



Rahul Sharma

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# AIRBNB LISTING ANALYSIS

Who Is Booking What? A Deep Dive into Airbnb Customer Behavior !



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# About Us

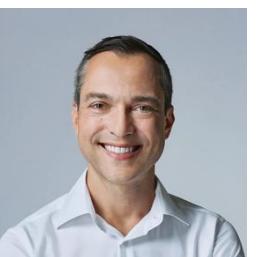
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Airbnb is an American company was born in 2007 when two hosts welcomed three guests to their San Francisco home, and has since grown to over 5 million hosts who have welcomed over 2 billion guest arrivals in almost every country across the globe. Airbnb operates an online marketplace for lodging, primarily homestays for vacation rentals, and tourism activities. Based in San Francisco, California, the platform is accessible via website and mobile app. Airbnb does not own any of the listed properties; instead, it profits by receiving commission from each booking. The company was founded in 2008. Airbnb is a shortened version of its original name, AirBedandBreakfast.com.

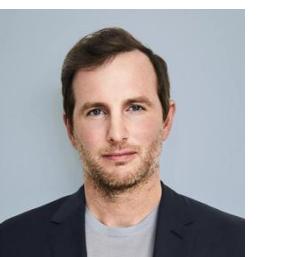
**Founders Of Airbnb**



[Brian Chesky](#)



[Nathan Blecharczyk](#)



[Joe Gebbia](#)





# Introduction

In the dynamic hospitality sector, online platforms such as Airbnb have transformed consumer booking behavior, creating both opportunities and challenges for traditional hotel operations. This analysis was conducted to address declining revenue trends and inconsistent room bookings observed across a selection of hotel listings on the Airbnb platform.

## ***The primary objectives of the project are :***

- Analyze booking patterns and occupancy rates across different hotel listings.
- Identify key factors contributing to low revenue performance.
- Recommend data-driven strategies to enhance visibility, pricing, and customer engagement.

The study covers listings from different cities over a year period, utilizing publicly available Airbnb data sets complemented by internal booking records. While the analysis focuses on core performance indicators, certain constraints such as unavailable customer feedback and seasonality effects may limit the scope of interpretation.





# Data Overview

01

## Data Source

- The Data of the project is collected from "KAGGLE" a public dataset available for everyone.
- Link :** [www.kaggle.com/datasets/arianazmoudeh/airbnbopendata](http://www.kaggle.com/datasets/arianazmoudeh/airbnbopendata)

02

## Data Description

- Main Variables :** name, host id, host\_identity\_verified, host name, neighbourhood group, neighbourhood, lat, long, country, country code, instant\_bookable, cancellation\_policy, room type, Construction year, price, service fee, minimum nights, number of reviews, reviews per month, review rate number, calculated host listings count, availability 365, total price, estimated\_annual\_revenue, minimum\_revenue\_of\_host, max\_revenue\_generated, min\_booking\_impact.
- The geographical coverage area is New York in United States.



# Data Volumn & Structure

01

## Record Data

This project contains 1,01,411 listing records of airbnb.

02

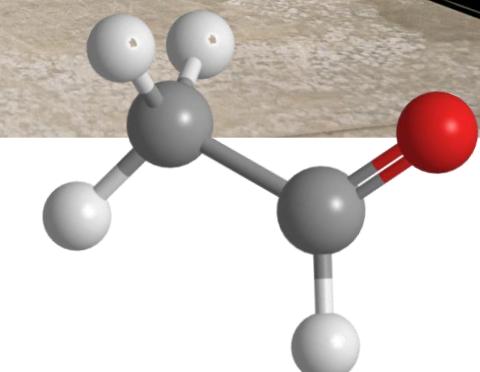
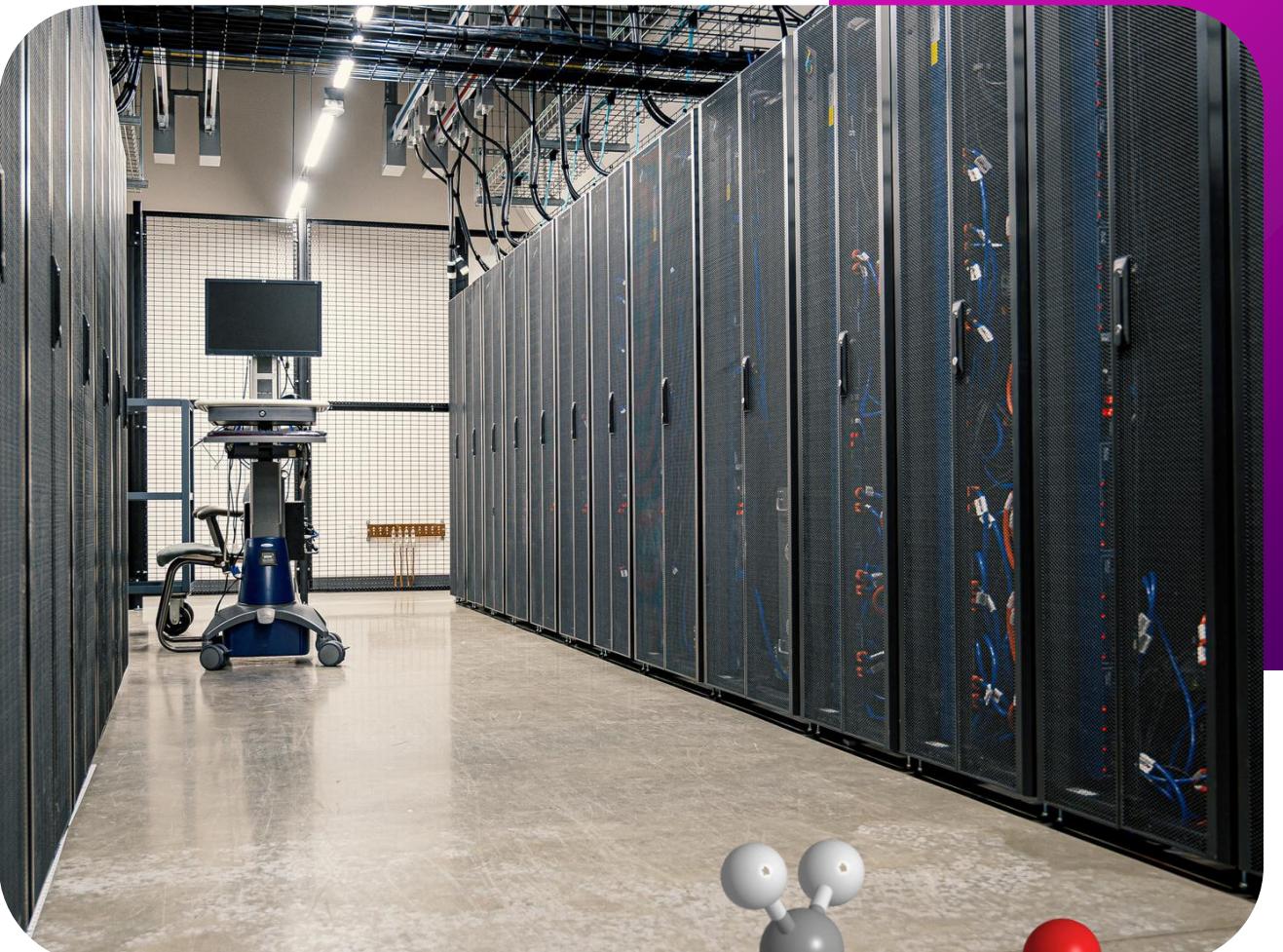
## Data Structurer

The data file, originally structured as a CSV, was later transformed into an structured XLSX file.

03

## Table Schema & File Size

This data file have single table structure and the size of the dataset is 20.2 mb





# Data Cleaning & Preprocessing

01

## Missing Values

Handling missing values by removing them, when the missing value are less in amount.



02

## Remove Duplicate

Removed the duplicate values for suring each record is unique to get accurate insights.

03

## Blank/NULL Values

filled blank/NULL values with Mean and for latitude, longitude blank values used the Geopy library for retrieving the lat, long values.

04

## Replacing Values

Standardization is vital for consistent aggregation and filtering. Inconsistencies like "brookln", "Brooklyn".

05

## Identify Irrelevant Data

Removed unnecessary columns for better optimize performance that contributing to more accurate, efficient and impactful insights for decision making.



# Methodology

## 01 Analytical Approach

To uncover the drivers behind low revenue and booking inconsistencies in Airbnb-listed hotel rooms, a structured analytical approach was employed. The project began with exploratory data analysis aimed at understanding distribution patterns, missing values, and variable correlations across key performance indicators.

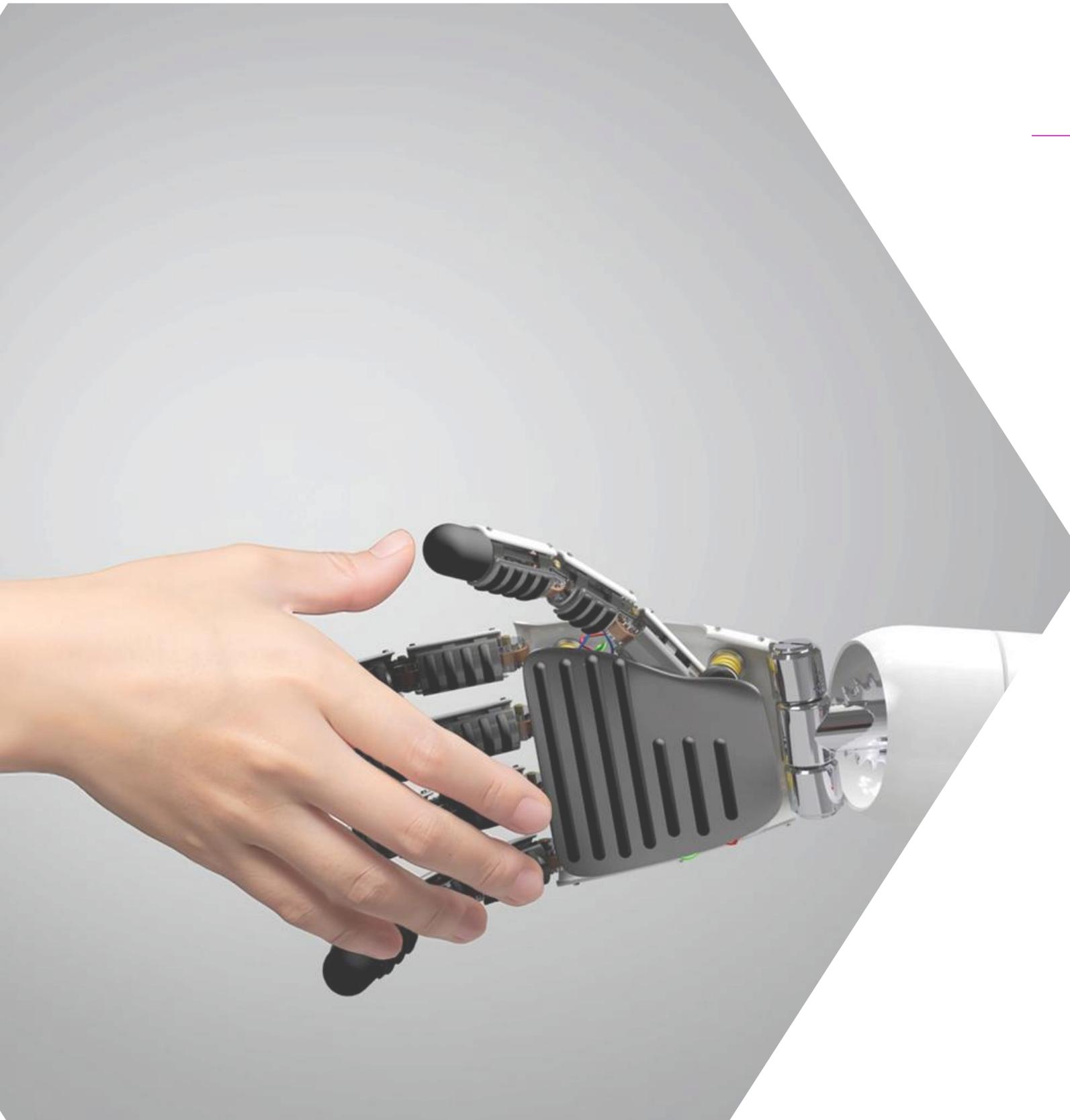
## 02 Techniques & Metrics

Python served as the primary tool for data cleaning and transformation. Tasks included handling null values, normalizing date formats, categorizing room types, and calculating derived metrics such as **Review Rate No**, **Estimate Annual Revenue**, **Minimum Revenue of Host**, **Max Revenue Generate**, **Min Booking Impact** and **Total Prize**. Excel was used to supplement the dataset by introducing new columns for comparison metrics, enabling a more intuitive breakdown of performance trends.

## 03 Tools & Technologies

- **Power BI** was selected. The platform's interactive capabilities enabled the creation of KPI cards, booking trend graphs, and geographic breakdowns that highlight revenue disparities across regions. These visualizations were instrumental in converting analytical insights into actionable perspectives aligned with business objectives.
- **Excel** is used for data management & cleaning.
- **Python** perform EDA, deeper statistical analysis, comparison and data transformation.





# Justification of choices

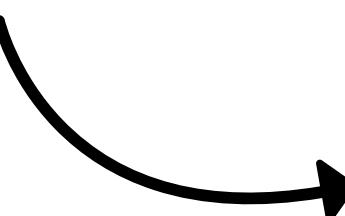
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The methodology ensures transparency, scalability, and accessibility – allowing stakeholders to interact with findings and identify targeted areas for improvement



## Analysis & Findings

The data analysis uncovered several performance patterns and disparities across Airbnb-listed hotel rooms that have direct implications on booking behavior and revenue generation.





## BUSINESS QUESTIONS ?

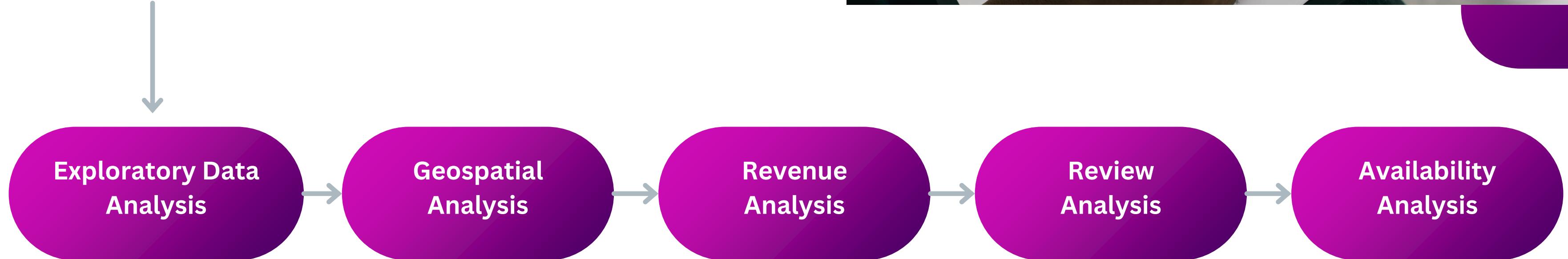
1. **What can be the reason of less occupancy of hotel & shared rooms ?**
2. **What factors contribute to the lower annual average revenue of private rooms compared to other rooms ?**
3. **Why are total reviews are so low for queens, Bronx and ststen island in neighbourhood group and also in room type ?**
4. **What causes hotels to have low availability ?**
5. **Is there have any co-relation between hotel pricing, customer reviews, room availability etc ?**
6. **What is the overall room price range distribution ?**





# Segment Analysis In Python

A segment-wise review revealed that hotel listings in **Neighbourhood Group**—particularly in Mumbai and Delhi—consistently recorded lower booking rates compared to mid-tier cities. These underperforming listings typically featured higher price points, limited availability, and fewer guest reviews, which likely discouraged conversions.





# EDA

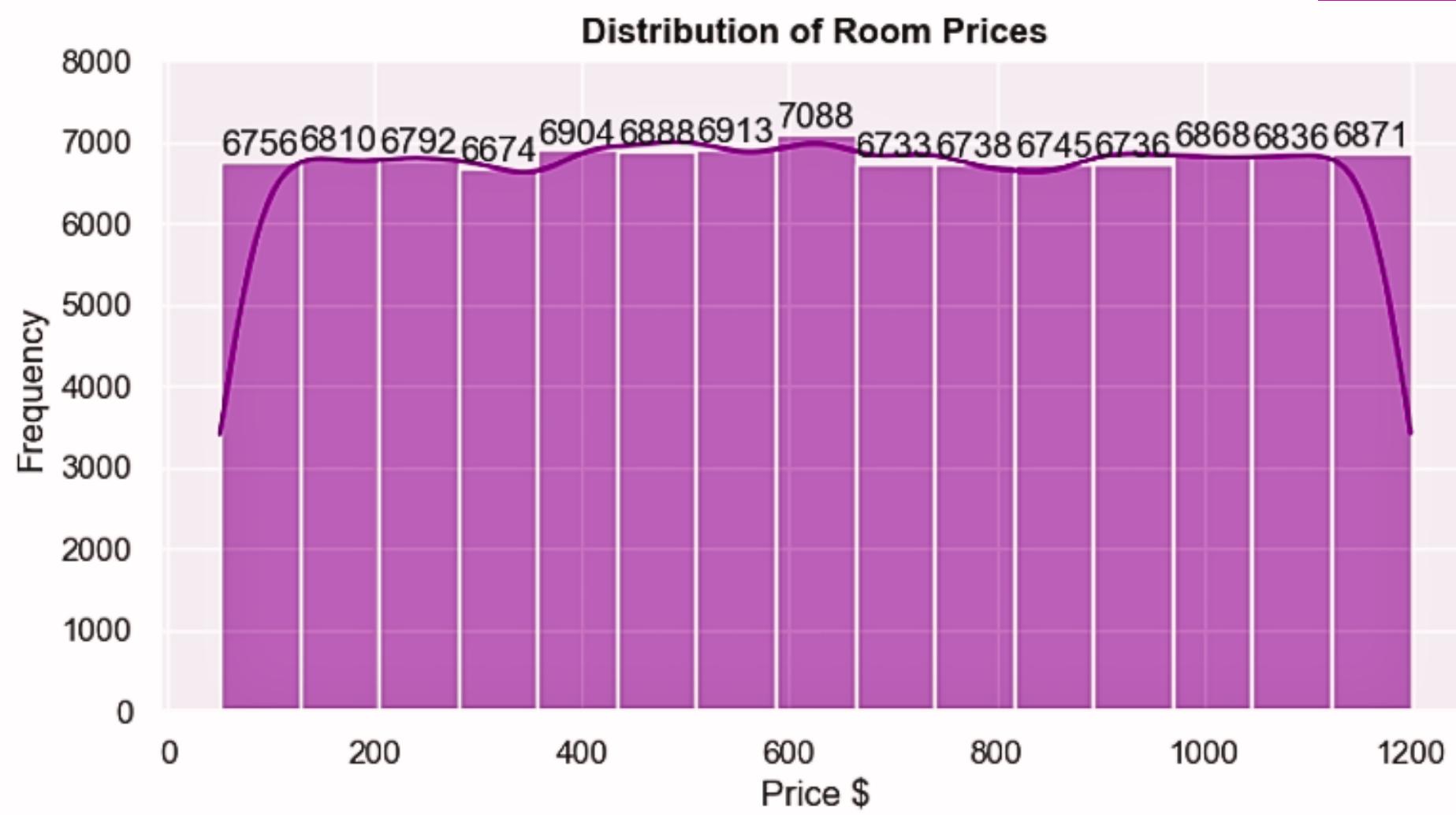
## EXPLORATORY DATA ANALYSIS



1

# Over-All Rooms Pricing

Let's investigate the distribution of **Room Rental Price** to determine if pricing strategies play a significant role in influencing hotel bookings and in revenue?



## EXPLANATION

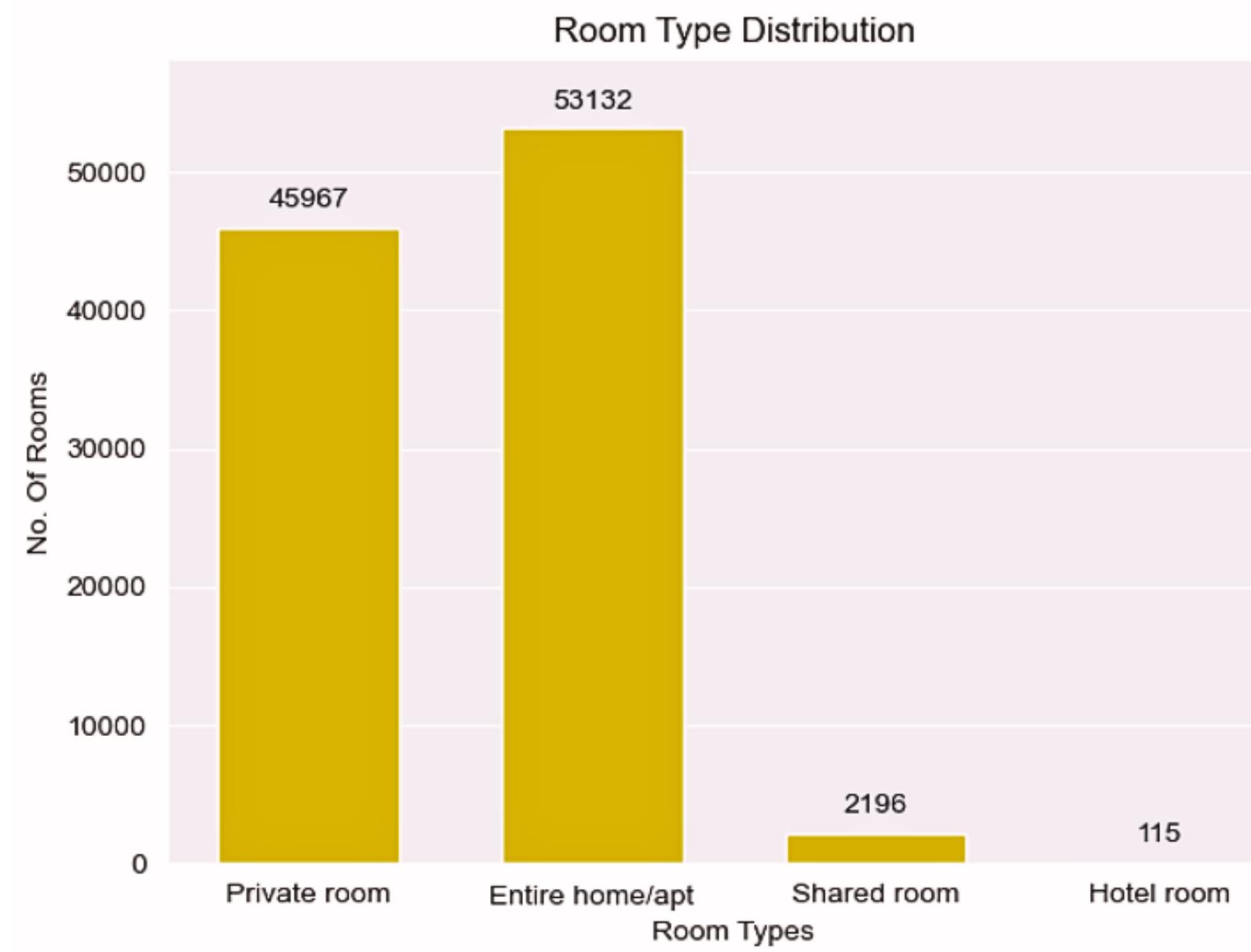
The chart displays the distribution of Room Rent Price. It's a histogram chart showing the count of each column.

- The histogram shows a fairly even distribution of listing price ranges.
- Indicating no particular concentration of listing in a specific price range.
- The distribution appears to be unimodal, with a single peak.
- The peak of the distribution is around the price range of 600 to 700 indicating that this is the most frequent room rent price in hotels.
- There are fewer rooms with very low (below 200) or very high (above 1000) rent prices.
- The distribution is somewhat symmetrical around the peak but with a slight skew towards the higher prices.

2

# Rooms Types

By examining the landscape of **Room Rental Prices**, we seek to uncover how **Room Types** specifically drive hotel bookings and impact revenue?



## EXPLANATION

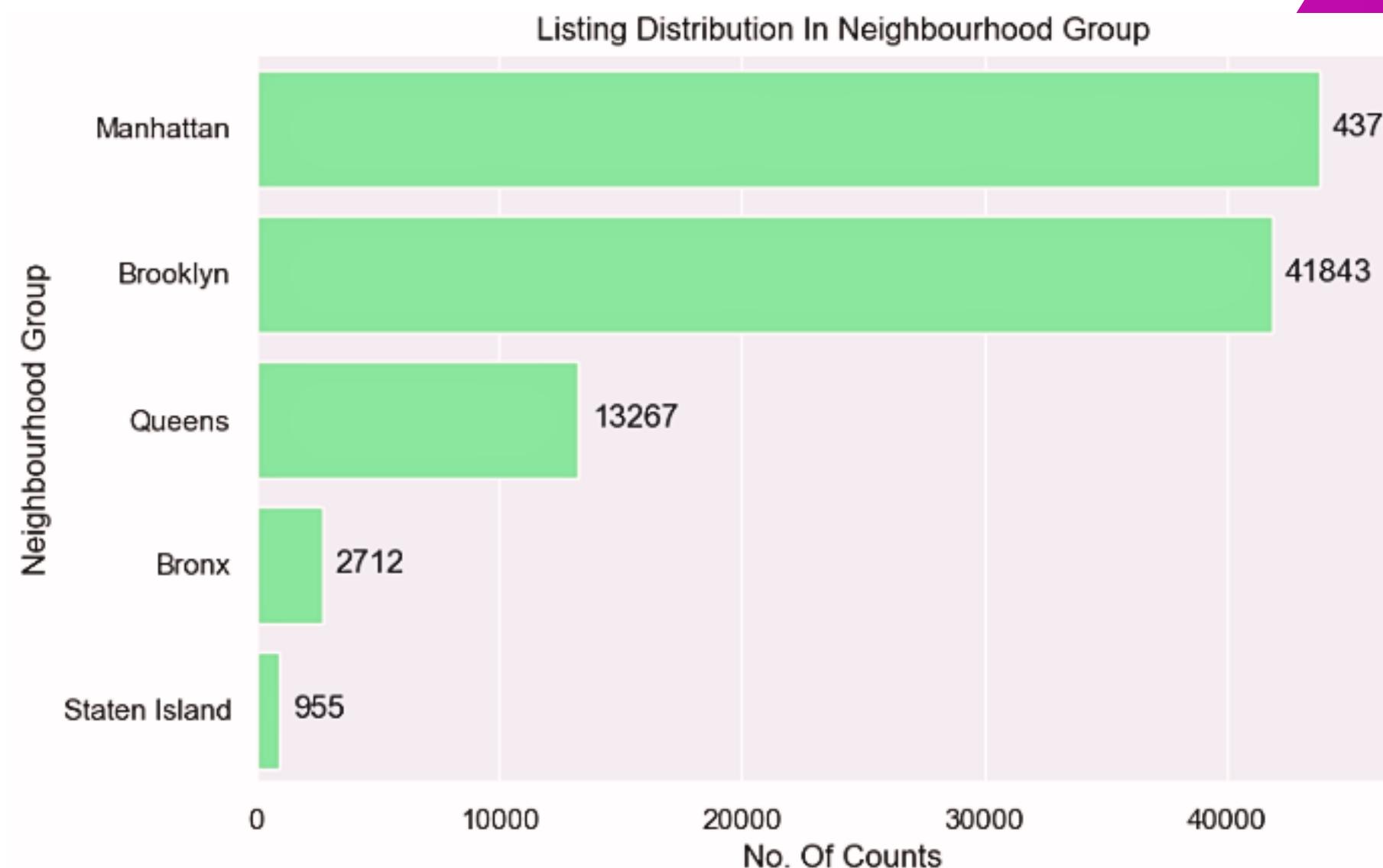
The chart displays the distribution of different room types. It's a column chart showing the count of each room type.

- Entire home/apt is the most frequent room type with a count of 53132, means the most of the revenue comes from this type of rooms.
- Private room is the second most frequent with a count of 45967.
- Shared room has significantly fewer listings with a count of 2196.
- Hotel room is the least common room type with only 115 listings.
- In essence, the majority of the listings are either entire homes/apartments or private rooms, while shared rooms and hotel rooms are much less common.
- Prioritize adding more of the **in-demand, low quantity** room types for direct revenue growth.

3

# Total Listing in Neighbourhood City

We will investigate the total numbers of **Room Listings** within each New York City borough to assess their collective impact on market share, bookings and revenue generation.



## EXPLANATION

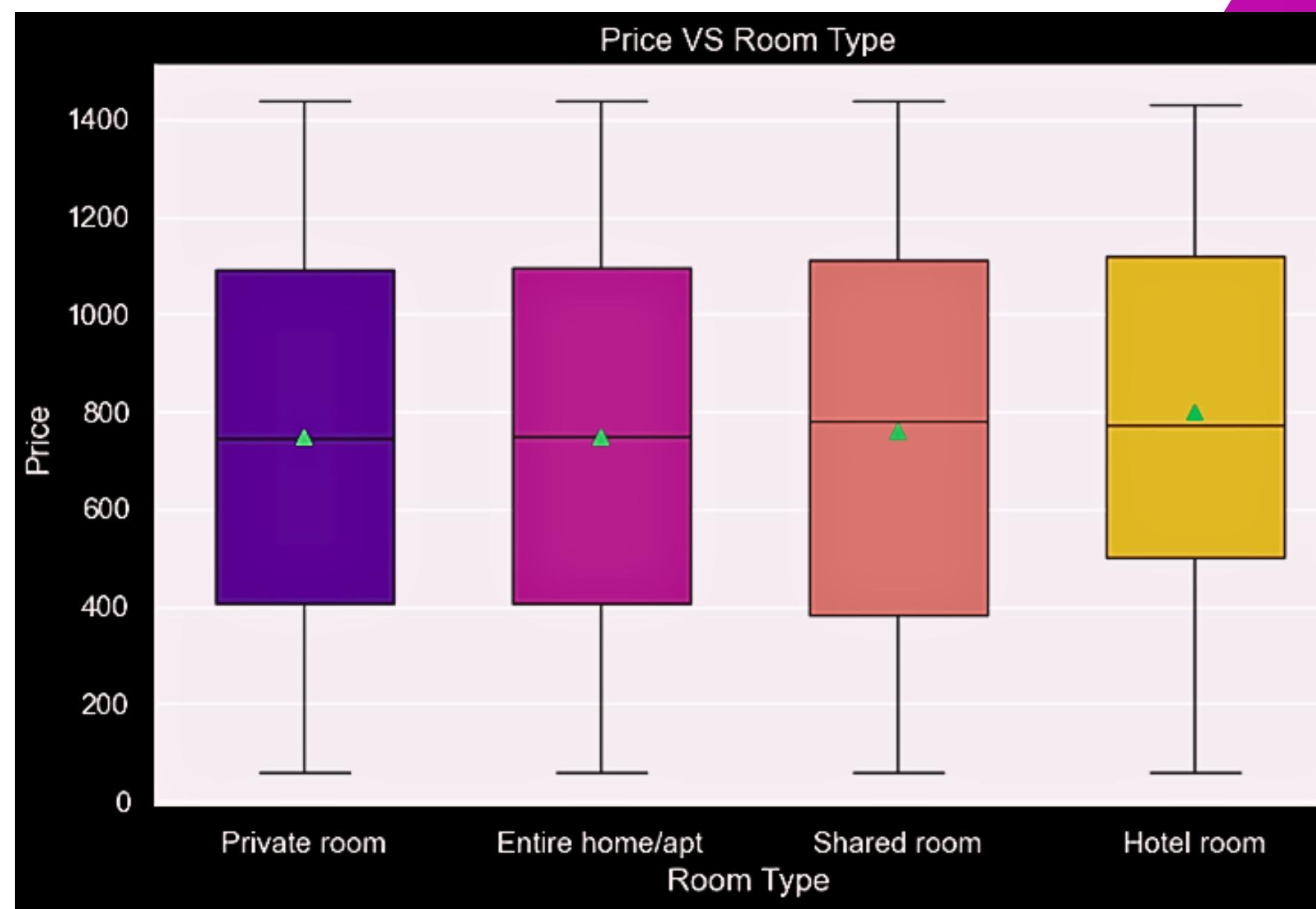
The chart displays the distribution of listing across neighbourhood group. It's a bar chart showing the count of each.

- Manhattan exhibits the highest number of listings, with a count of approximately 43,793.
- Brooklyn holds the second-highest number of listings, with a count of approximately 41,843, which is close to Manhattan's count.
- Queens shows a significantly lower number of listings compared to Manhattan and Brooklyn, with a count of around 13,267.
- Bronx has a considerably smaller number of listings compared to the top three, with a count of approximately 2,6712.
- Staten Island Displays the fewest listings among the represented neighbourhood groups, with a count of around 955.
- Suggestion is if demand is high, implement premium pricing and explore increasing inventory, either demand is low re-evaluate their listings strategy rather than expanding.

4

# Relation in Price VS Room Types

This chart compares average prices of different Airbnb room types across NYC neighborhoods. It highlights how pricing varies significantly depending on the room type.



## EXPLANATION

The chart displays the relation between Price And Room Type. It's a box plot showing relation of both by mean,median,low,high for each room type.

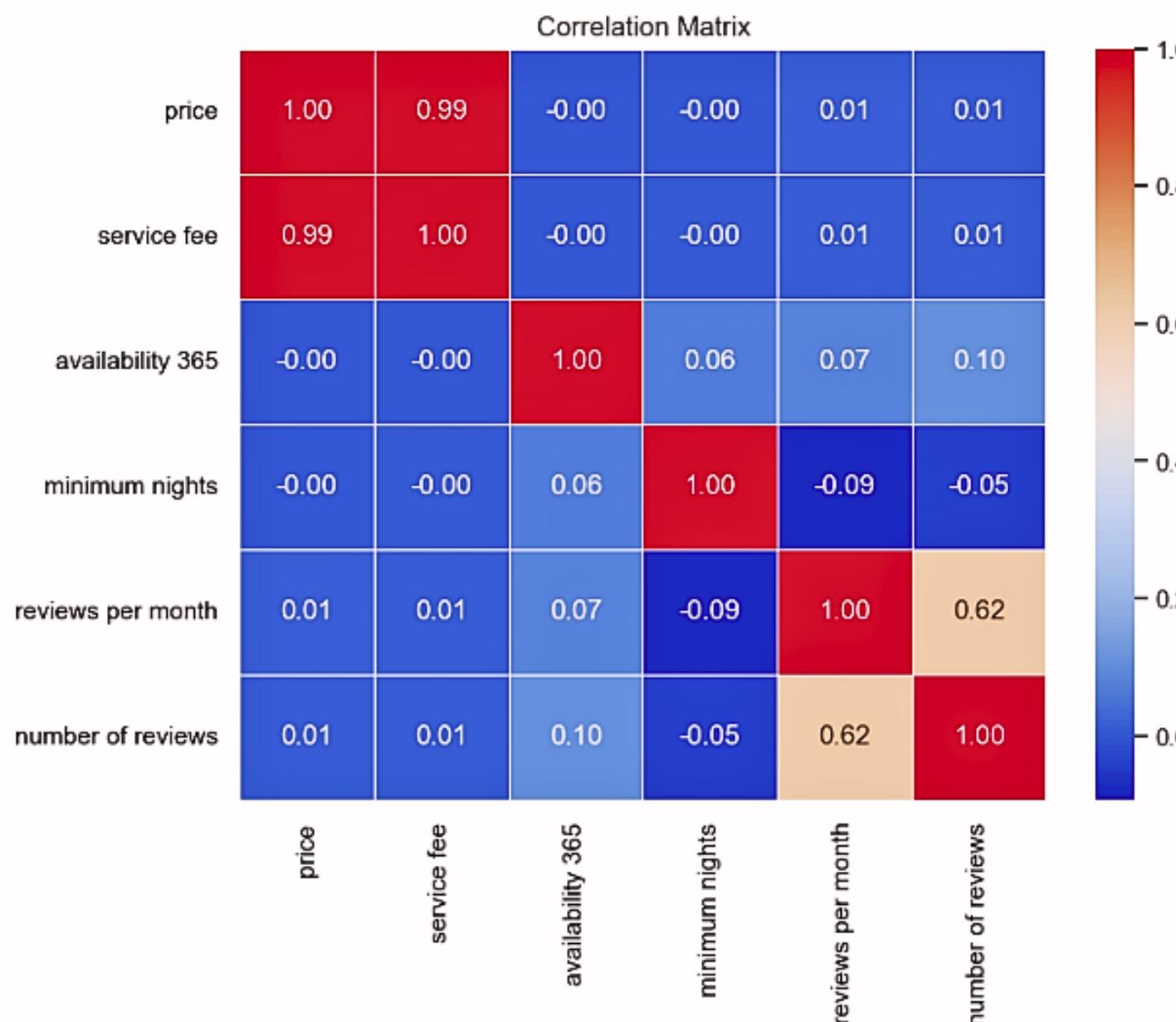
- Entire home/apt appears to have the highest median price and a wider spread of prices compared to other room types.
- Hotel room also shows a relatively high median price.
- Private room has a lower median price than 'Entire home/apt' and 'Hotel room'.
- Shared room seems to have the lowest median price and the least spread in prices.
- Overall pricing are balanced in all the vailable room types, there is no markable sign that effect the bookings market.



5

# Correlation Identification

Exploring these correlation is essential for understanding the variable impact on a hotel's financial performance and bookings dynamics.



## EXPLANATION

The chart displays the Correlation Matrix between available numeric columns. It's a heatmap showing relation of each others.

### 1. Strong Positive Correlation:

Price & Service Fee (0.99) – As price increases, service fee rises proportionally.

### 2. Weak or No Correlation:

- Price and Service Fee show near-zero correlation with availability, minimum nights, reviews per month, and number of reviews.
- Availability 365 has weak links with minimum nights (0.06), number of reviews (0.10), and reviews per month (-0.02).
- Minimum Nights has weak negative correlation with review activity.

### 3. Moderate Correlation:

Reviews per Month & Total Reviews (0.62) – More frequent reviews lead to more total reviews over time.



# GA

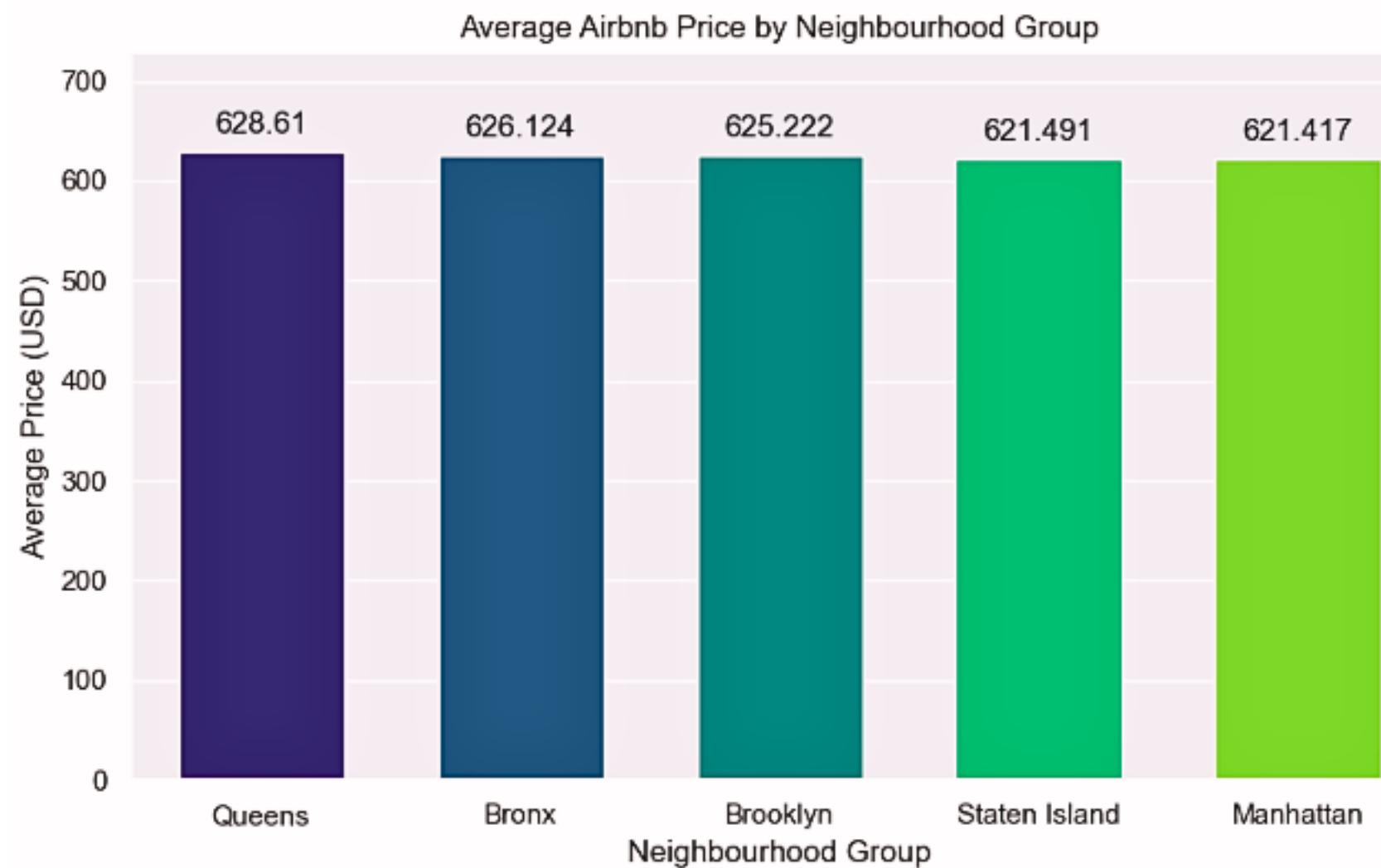
## GEOSPATIAL ANALYSIS



1

# Average Price In Neighbourhood

In EDA we check the overall pricing of rooms, so now lets have a look of different **Average Room Pricing** in borough neighbourhoods.



## EXPLANATION

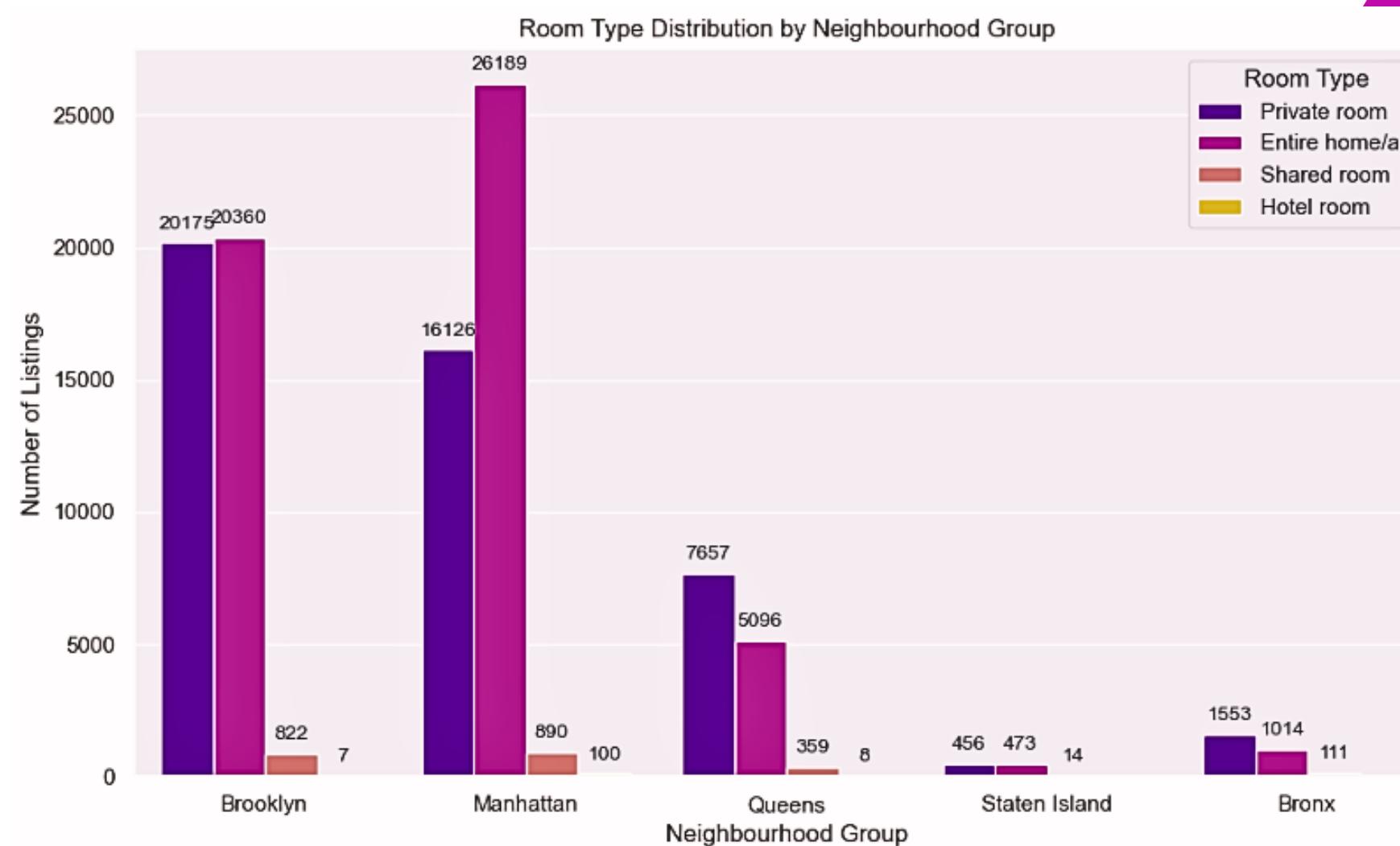
This bar chart displays the average Airbnb price across different neighbourhood groups, illustrating the mean price for each area.

- All five neighbourhood groups have average Airbnb prices that are relatively close to each other, ranging from approximately \$621 to \$628.
- Queens has the highest average Airbnb price at \$628.61.
- Bronx follows closely with an average price of \$626.12.
- Brooklyn has an average price of \$625.22.
- Staten Island shows an average price of \$621.49.
- Manhattan has the lowest average Airbnb price among the groups displayed, at \$621.41.
- Conclusion is there are no significant differences in neighbourhood pricing, that indicates pricing is not a concern of lower revenue and as for bookings.

2

# Airbnb Room Distribution in NYC

Analyzing the borough's rooms that helps to identify which rooms are booked the highest, moderate and lowest that impacts on bookings.



## EXPLANATION

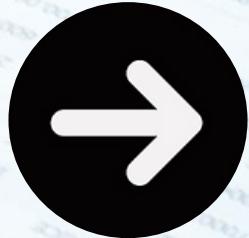
This clustered bar chart illustrates the distribution of different room types (Private room, Entire home/apt, Shared room, Hotel room) across various neighbourhood groups, showing the number of listings for each combination.

- Manhattan and Brooklyn have the highest overall number of Airbnb listings, with "Entire home/apt" being most common in Manhattan and a near-equal distribution of "Private room" and "Entire home/apt" in Brooklyn.
- Queens primarily features "Private room" listings, while Bronx and Staten Island have significantly fewer listings across all room types.
- "Private room" and "Entire home/apt" are the overwhelmingly dominant room types across all neighbourhood groups.
- "Shared room" and "Hotel room" account for a very small fraction of total listings in every neighbourhood group shown.
- We can say the major revenue is generated from private, entire home/apt room types.



# RA

## REVENUE ANALYSIS

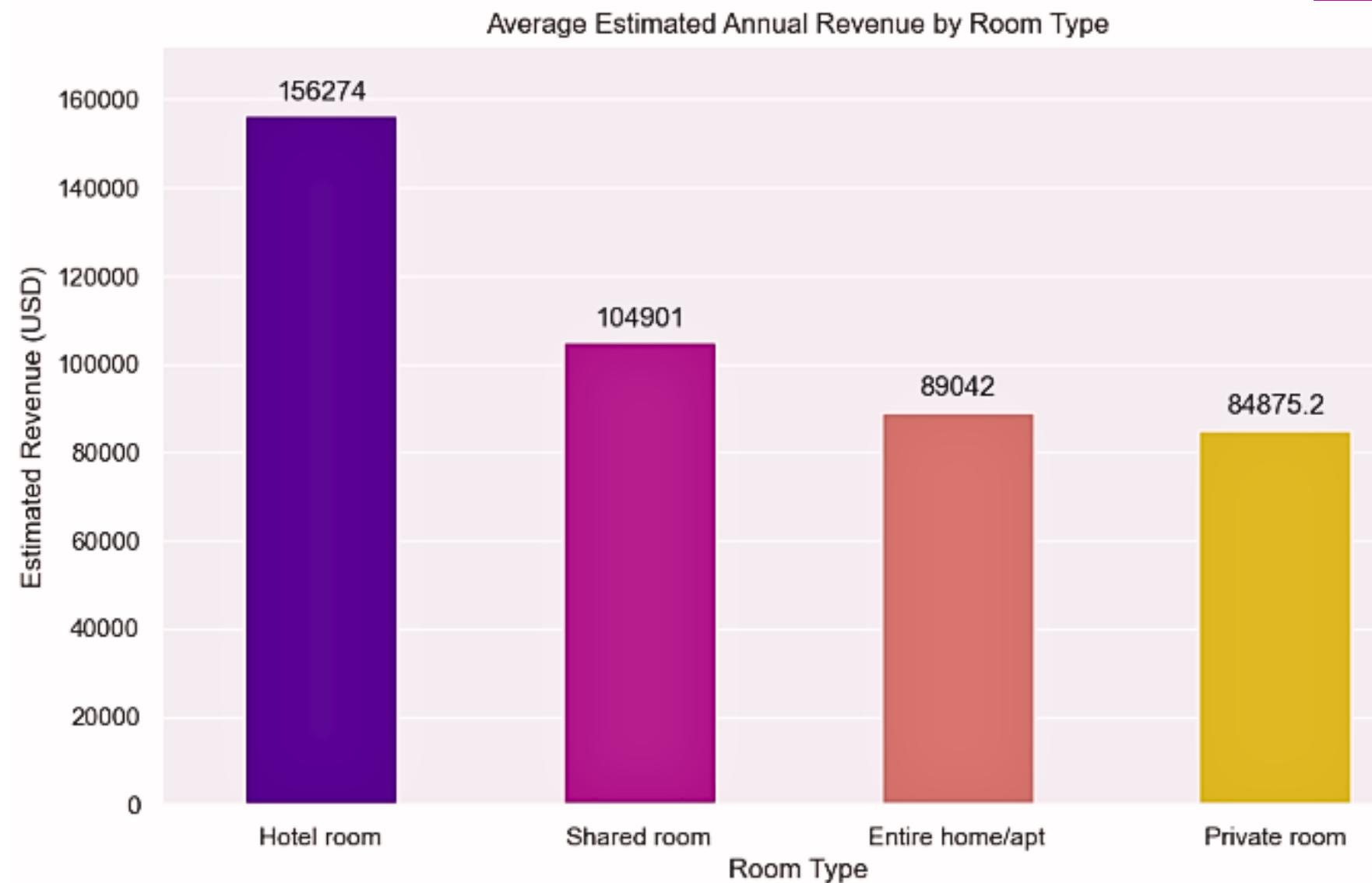


1

# Average Annual Revenue By Rooms

## EXPLANATION

Let's investigate the **Average Annual Revenue** by different rooms types to understand which room types generate the most, least revenue on average.



This bar chart displays the average estimated annual revenue (in USD) for different room types: Hotel room, Shared room, Entire home/apt, and Private room.

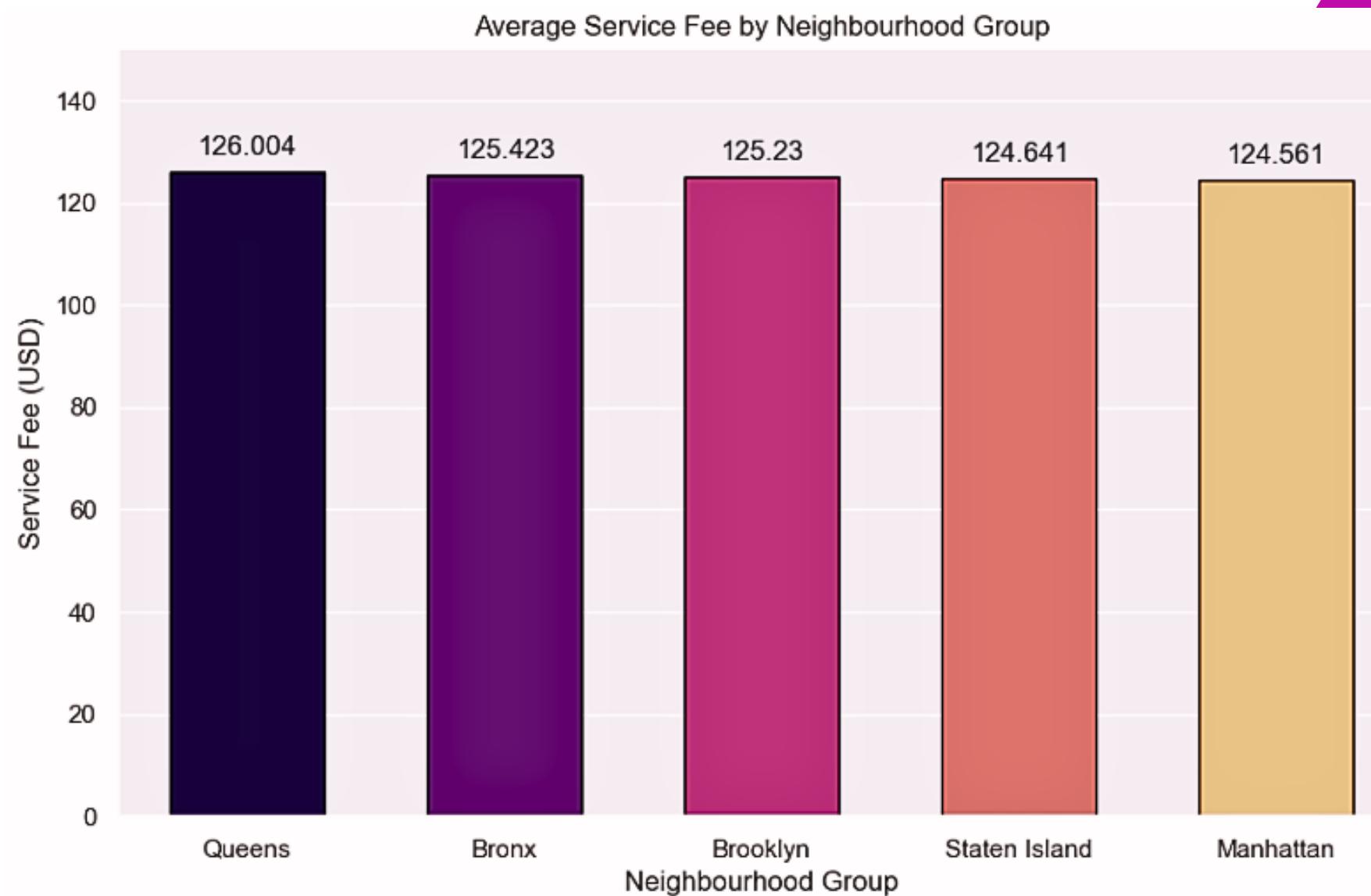
- The chart indicates that Hotel rooms generate the highest average estimated annual revenue at approximately \$156,274.
- Shared rooms follow with the second highest average revenue, estimated at around \$104,901 annually.
- Entire home/apt listings have an average estimated annual revenue of approximately \$89,042.
- Private rooms show the lowest average estimated annual revenue among the listed types, at around \$84,875.
- There's a significant difference in average estimated annual revenue between Hotel rooms and the other room types, with Hotel rooms earning substantially more.
- The difference in average revenue between Entire home/apt and Private rooms is relatively small compared to the difference with Hotel or Shared rooms.

2

## Average Service Fee By Neighbourhood

# EXPLANATION

Let's investigate the **Average Service Fee** across different neighbourhood group to understand if there are significant variation in service charges in rooms types.



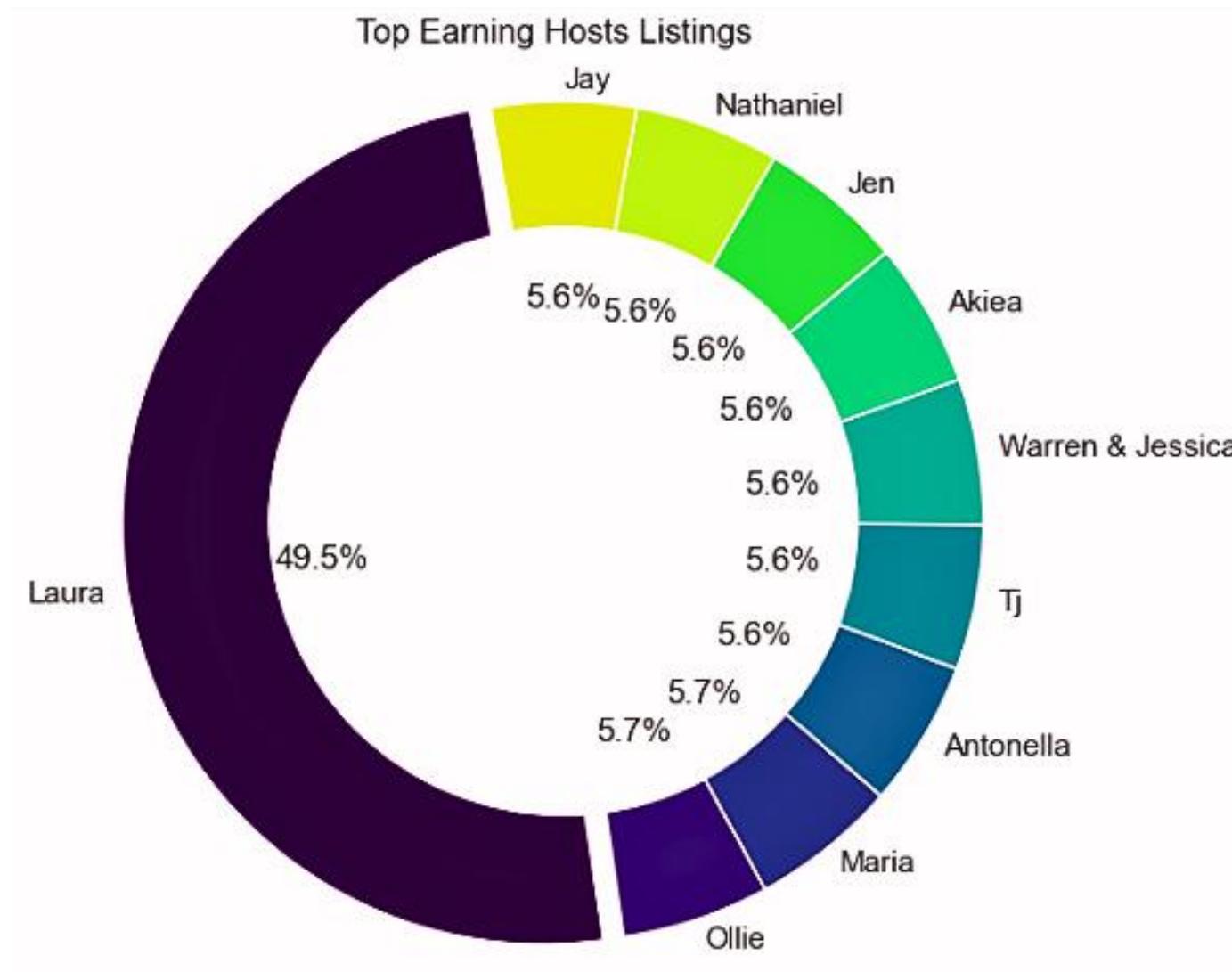
This bar chart displays the average service fee (in USD) for Airbnb listings across five different neighbourhood groups: Queens, Bronx, Brooklyn, Staten Island, and Manhattan.

- The average service fees across all five neighbourhood groups are remarkably consistent, hovering around \$124-\$126 USD.
- Queens shows the slightly highest average service fee at \$126.004 USD.
- Bronx follows closely with an average service fee of \$125.423 USD.
- Brooklyn has an average service fee of \$125.23 USD.
- Staten Island has an average service fee of \$124.641 USD.
- Manhattan shows the lowest average service fee among the groups at \$124.561 USD, though the difference is minimal.
- Overall, the data suggests that the neighbourhood group does not significantly influence the average service fee, as the values are nearly identical across all areas.

3

# Top Earning Listing's Host Name

Let's analyze the distribution of listings among top-earning hosts to understand host concentration.



## EXPLANATION

This donut chart, titled "Top Earning Hosts Listings," displays the percentage distribution of listings among several top-earning hosts.

- The chart highlights that a single host, Laura, accounts for a dominant 49.5% of the total listings among these top earners, nearly half of all listings.
- The remaining portion of the listings (approximately 50.5%) is distributed among nine other hosts.
- Ollie and Maria each hold 5.7% of the listings.
- Antonella, TJ, Warren & Jessica, Akiea, Jen, Nathaniel, and Jay each account for 5.6% of the listings.
- This distribution clearly indicates a highly concentrated market among top hosts, with one individual (Laura) holding a significantly larger share than any other individual or group of individuals.



# RA

## REVIEW ANALYSIS

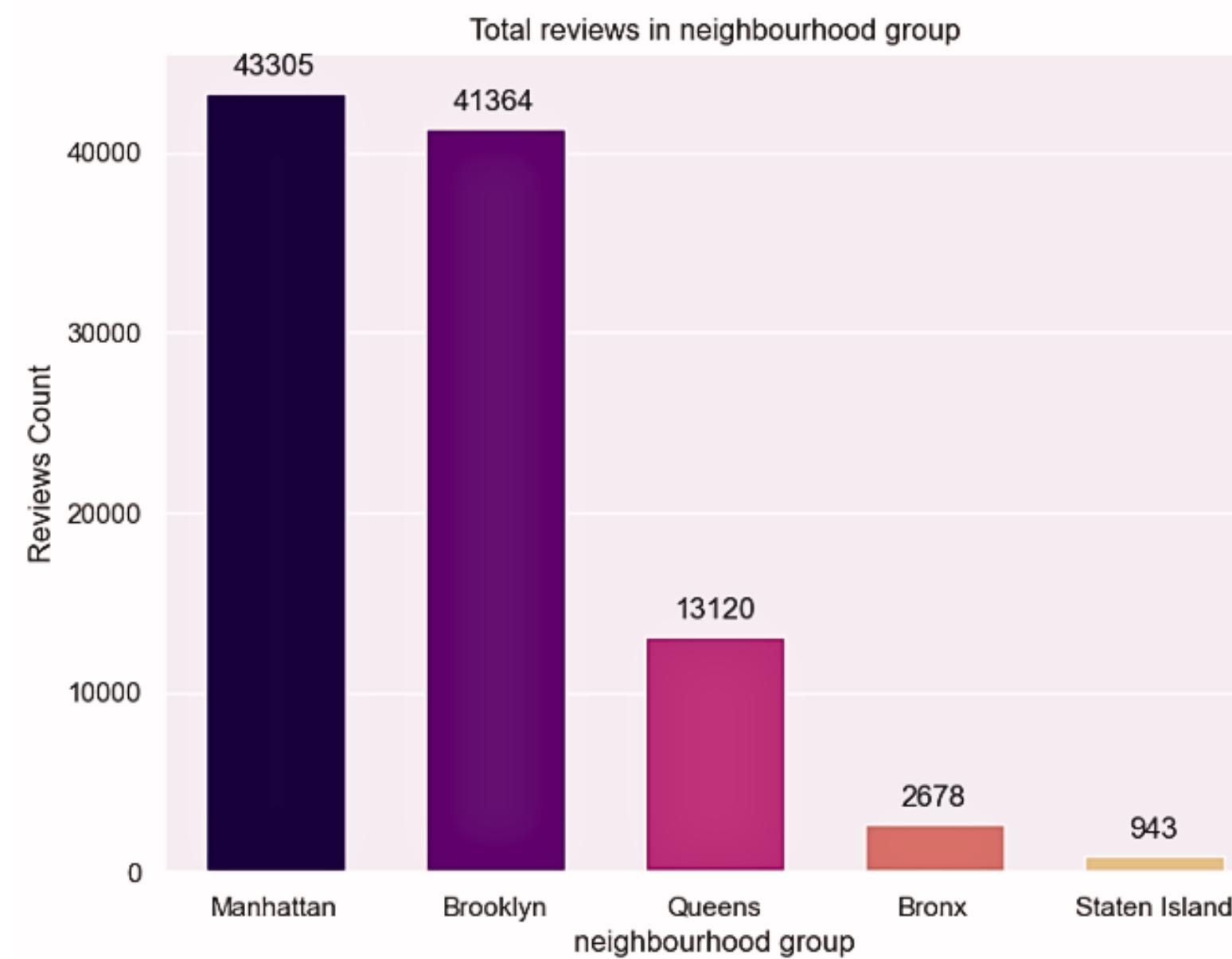


1

# Reviews In Neighbourhood

## EXPLANATION

Let's analyze the total reviews per neighbourhood group to understand review activity across different areas.



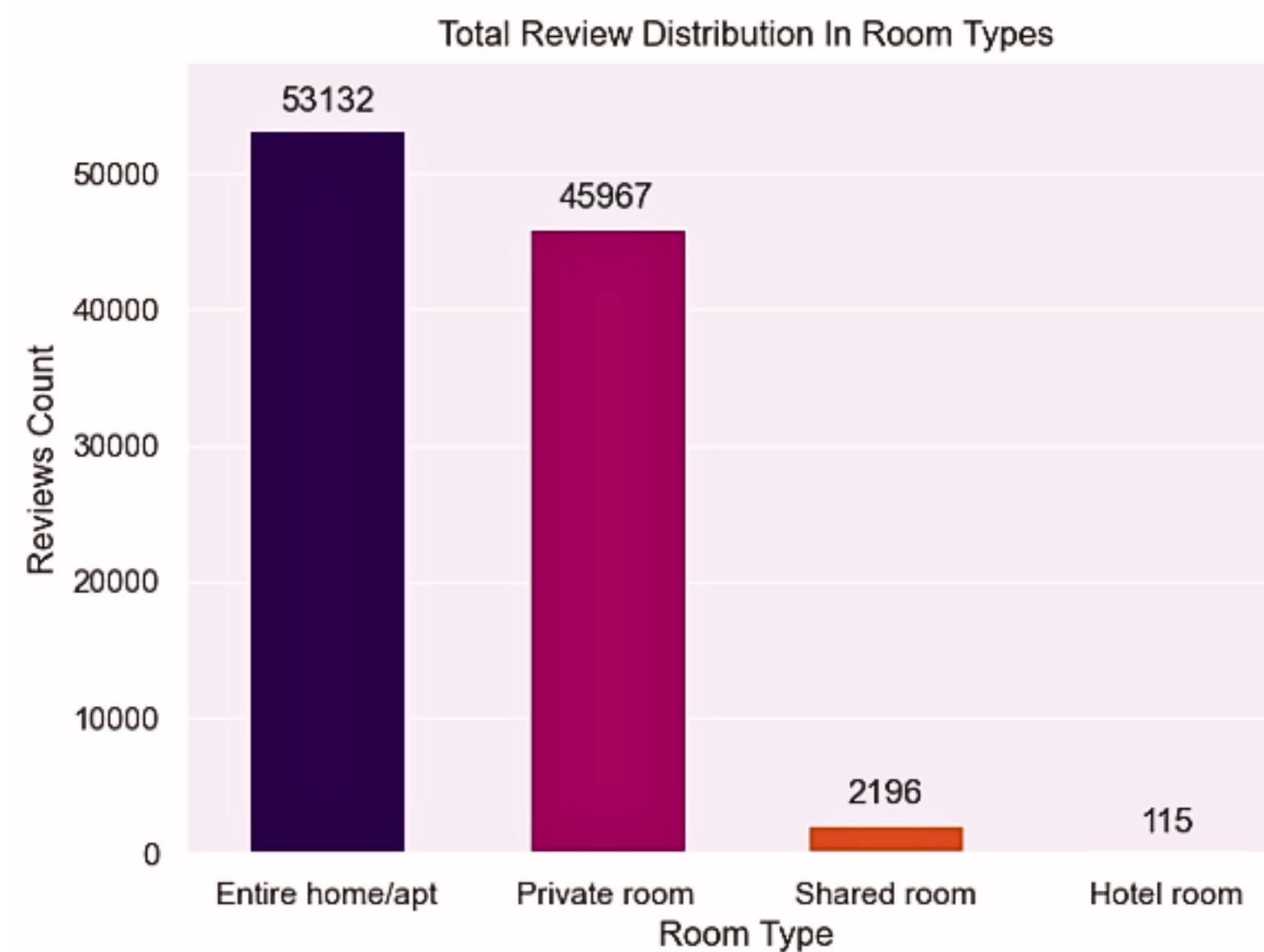
This bar chart, displays the total count of reviews for Airbnb listings across five different neighbourhood groups: Manhattan, Brooklyn, Queens, Bronx, and Staten Island.

- Manhattan has the highest total number of reviews, with 43,305 reviews.
- Brooklyn follows closely as the second-highest, with 41,364 reviews, indicating very similar review activity to Manhattan.
- Queens has significantly fewer reviews than Manhattan and Brooklyn, with a total of 13,120 reviews.
- Bronx shows a much lower review count at 2,678 reviews.
- Staten Island has the fewest reviews among all groups, with only 943 reviews.
- The chart clearly indicates that the vast majority of review activity, and likely listing engagement, is concentrated in Manhattan and Brooklyn and others needs to improve their room services and overall customer experience for better reviews.

2

# Reviews In Room Type

We'll explore how total reviews are distributed among various room types to identify which ones receive the highest engagement.



## EXPLANATION

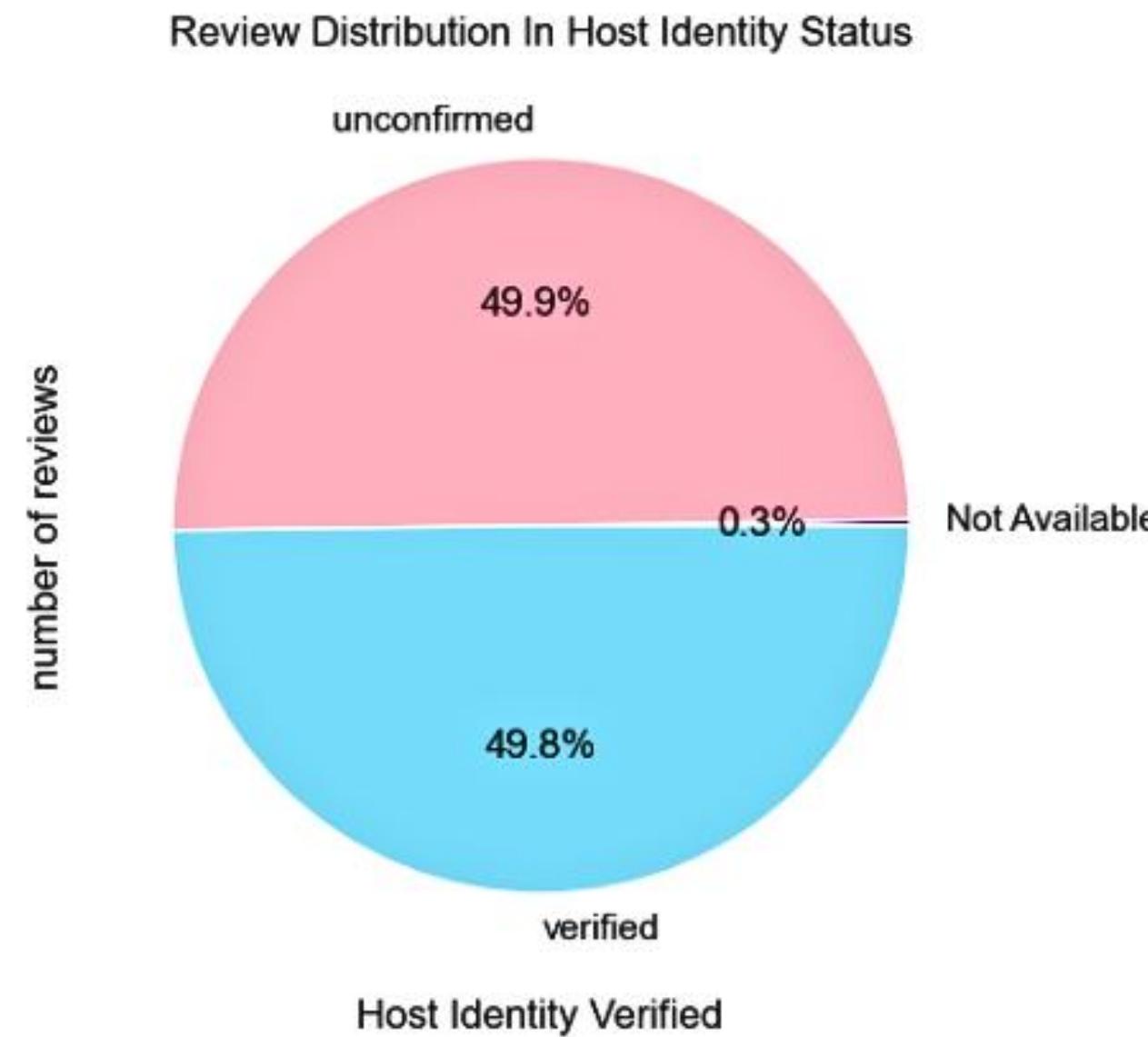
This bar chart, titled "Total Review Distribution In Room Types," displays the total count of reviews for Airbnb listings categorized by room type: Entire home/apt, Private room, Shared room, and Hotel room.

- Entire home/apt listings have the highest total number of reviews, with 53,132 reviews.
- Private rooms are the second most reviewed room type, with 45,967 reviews, indicating a high level of engagement.
- Shared rooms have significantly fewer reviews compared to the first two categories, totaling 2,196 reviews.
- Hotel rooms have the fewest reviews among all types, with only 115 reviews.
- The chart clearly shows that "Entire home/apt" and "Private room" listings dominate the review landscape, suggesting they are the most frequently booked or generate the most feedback from guests, while "Shared room" and "Hotel room" account for a very small fraction of the total reviews.

3

# Reviews In Room Type

Now we will examine the distribution of reviews based on host identity status to understand how host verification correlates with review counts.



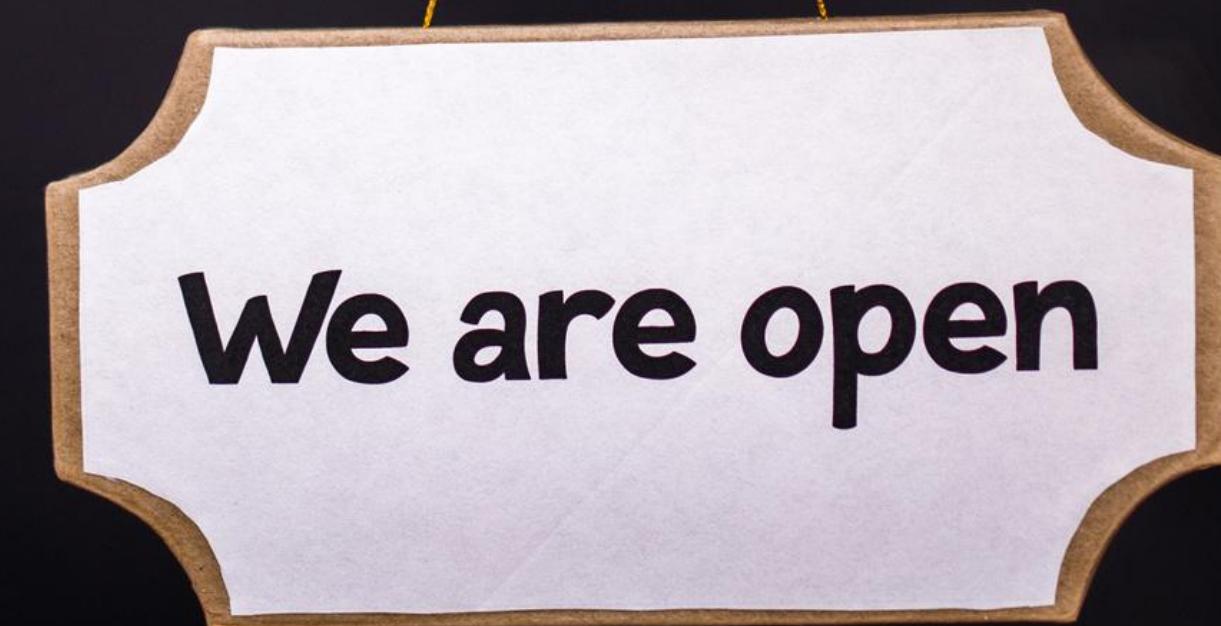
## EXPLANATION

This pie chart, titled "Review Distribution In Host Identity Status," illustrates the proportion of reviews based on whether the host's identity is "unconfirmed," "verified," or "Not Available."

- The reviews are almost evenly split between hosts whose identity is unconfirmed (49.9%) and those whose identity is verified (49.8%). This indicates that roughly half of the total reviews are associated with unconfirmed hosts, and the other half with verified hosts.
- A very small percentage of reviews, 0.3%, are associated with hosts where the identity status is "Not Available."
- The chart suggests that, in terms of review volume, there isn't a strong bias towards either confirmed or unconfirmed host identities; both categories receive a substantial and nearly equal share of reviews.
- Also suggest those host's listing which are not verified 49.9% should be verified.

# AA

## AVAILABILITY ANALYSIS

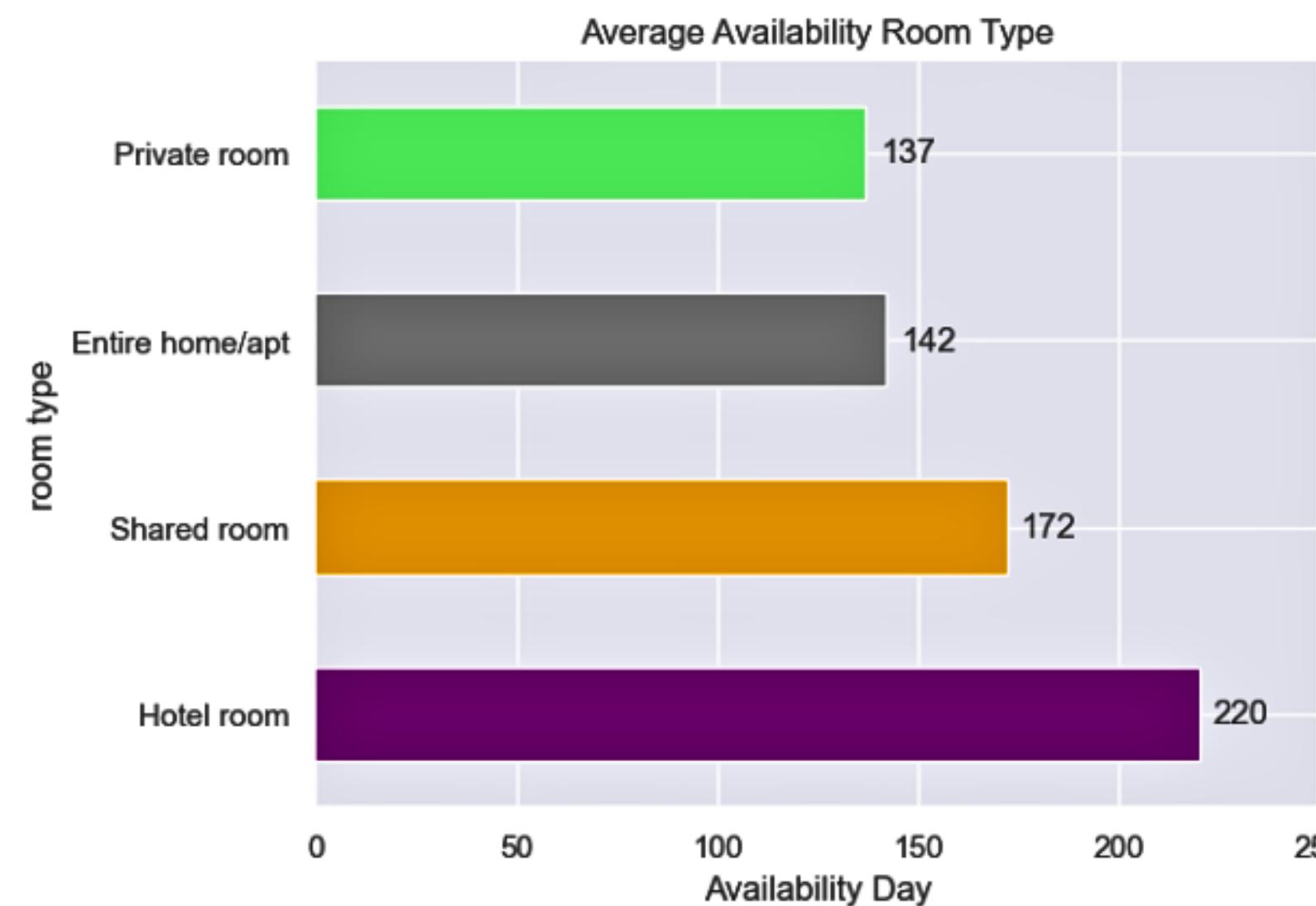




1

# Room Availability

Analyzing average daily availability by room type to identify those most often bookable."



## EXPLANATION

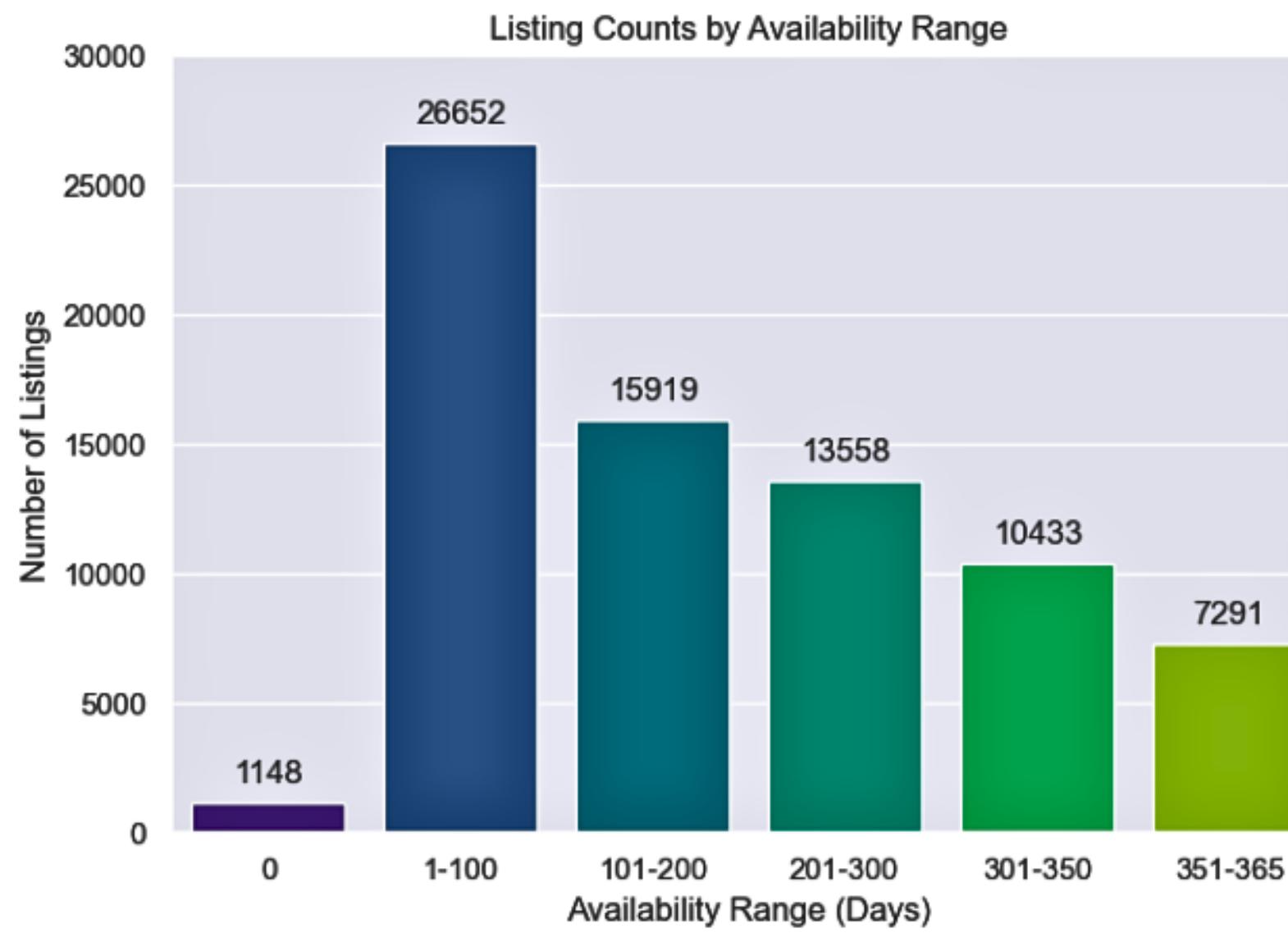
This horizontal bar chart displays the average number of days (out of 365) that different room types are available for booking.

- Hotel rooms have the highest average availability, with approximately 220 days available per year.
- Shared rooms come next, with an average availability of 172 days.
- Entire home/apt listings have an average availability of 142 days.
- Private rooms show the lowest average availability among the listed types, with 137 days available per year.
- The chart indicates a clear hierarchy in availability, with commercial-style "Hotel rooms" being available significantly more often than shared or private residential listings.

2

# Room Availabilities

Analyzing listing volumes across availability segments to reveal distribution patterns.



## EXPLANATION

This bar chart, titled "Listing Counts by Availability Range," displays the number of Airbnb listings categorized by their availability in days over a year.

- The highest number of listings, 26,652, fall within the 1-100 days availability range, indicating that a large portion of listings are available for a relatively short period annually.
- The next largest group is in the 101-200 days range, with 15,919 listings.
- This is followed by 13,558 listings in the 201-300 days range.
- There are 10,433 listings available for 301-350 days.
- A significant number of listings, 7,291, are available for almost the entire year, falling into the 351-365 days range.
- The fewest listings, 1,148, are those with 0 days of availability, meaning they are never available for booking in the given year.
- Overall, the chart shows a general trend where the number of listings decreases as the availability range increases, with the majority of listings being available for less than 200 days.

3

# Zero Availability Room Listings

Availability analysis highlighting the proportion of non-bookable listings.



## EXPLANATION

This pie chart, titled "Listings with 0 Availability," illustrates the distribution of listings based on whether they are "Available" or "Not Availability" (implying 0 days of availability).

- The vast majority of listings, 77.1%, are categorized as "Available." This suggests that most listings in the dataset are potentially bookable.
- A notable portion of listings, 22.9%, are marked as "Not Availability" (meaning 0 days of availability). This indicates that nearly a quarter of the listings are not available for booking at all within the 365-day period.
- The chart highlights that while most listings are available, a significant segment exists that contributes to the total listing count but cannot be booked, which could impact overall market supply, revenue as well as bookings.

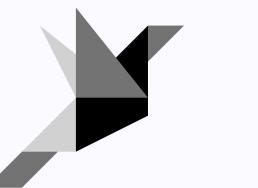


Rahul Sharma

## Recommendations

# Optimising Your Hospitality Business

Actionable strategies for increased bookings, revenue, and guest satisfaction.

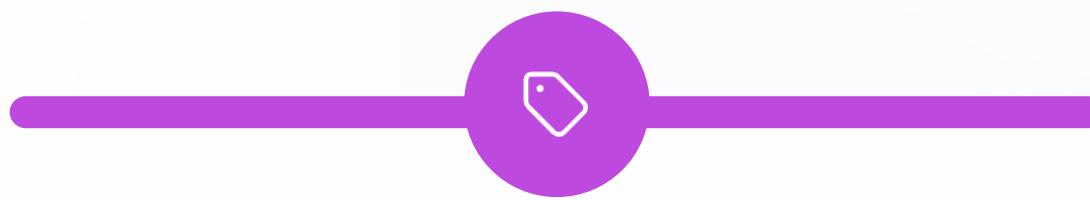




## UNLOCKING REVENUE POTENTIAL

# Tackling Low Occupancy in Hotels & Shared Rooms

While private rooms and entire homes currently dominate the market, hotels and shared rooms face lower bookings and reviews. This presents a clear opportunity for strategic intervention.



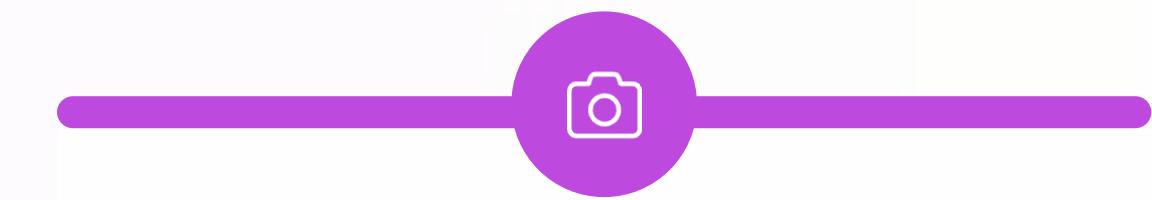
### Dynamic Repricing

Implement flexible pricing strategies and seasonal discounts during off-peak periods to attract more bookings.



### Bundle & Promote

Offer bundled services like complimentary breakfast or local guides. Highlight shared rooms for budget-conscious travellers and backpackers.



### Enhance Visuals

Invest in professional photography and compelling descriptions to make less popular room types more appealing to potential guests.



## OPTIMISING PRIVATE ROOM INCOME

# Maximising Revenue for Private Rooms

Despite their popularity, private rooms often yield lower annual revenue compared to other accommodation types. We can change this with targeted strategies.

### Smart Pricing

- 1 Utilise dynamic pricing tools to adjust rates based on demand, ensuring optimal revenue during peak seasons.

### Flexible Stays

- 2 Optimise minimum stay requirements to attract more bookings, especially for shorter trips.

### Host Upgrades

- 3 Encourage hosts to enhance amenities like Wi-Fi and flexible cancellation policies to justify premium pricing.



Expanding visibility is crucial. Advise private room hosts to cross-list their properties on multiple platforms to reach a wider audience and increase booking opportunities.



## DRIVING GUEST ENGAGEMENT

# Boosting Reviews in Under-Represented Boroughs

Manhattan and Brooklyn currently dominate listings and reviews. We need to focus on Queens, The Bronx, and Staten Island to ensure a balanced market.



## Localized Marketing

Promote the unique local attractions and cultural experiences available in Queens, The Bronx, and Staten Island to generate interest and bookings.



## Guest Engagement

Implement targeted campaigns, including follow-up emails and incentives like discounts, to encourage guests to leave reviews.



## Host Quality

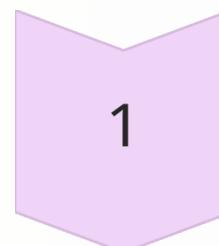
Provide comprehensive training and guidelines for hosts in these areas, focusing on enhancing the overall guest experience.



## ENHANCING VISIBILITY & AVAILABILITY

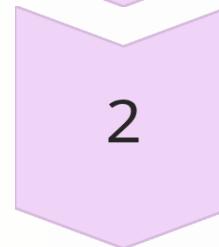
# Addressing Market Concentration and Zero-Availability Listings

A single host, 'Laura', holds nearly half of the top listings. Additionally, a significant portion (22.9%) of listings have zero availability, hindering booking opportunities. This indicates a need to democratise the platform and improve overall listing management.



### 1 Increase Availability

Encourage hosts to open their calendars for more days, particularly during high-demand seasons, to maximise booking opportunities.



### 2 Targeted Pricing

For listings with high availability but low bookings, suggest slight price reductions or long-stay discounts to attract more guests.



### 3 Review Boost

Implement strategies to encourage early reviews for new listings, as more reviews typically lead to increased bookings.



### 4 Promote Smaller Hosts

Introduce features like "New & Verified Hosts" to provide exposure to new hosts and diversify market offerings.



### 5 Audit & Clean

Regularly audit and remove inactive or zero-availability listings to improve platform credibility and user experience.



## STRATEGIC GROWTH

# Key Takeaways & Next Steps

To secure sustainable growth and maximise profitability, focus on diversifying revenue streams, improving host performance, and enhancing guest experience.

### Additional Revenue Streams

Introduce optional paid add-ons like room service, cleaning, or airport pickup to significantly increase average revenue per booking.

### Loyalty & Referrals

Implement loyalty points or referral discounts to encourage repeat bookings and enhance customer stickiness.

### Host Education

Provide ongoing training for hosts on pricing, review management, photo quality, and guest handling to elevate overall service standards.

### Mobile Optimisation

Continuously optimise the mobile app experience with features like last-minute deals and real-time chat, as most bookings occur on mobile.



# Conclusion

## Strategic Insights for Airbnb Hotel Listings

### Identify Booking Challenges.

Uneven availability, pricing mismatches, and review gaps impact occupancy and revenue.

### Data-Driven Recommendations.

Dynamic pricing, improved visuals, host education, and platform audit for zero-availability listings.

### Target Underrepresented Boroughs.

Focus on Queens, Bronx, and Staten Island via localized marketing and improved guest experience.

### Boost Platform Trust.

Increase visibility for smaller hosts, promote verified listings, and encourage early reviews.

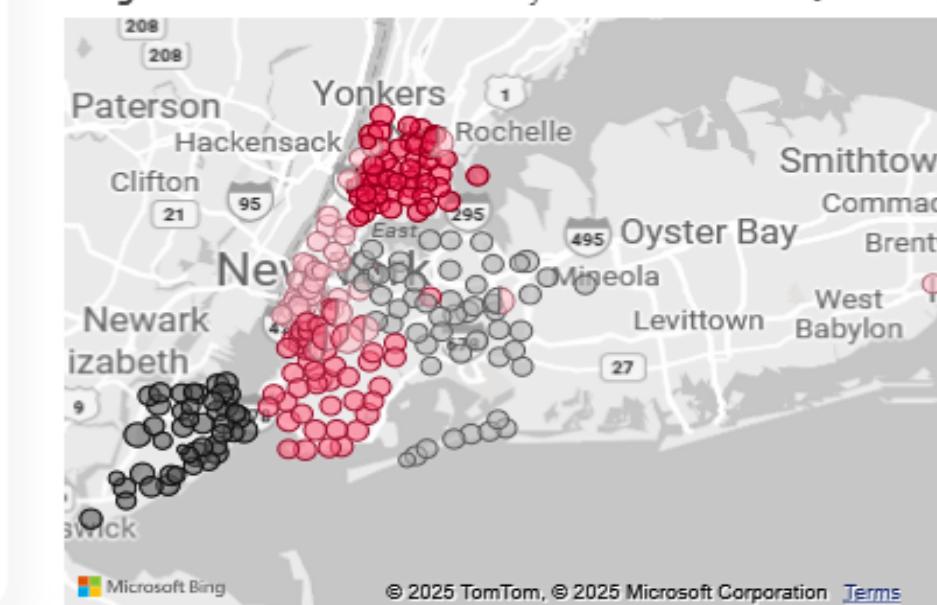
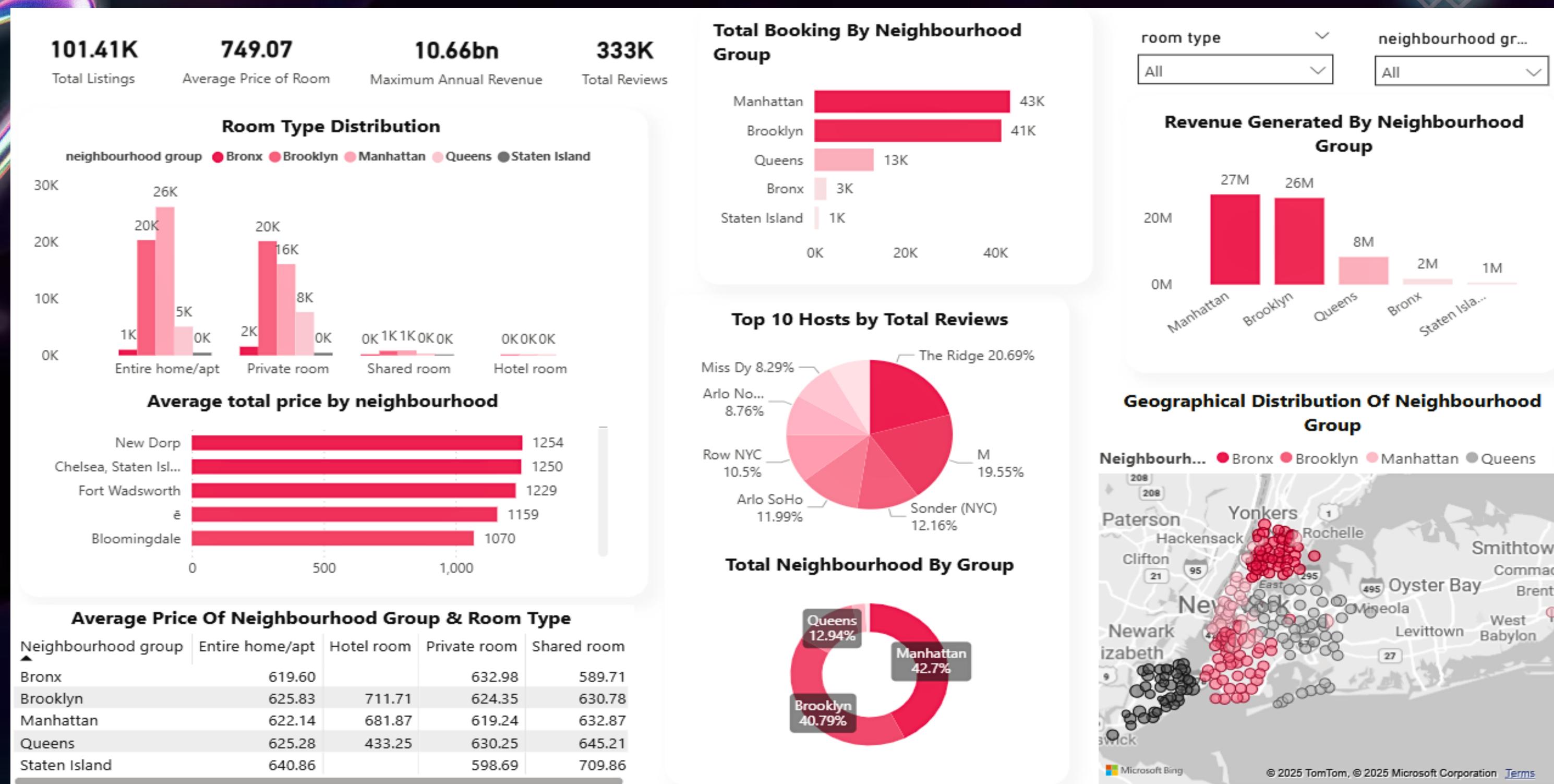
### Enable Scalable Growth.

Leverage flexible pricing, seasonal strategies, and mobile optimization for broader engagement



# AIRBNB HOTEL LISTINGS DASHBOARD

Insights Across NYC Boroughs



# DASHBOARD OVERVIEW



This Power BI dashboard visualizes the performance landscape of 101K+ Airbnb listings across New York City. It highlights key metrics including average room price (\$749), total annual revenue (\$10.66B), and borough-level booking trends. Visuals showcase room type distribution, top hosts by reviews, pricing insights by neighborhood, and geospatial listing patterns—revealing the booking dynamics, pricing disparities, and host dominance that shape the platform's hospitality ecosystem.

## Highlights

- Most Popular Room Type
- Highest Annual Revenue
- Listings Map View
- Top Hosts
- Pricing Variance
- Total Bookings

# OUR PROJECT

This analysis uncovered key patterns impacting revenue, especially for hotel and shared rooms. We've built recommendations rooted in data—from pricing to visibility—designed to unlock growth and improve the overall guest experience. With these strategies, Airbnb hotel listings can move from reactive fixes to proactive success.





Rahul Sharma

# THANK YOU

FOR YOUR ATTENTION



**Presented By :** Rahul Sharma

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