

Airbnb Listings Dashboard Documentation

Overview

This project focuses on analyzing **Airbnb listings data** from two major U.S. cities—**Chicago** and **New Orleans**—to gain meaningful insights into local market trends, host behavior, pricing patterns, and property distribution. Utilizing Power BI, the project transforms raw listing data into an interactive, visual dashboard that helps users explore and compare Airbnb operations across these urban environments.

The goal is to conduct an **Exploratory Data Analysis (EDA)** and convert the insights into a well-organized dashboard that provides stakeholders, hosts, or analysts with a clear understanding of how Airbnb performs in different neighborhoods, how prices vary, what property types dominate, and how host experience relates to reviews and pricing.

The dataset comprises detailed attributes such as room type, neighborhood, price, host information, availability, and number of reviews. A combination of **data cleaning, transformation using Python**, and **visual storytelling through Power BI** enables the creation of a dashboard categorized into four key areas:

1. **Overview of Airbnb**
2. **Property Analysis**
3. **Pricing Analysis**
4. **Host Analysis**

The dashboard supports **interactive filtering** by city, room type, and price category, enabling a flexible and user-centric experience. It serves as a decision-support tool to identify high-performing neighborhoods, competitive pricing strategies, and the impact of host experience on customer engagement.

Data Source

The data was sourced from open Airbnb datasets and consists of individual CSV files for each city:

- **chicago.csv**
- **new_orleans.csv**
- **neighbourhoods.csv**

These datasets contain information such as:

- Listing ID, property and room types

- Host details and review metrics
 - Availability and pricing
 - Neighbourhood information
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Why Airbnb?

Airbnb allows users to book various types of accommodations globally and is particularly attractive due to its affordability and the ability to stay in local communities. It operates in over 191 countries, with 4 million listings and 150 million users. Its value is estimated at \$32 billion with a global growth rate of 153% since 2009.

Methodology

1. Data Cleaning and Transformation

Using Python (pandas):

```
import pandas as pd
chicago = pd.read_csv("chicago.csv", encoding="utf-8",
error_bad_lines=False)
new_orleans = pd.read_csv("new_orleans.csv", encoding="utf-8",
error_bad_lines=False)
chicago['City'] = 'Chicago'
new_orleans['City'] = 'New Orleans'
combined = pd.concat([chicago, new_orleans], ignore_index=True)
combined.to_csv("airbnb_combined.csv", index=False)
```

Neighbourhood data cleaning:

```
neighbourhoods = pd.read_csv("neighbourhoods.csv", encoding="utf-8")
neighbourhoods =
neighbourhoods[['neighbourhood']].dropna().drop_duplicates()
neighbourhoods.columns = ['Raw_Neighbourhood']
neighbourhoods['Cleaned_Neighbourhood'] = (
    neighbourhoods['Raw_Neighbourhood'].astype(str)
    .str.lower().str.strip().str.replace('-', ' ', regex=False)
    .str.replace('_', ' ', regex=False)
)
neighbourhoods.to_csv("neighbourhood_cleaned_reference.csv",
index=False, encoding='utf-8-sig')
```

2. DAX Calculated Columns in Power BI

- **Host Category**

```
Host_Category =
IF(airbnb_listings[number_of_reviews] > 50, "Experienced",
    IF(airbnb_listings[number_of_reviews] > 10, "Moderate", "New"))
```

- **Price Category**

```
Price_Category =
SWITCH(TRUE(),
    airbnb_listings[price] < 100, "Low",
    airbnb_listings[price] < 200, "Medium",
    "High")
```

Dashboard Visualizations

Airbnb Listings Overview: Comparative Analysis of Chicago and New Orleans

KPI Card: Total Listings

- Metric Displayed: Total number of Airbnb listings across both cities.
- Value: 16,617 listings.
- This provides a quick snapshot of the total supply of Airbnb properties in Chicago and New Orleans combined.

Slicers

1. **City**
 2. **Room Type**
 3. **Price Category**
- Functionality: These interactive filters allow users to explore the data by selecting specific cities (Chicago or New Orleans), room types (e.g., Entire home/apt, Private room), and price categories (e.g., Low, Medium, High).
 - This enables focused analysis by refining the data view based on selected parameters.

City-wise Breakdown – Donut chart

- Visualization: A donut chart is used to compare the distribution of total Airbnb listings between Chicago and New Orleans.
- Insight:
 - Chicago accounts for 47% of the total listings, which is approximately 7811 listings.
 - New Orleans contributes the remaining 53%, approximately 8806 listings.

Property Analysis

Room Type Distribution – Donut Chart

- Visualization: Donut chart displaying the proportion of each room type available in Airbnb listings.
- Common Categories:
 - Entire home/apt
 - Private room
 - Shared room
 - Hotel room
- Insight:

Shows the dominant room type in the dataset is entire home or an apartment. It indicates that most hosts offer fully private properties.

- This helps stakeholders understand guest preferences and market trends in accommodation types across both cities or filtered selections.

Listings by Neighbourhood – Bar Chart (Top 10)

- Visualization: Bar chart displaying the Top 10 Neighbourhoods ranked by the number of Airbnb listings.
- Insight:
Reveals hotspots within the cities where listings are concentrated — e.g., neighborhoods like Central business district in Chicago or Near North Side in New Orleans have the highest number of listings.
- Purpose:
Assists in location-based analysis, such as identifying:
 - High-demand areas
 - Opportunities for market expansion
 - Neighborhood-wise performance

Pricing Analysis

Avg Price vs Room Type – Column Chart

- Visualization: Vertical column chart showing the average price for each room type.
- Insight:
 - Allows comparison of how pricing varies between categories like Entire home/apt, Private room, Shared room, etc.
 - Hotel rooms have the highest average price, while shared rooms tend to be the cheapest.
- Purpose:
 - Helps understand pricing strategy by room type.
 - Useful for both hosts and analysts to evaluate which room types yield higher returns.

Top 10 Neighbourhoods by Price – Bar Chart

- Visualization: Horizontal bar chart listing the Top 10 neighbourhoods with the highest average listing prices.
- Insight:
 - Highlights premium locations where Airbnb listings command higher rates - eg., neighborhoods like Freret in Chicago or Near North Side in New Orleans have the highest rates.
 - May include upscale neighborhoods, tourist hotspots, or waterfront locations.
- Purpose:
 - Supports strategic pricing analysis and helps in identifying high-value localities.
 - Useful for investors, property managers, and tourism analysts targeting premium segments.

Host Analysis

Host Category vs Avg Reviews & Pricing – Stacked Bar Chart

- **Visualization:**
A stacked bar chart where each bar represents a host category:
 - Experienced
 - Moderate
 - New
 - **Insight:**
 - Experienced hosts have the highest average number of reviews, indicating strong guest engagement and consistent performance.
 - Average pricing may also be higher for experienced hosts, showing their ability to charge a premium due to trust and reputation.
 - New hosts have fewer reviews and lower average pricing, which may reflect their strategy to attract bookings and build credibility.
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Insights

1. **Popular Neighbourhoods:**
 - Comparing both the cities higher rates were found to be in Freret in Chicago with an average pricing of \$1,210 and Central business district had the maximum number of listings with 1,321 properties listed.
 2. **Room/Property Type Share:**
 - Entire home/apartment dominates in both cities with 13,497 listings in total.
 - Private rooms are more common in lower price ranges with 2024 listings compared to medium price range (446 listings) and higher price range (357 listings)
 3. **Price Variation:**
 - Higher pricing trends observed for hotel rooms and specific neighbourhoods (like Freret in Chicago).
 - In general, property in New Orleans had lower pricing compared to Chicago.
 4. **Host Patterns:**
 - Experienced hosts tend to have higher pricing and more reviews.
 - Moderate review category hosts have higher pricing compared to experienced hosts,
 - New hosts charge competitively to attract bookings.
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Limitations

- Listings may change over time, hence periodic data refresh is essential.
 - Some fields like property type is missing.
 - External factors like seasonality or events are not considered.
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Conclusion

This project provided a comprehensive analysis of Airbnb listings in **Chicago** and **New Orleans**, leveraging Python for data preprocessing and Power BI for interactive visualization. Through calculated metrics like **Host Category** and **Price Category**, and by combining datasets with city labels, we enabled dynamic filtering and comparison across regions. The dashboard effectively highlights key patterns in Airbnb performance, from neighborhood popularity to pricing strategies and host engagement.

For instance, neighborhoods like *Freret* in Chicago and *Near North Side* in New Orleans emerged as high-priced zones with a relatively high number of listings. **Entire homes/apartments** dominated the room type distribution, while **hotel rooms** commanded higher average prices. Moreover, **experienced hosts** (with over 25 reviews) showed a consistent ability to charge higher prices while also maintaining stronger review volumes. These insights not only offer value to hosts and travelers but also serve as a foundation for further market strategy development.
