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ITD112 - Final Project
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Project Objectives

1. Develop an interactive and insightful dashboard using the Albany Airbnb dataset.
2. Create a dashboard with a heatmap, allowing users to interact with the map to select Airbnb listings in the area, with filter options for refined searches.
3. Add a counter to display average metrics within the dashboard.
4. Enable comparison of individual listings to other listings and to overall averages.
5. Analyze trends in the dataset, including pricing, availability, property characteristics, and guest feedback, to answer the following questions:
    a. What are the sentiments expressed in guest reviews?
    b. Do factors such as location or neighborhoods influence pricing?
    c. Are there peak pricing periods, or do prices fluctuate on specific dates?

Dashboard Design

The index template features a clustered map visualization with popups, allowing users to explore Albany's listing distribution while reducing clutter by grouping nearby markers. An interactive legend with custom icons helps users quickly differentiate property types on the map. Summary cards provide quick market insights, displaying average values for price, bedrooms, bathrooms, and beds. Above the map, a two-column filter form enables users to refine search criteria with a JavaScript function ensuring necessary inputs are complete, particularly for availability filters. Additionally, a dedicated card highlights the cheapest listing for quick access to budget-friendly options, while each marker's popup includes essential details and a link to more information, creating a seamless flow from overview to specific listings.

This dashboard also includes several comparison and analysis tools. A Compare Listings section uses radar charts, progress bars, and tables to visualize differences across key property attributes, helping users quickly assess how listings stack up against each other. Scatter plots and histograms provide further insights, showing price distribution, room counts, and other metrics to reveal market trends. A Calendar Analysis integrates line and Gantt charts to track listing availability over time, making it easy to plan around peak and off-peak times. Finally, Location Analysis with box plots and averages enables a detailed view of listing attributes by area, giving users insight into neighborhood trends and comparisons. These visualizations deepen the user's ability to explore and compare listings by key attributes, availability, and location.

Insights and Findings:

The sentiments expressed in guest reviews are predominantly *Very Positive*, as indicated by the high count in the sentiment distribution bar chart. This trend is further supported by the yearly sentiment breakdown, which shows *Very Positive* reviews have consistently been the most common over time, with a steady increase in review counts in recent years. While other sentiments such as *Positive*, *Neutral*, *Negative*, and *Very Negative* are present, they are significantly less frequent, suggesting an overall high level of guest satisfaction. Furthermore, the comparison chart highlights that the listing sentiment average slightly exceeds the overall sentiment average, reinforcing the generally positive sentiment in guest reviews.

Shifting focus to pricing, the majority of listings fall within the $51 to $150 range, which appears to be the sweet spot in the rental market. Properties in this pricing tier attract the most bookings, balancing affordability and quality to meet traveler expectations. On the other hand, listings priced above $200 cater to a more exclusive audience, resulting in reduced demand for these higher-tier properties.

Turning to price changes over time, the analysis of the price changes summary, as well as the plotted daily and monthly average prices, indicates remarkable stability in the rental market. Most listings show a *price_change* of 0.0, signifying that the starting and ending prices, as well as the minimum and maximum prices, remained consistent throughout the observed period. Similarly, daily and monthly average price trends reveal no significant spikes or seasonal patterns, suggesting a non-seasonal market or a fixed pricing strategy across listings.

When analyzing *Price Distribution by Neighbourhood*, it becomes clear that location significantly influences pricing. Each neighborhood (or ward) displays a distinct price range and median price, with certain neighborhoods exhibiting broader price ranges and higher medians. For instance, the *Fourteenth Ward* and *Fifteenth Ward* stand out with higher median prices and more varied pricing, indicating these areas are more expensive or cater to diverse market segments. In contrast, neighborhoods such as the *Third Ward* and *Sixth Ward* exhibit lower medians and tighter distributions, pointing to more consistent and potentially lower pricing.

Delving deeper, factors such as proximity to business hubs, attractions, and safety drive pricing differences. For example, the *Fifteenth Ward* emerges as the priciest area, likely due to its exclusivity, luxury amenities, and proximity to major landmarks, making it appealing for travelers seeking upscale accommodations. Conversely, the *Fifth Ward* offers more

affordable options, likely due to its location farther from key attractions and a greater density of budget-friendly listings, catering to cost-conscious travelers.

Finally, the analysis of Albany's short-term rental market reveals predictable trends driven by recurring events, seasonal festivities, and academic schedules. Peaks in unavailable listings during events such as the Adirondack Nationals Car Show, Thanksgiving, and university graduations highlight high-demand periods. These insights present opportunities for hosts to optimize their pricing and marketing strategies. Seasonal festivals and holidays further shape market dynamics, underscoring the importance of early bookings for renters seeking affordable stays.

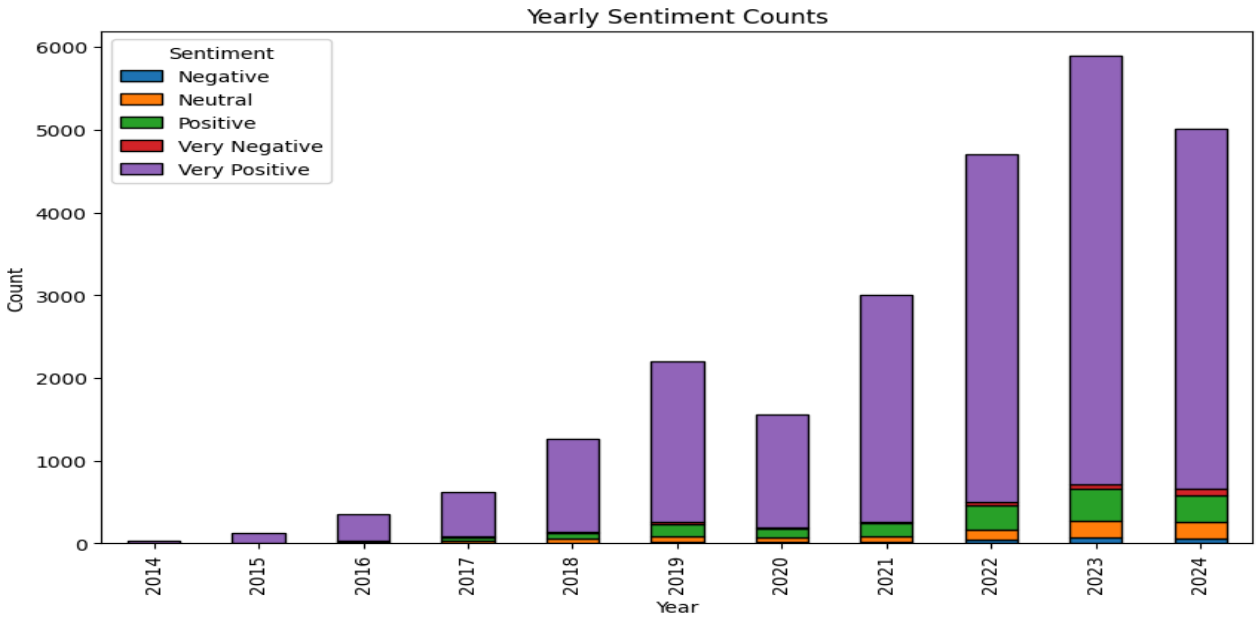
Conclusions

The analysis reveals that **guest reviews are predominantly Very Positive**, indicating high guest satisfaction, with positive sentiment remaining consistent over time. **Pricing, on the other hand, shows no significant fluctuations or seasonal patterns,** suggesting a stable, non-seasonal market or a fixed pricing approach. **Location strongly influences pricing, as certain neighborhoods**, like the **Fourteenth Ward** and **Fifteenth Ward**, have higher median prices and more variability, while others, such as the **Third Ward** and **Sixth Ward**, maintain lower and more consistent prices. To optimize revenue and guest experience, we recommend implementing a **dynamic pricing model** to respond to potential demand changes and using **location-based insights** to market premium and budget-friendly options effectively. The analysis of Albany's short-term rental market reveals **predictable trends** driven by **recurring events, seasonal festivities, and academic schedules**. **Peaks in unavailable listings during events like the Adirondack Nationals Car Show, Thanksgiving, and university graduations**

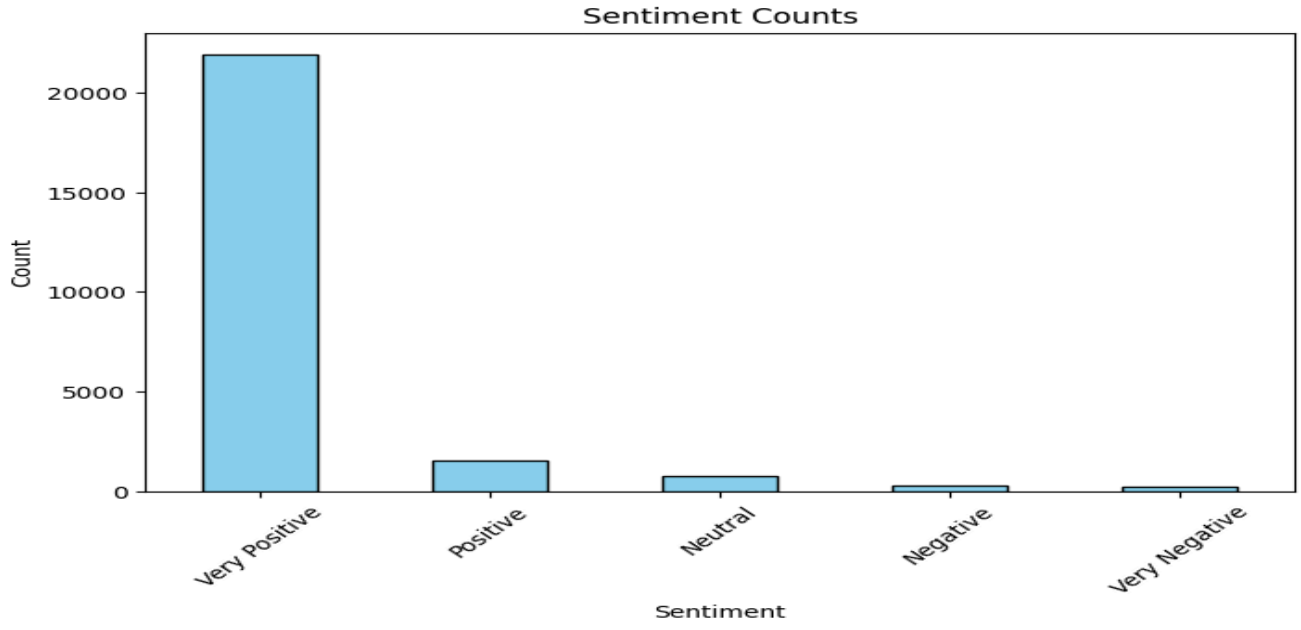
Additionally, applying **Apriori and Association Rule Mining** could reveal common guest preferences, enabling tailored amenity packages or recommendations. Advanced NLP models could also enhance sentiment analysis by identifying specific areas of guest feedback, helping to further improve satisfaction. Lastly, there are more analyses made aside from this and are available in the dashboard such as property type relation to neighborhood. Moreover,

Appendices

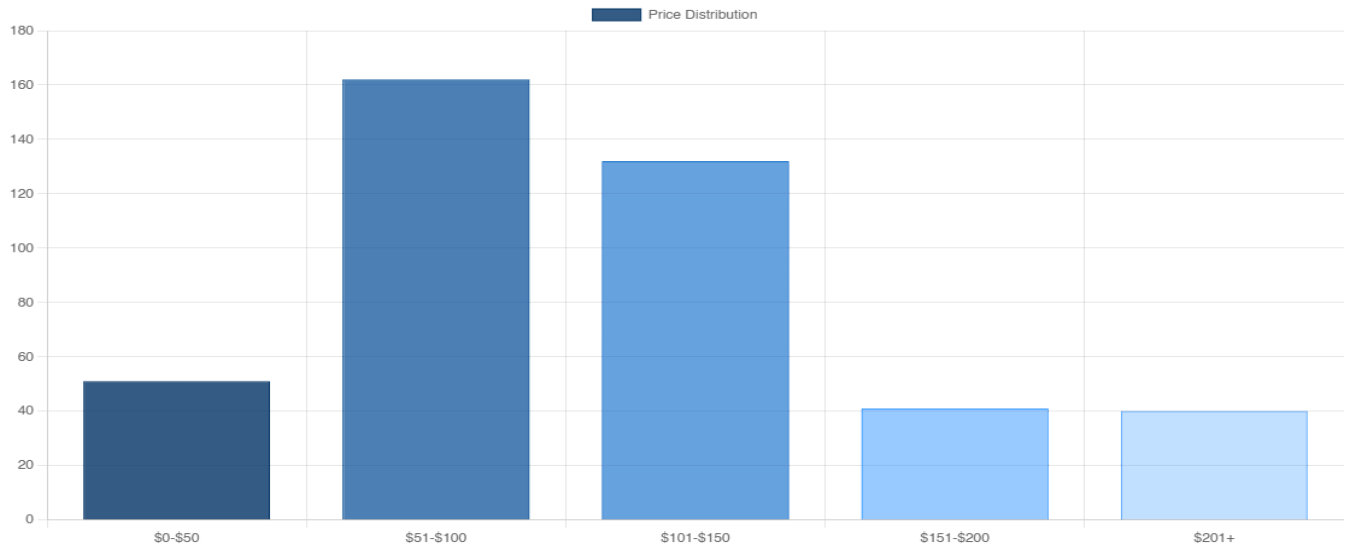
Yearly Sentiment Counts



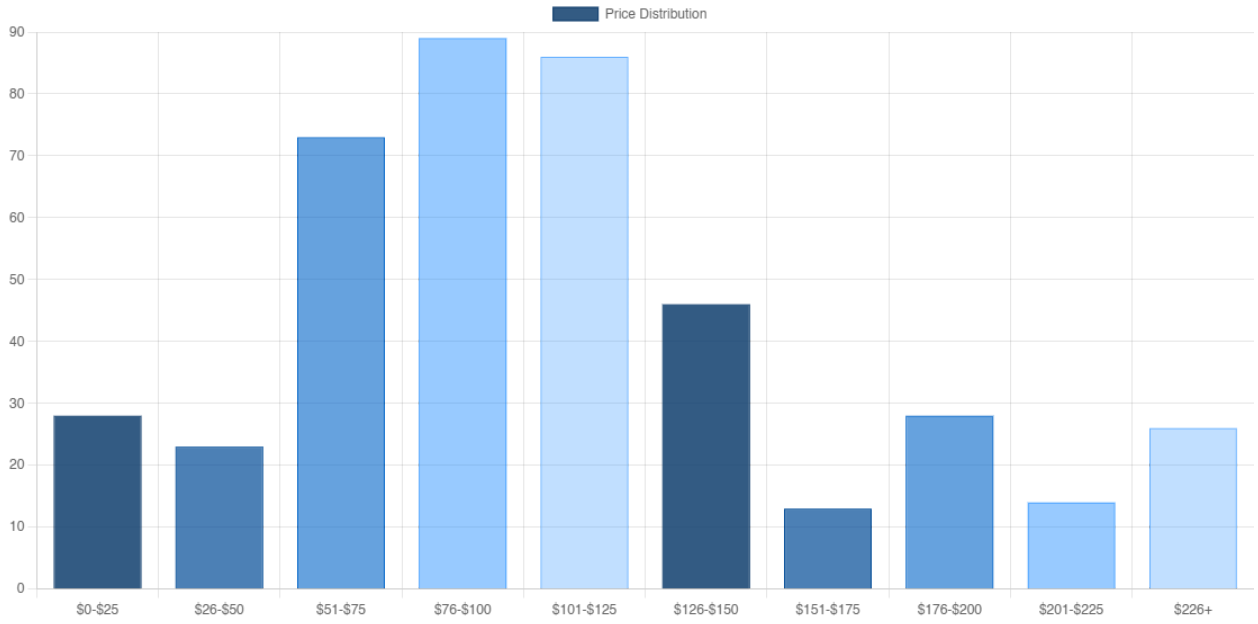
Sentiment Distribution Table



Price Distribution Table (5 bars)

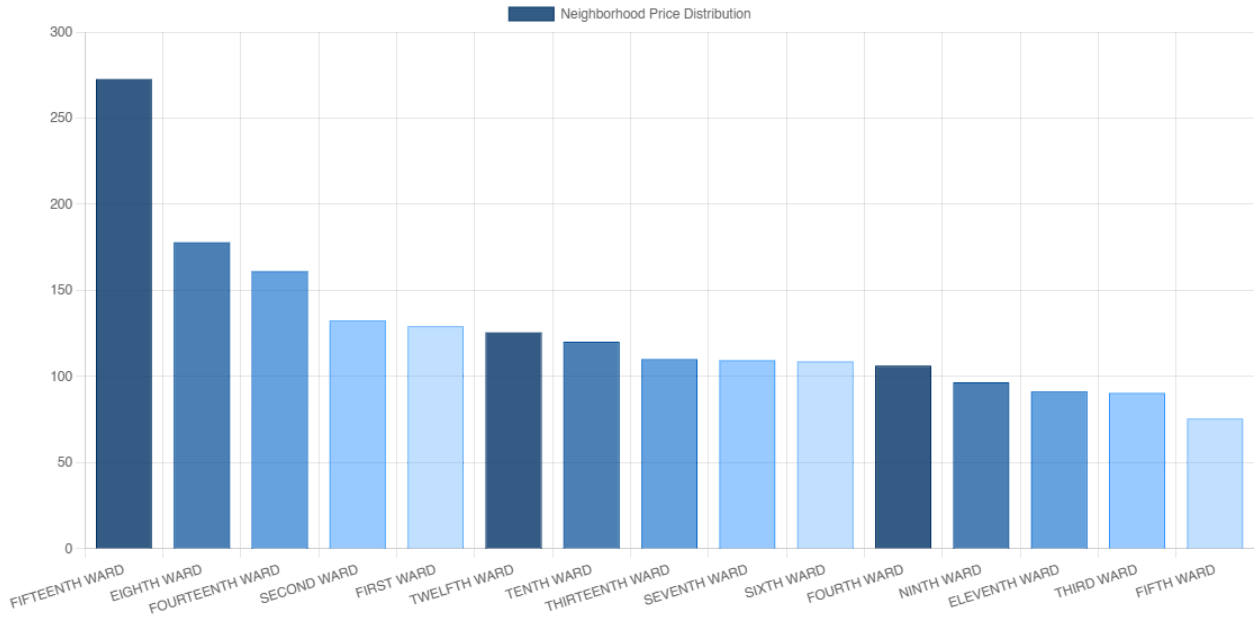


Price Distribution Table (10 bars)

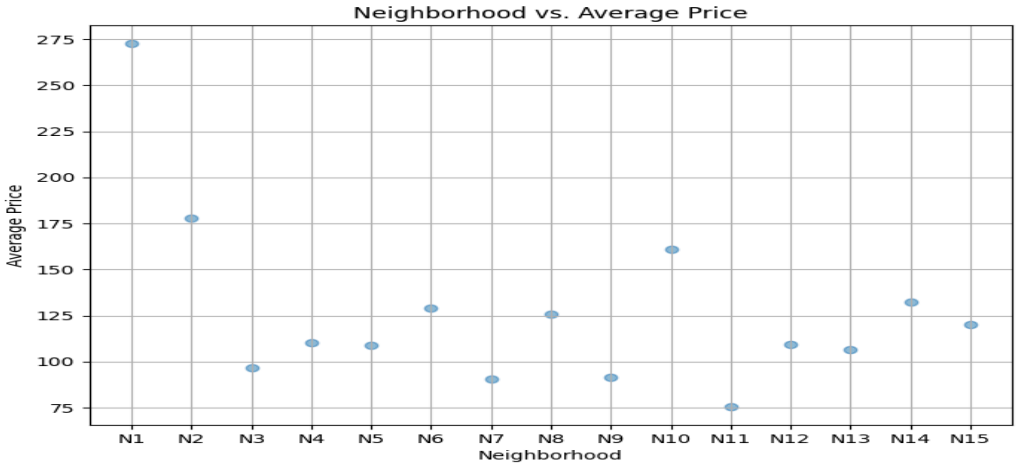


Price Trends Linechart

Neighborhood Price Distribution



Neighborhood vs Average Price



Availability and Unavailability Trends