocessing

- **Source File:** AB_US_2023.csv
 - **Output File:** airbnb_dashboard_data.csv (Cleaned)
 - **Steps:**
 - Removed listings with price = 0 or minimum_nights > 365
 - Filled missing neighbourhood_group with 'Unknown'
 - Converted last_review to datetime
 - Filtered extreme values (e.g., capped price at \$10,000)
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Dashboard Visuals used POWERBI

Visualization	Type	Description
Room Type Distribution	Pie Chart	Shows share of Entire home, Private, Shared, Hotel
Avg Price by Group	Bar Chart	Compares average listing price per neighbourhood group
Reviews vs Price	Scatter Plot	Correlation between review count and listing price
Top Neighbourhoods by Revenue	Bar Chart	Based on price × minimum nights

Slicers to Use:

- Room Type
 - Neighbourhood Group
 - Price (slider)
 - Minimum Nights (slider)
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SQL Query Use Cases

These queries support backend insights and custom dashboard visuals:

1. **Average Price by Neighbourhood Group**
 2. **Room Type Distribution**
 3. **Reviews vs Price**
 4. **Geographic Price Heatmap (latitude, longitude)**
 5. **Top Cities by Estimated Revenue**
 6. **Listings Available All Year (availability_365 = 365)**
 7. **Overpriced Listings Filter (Price > \$1000)**
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Chart: Room Type Distribution

Pie Chart Summary:

- **Entire home/apt:** ~72.7%
 - **Private room:** ~26%
 - **Shared room:** ~1%
 - **Hotel room:** <1%
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Project Assets & Deliverables

- Cleaned CSV (airbnb_dashboard_data.csv)
- SQL Queries File (SQL_queries.sql)
- Visuals:
 - room_type_distribution.png

- avg_price_by_neighbourhood.png
 - reviews_vs_price.png
 - feature_importance.png
 - Machine Learning Model (Random Forest)
 - Dashboard-ready guide (Power BI + Tableau)
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Future Enhancements

- Add Streamlit UI for pricing recommendation
- Use Folium for interactive location maps
- Email-ready auto-generated reports
- Real-time API integration with Airbnb