

Data Visualizations of Apartments for Rent in USA

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I. INTRODUCTION

Exploring apartment rental data holds paramount importance within the real estate landscape, especially considering the industry's substantial economic footprint and consistent growth trajectory. Presently valued at \$176.8 billion, the apartment rental sector has demonstrated steady expansion, with a notable 1.3% growth recorded thus far this year and a projected annual growth rate of 3.5% [1]. This growth is underscored by significant increases in rental rates observed over the past decade, culminating in an average asking rent of \$2,016 monthly. Notably, a significant portion of the population, accounting for 35% of households, opts for rental properties, emphasizing the sector's vital role in meeting housing needs [1]. Against this backdrop of robust growth and increasing rental rates, exploring apartment rental data through comprehensive analysis becomes imperative. By delving into rental data, stakeholders can gain valuable insights into pricing trends, regional variations, and factors influencing rental affordability, thereby informing strategic decision-making processes and fostering a more equitable housing landscape. Therefore, the goal of this report is to utilize multiple data visualizations for exploratory analysis to uncover potential relationships among attributes to grasp a stronger comprehension of the rental market in the United States.

II. DATA DESCRIPTION

The dataset utilized for this data visualization exploration comprises apartment rental advertisement descriptions in the United States from 2019, totaling 100,000 rental entries and encompassing 22 attributes [2]. This dataset has been used for clustering to discover new features, regression for the square feet or price, recommendation systems, and geo data analysis. Given the dataset's substantial size, leveraging data visualization proves highly advantageous, as visual representations enable easier comprehension compared to raw numerical data tables. Table I below delineates the attributes, their data types, example values, and descriptions. Notably, the dataset comprises eight numeric attributes, which serve as the measure values, and 14 categorical attributes, serving as dimensions. The "Id" attribute functions as a unique identifier for each rental instance, ensuring data integrity and traceability. The "Category" attribute categorizes listings into distinct housing classifications, facilitating segmentation and analysis. "Bathrooms," "Bedrooms," "Price," and "Square feet" offer quantitative measures, aiding in property characterization and comparison. Categorical attributes like "Currency," "Fee," "Pets allowed," "Price type," "Cityname," and "State" provide insights into pricing structure, location, and amenities available. The "Time" attribute serves as a timestamp indicating when each rental advertisement was created, enabling temporal analysis of market trends. Additionally, the "Amenities" attribute offers valuable information on features and facilities, influencing tenant preferences and satisfaction levels.

TABLE I. DATA ATTRIBUTES

Attribute	Type	Example Value	Description
Id	Categorical	5668640009	Unique identifier for apartment
Category	Categorical	Housing/renting/a partment	Category of classified
Title	Categorical	One BR 507 & 509 Esplanade	Title text of apartment
Body	Categorical	This unit is located at 507 & 509 Esplanade, Redondo Beach, 90277, CA Monthly rental rates range from \$2195. We have 1 beds units available for rent	Body text of apartment description

Attribute	Type	Example Value	Description
Amenities	Categorical	AC, cable, internet	Features and facilities that contribute to convenience
Bathrooms	Numeric	2	Number of bathrooms
Bedrooms	Numeric	2	Number of bedrooms
Currency	Categorical	USD	Type of currency
Fee	Categorical	Yes	Fee
Has photo	Categorical	Photo	Photo of apartment
Pets allowed	Categorical	Yes, no, dogs, cats	What pets are allowed
Price	Numeric	1500	Rental price of apartment
Price display	Numeric	\$1500.00	Price converted to display for readers
Price type	Categorical	Weekly, monthly	Pricing method
Square feet	Numeric	978	Square footage of apartment
Address	Categorical	146 Lochview Ln	Address of apartment
Cityname	Categorical	Raleigh	City that the apartment is located
State	Categorical	NC	State that the apartment is located
Latitude	Numeric	33.8520	Latitude of apartment
Longitude	Numeric	-118.3783	Longitude of apartment
Source	Categorical	RentLingo	Origin of classified
Time	Numeric	1577360355	When classified was created as a timestamp

III. METHODOLOGY AND RESULTS

Tableau was utilized to develop the data visualizations to further explore this dataset. The dataset was imported, and the first area to be explored was the square footage of the apartments and their pricing. This was created to gain a general insight into how much rent is costing per square foot. Fig. 1 below shows the correlation between the square footage of the apartments and their price in USD. This was created by creating a scatter plot with sum of square feet and sum of price, and the detail are shown for Id. The view is filtered on Id and sum of price. The Id filter excludes 5315021593, 5666447277, and 5668662559 because those were outliers. The sum of price filter keeps non-Null values only. A trendline was added for further emphasis on the positive correlation between the square footage and the price of the apartments which was to be expected. The blue circles were used for this scatter plot in order to create contrast with the white background. The size of the circles was also reduced to a medium size so there was limited overlap of the data points without limiting the visibility of the datapoints.

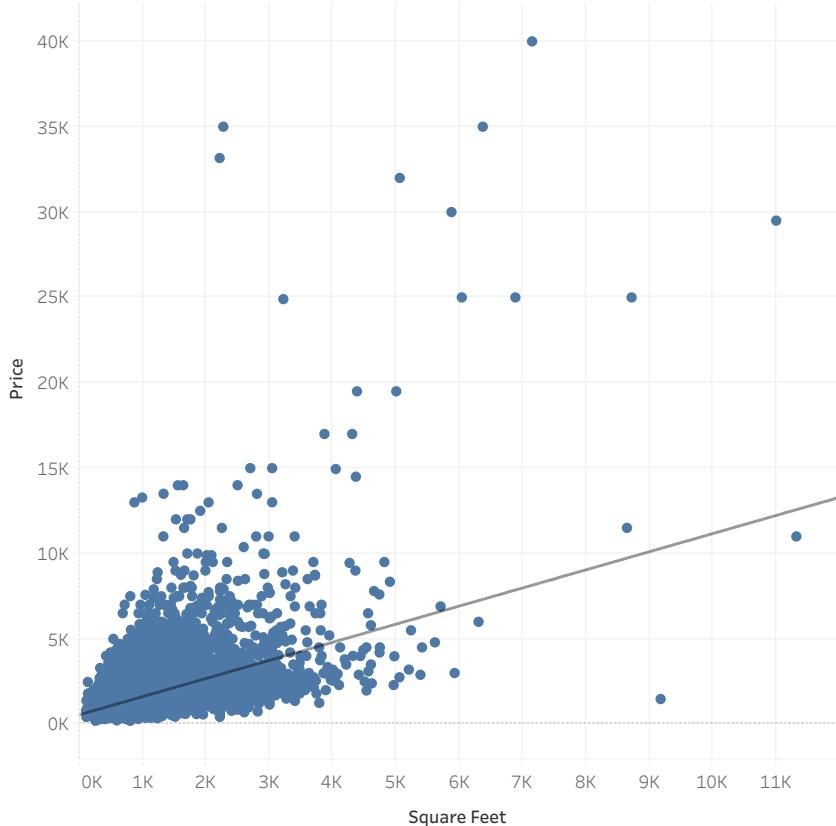


Fig. 1 Square Feet vs. Price

Fig. 1 provided a general insight into the cost of an apartment based on its size, but there are other factors to take into consideration, such as location. The next visualization is a geospatial visualization which maps the states based on their average rental price. This can give a general idea if the state has a tendency to have high rent. As seen in Fig. 2, the states such as California and New York tend to have the most expensive rent in the country. The legend shows that the darker the blue is, the more expensive the rent. On the other hand, states including West Virginia and Colorado have low average rent as seen with their light blue-green color.

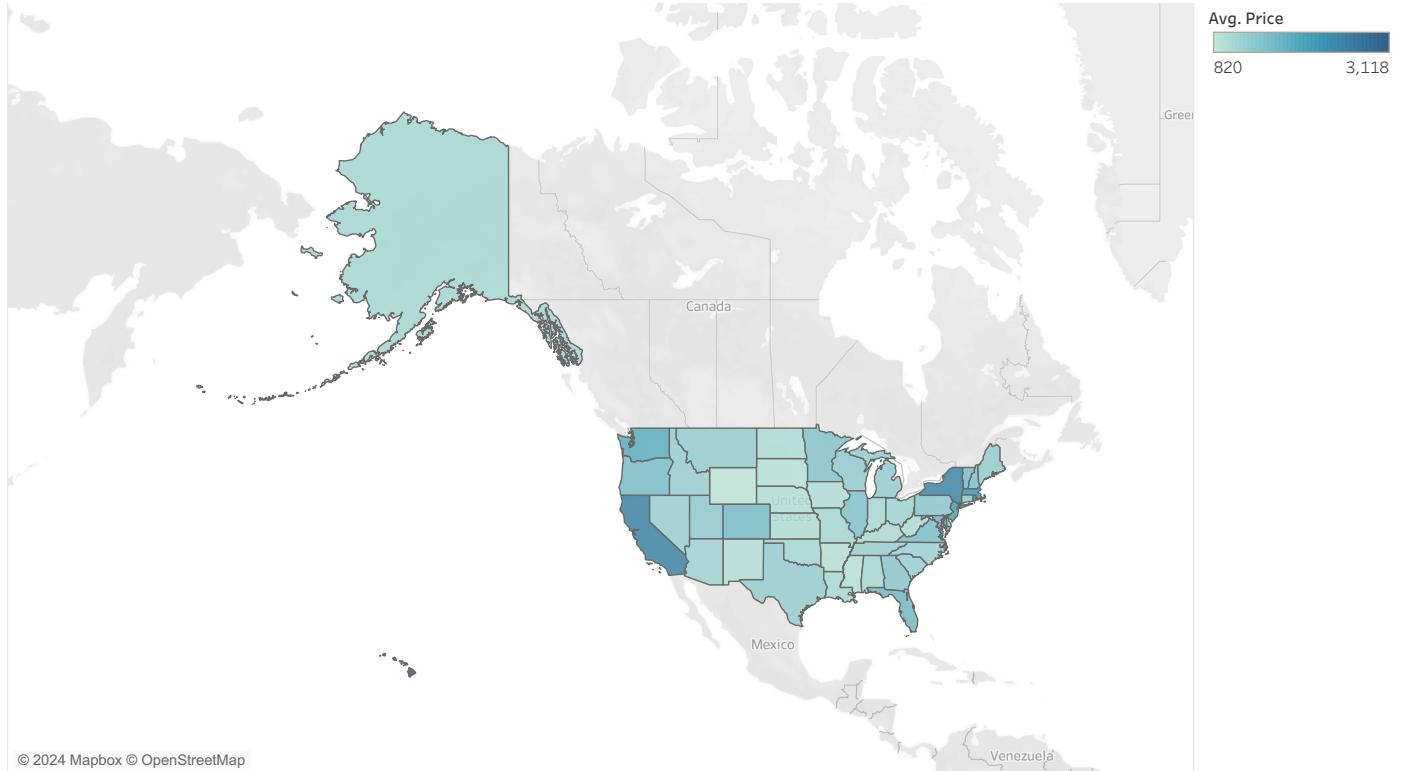


Fig. 2 States Mapped by Price

It should be noted that in Fig. 2, the examination focused on the average prices of rent. The average rent price can be skewed by a state containing larger than average apartments driving up the cost of rent. Therefore, in Fig. 3, the geospatial visualization examines the states mapped by average square footage. This allows us to determine whether New York and California are more expensive because they rent larger apartments or simply because the state is more expensive overall. The findings from Fig. 3 indicate that apartments in California are more expensive due to their location, rather than their size. This same observation holds true for New York as well. Interestingly, West Virginia, which was actually one of the cheaper states for rent, has some of the largest rentals as well, as evidenced by its dark blue color in Fig. 3.

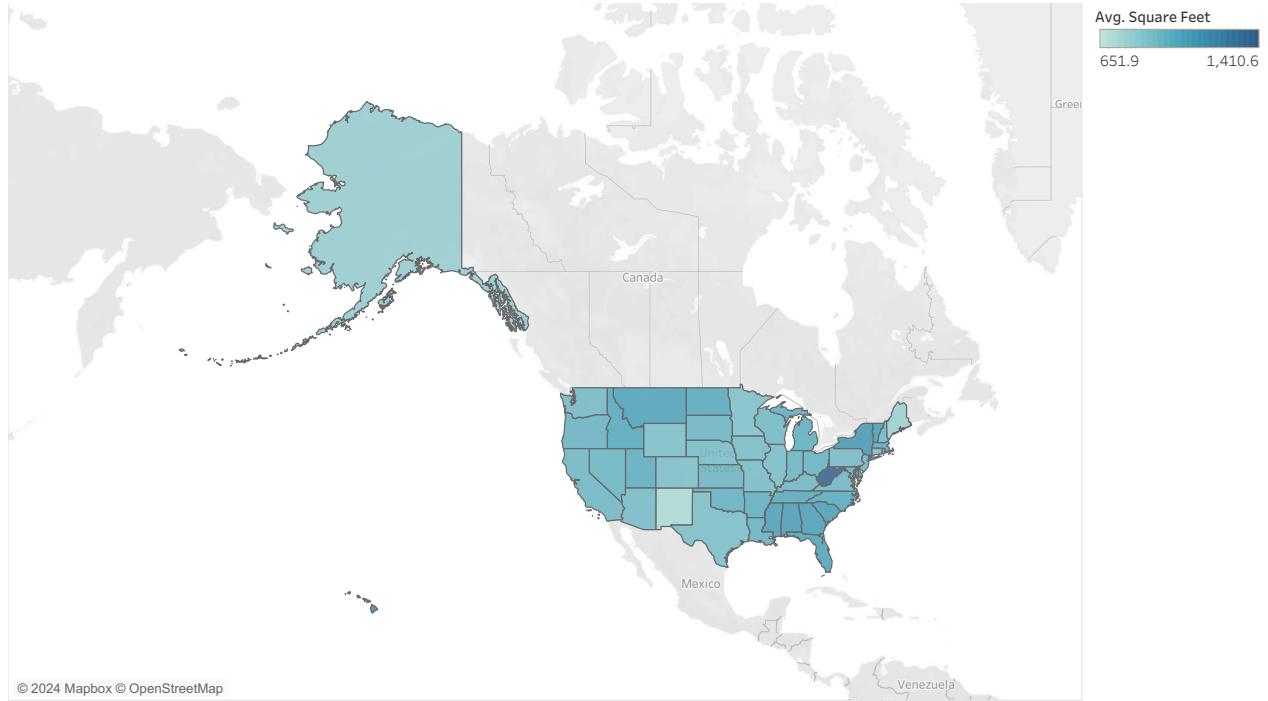


Fig. 3 States Mapped by Square Footage

The next area of exploration was whether or not there was a connection between the size of the apartment and the presence of an apartment fee. The values were combined into groups, so the values were either yes or no. The scatter plot was created for sum of square footage for each fee. The color shows detail about Fee. Details are also shown for Id. The color scheme was chosen to provide contrast. A red-green color scheme was specifically avoided to prevent any red-green color-blind individuals from being unable to interpret the graph. The graph in Fig. 4 shows that the fees are only implemented on the smaller apartments 2K sq. ft or less. However, there are apartments this size that do not have any fees either. All apartments that are greater than 2K sq. ft do not have any fees.

Sum of Square Feet for each Fee. Color shows details about Fee. Details are shown for Id. The data is filtered on average of Square Feet, which ranges from 101 to 50,000.



Fig. 4 Square Footage Vs. Fee

To further investigate, a pie chart was created which shows the price type broken down by the presence or absence of a fee. The view is filtered in fee and price type. The price type filter excludes Null and thumbnail. The price type filter keeps any categorical values. Fig. 5 shows that all of the rentals that have a fee just have a monthly rent payment plus the fee. The apartments that do not have a fee either pay monthly rent, weekly rent, or a monthly/weekly rental payment.



Fig. 5 Fee Vs. Price Type

IV. DISCUSSION

The data visualizations conducted in this exploratory analysis yielded valuable insights into various attributes of apartment rentals in the United States. Through visual examination, it became evident that there exists a positive correlation between the square footage of apartments and their rental prices, as depicted in Fig. 1. Larger apartments tend to command higher rents, aligning with typical pricing practices in the real estate market.

Moreover, Fig. 2 provided a geographical perspective on rental prices across different states, revealing regional disparities in rental affordability. States such as California and New York exhibited higher average rental prices compared to states like West Virginia and Colorado. This geospatial analysis highlighted the influence of location on rental costs.

Further exploration into the relationship between apartment size and associated fees, as shown in Fig. 4, unveiled an interesting trend. Smaller apartments, typically 2K sq. ft or less, tended to have additional fees, while larger apartments exceeding 2K sq. ft generally did not incur such fees. This suggests that property management companies or landlords may implement fees as a proportion of the overall rental cost, particularly for smaller living spaces.

Additionally, the analysis of price types and the presence of fees, as depicted in Fig. 5, provided insights into the payment structures offered by landlords or property managers. Notably, all rentals with fees were associated with monthly rent payments in addition to the fee, while apartments without fees exhibited a variety of payment options, including both monthly and weekly rental terms.

V. CONCLUSIONS

In this report, we took a dataset from a UCI machine which was an accumulation of apartment rental advertisement descriptions from 2019 and created visualizations to conduct exploratory analysis. These visualizations facilitated a deeper understanding of the rental market dynamics, including interplay between apartment attributes such as size, location, amenities, and associated costs.

REFERENCES

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- [2] "UCI Machine Learning Repository." Archive.ics.uci.edu, 2019, archive.ics.uci.edu/dataset/555/apartment+for+rent+classified.