

Airbnb investment in Austin, TX

market analysis and income modeling

DSI course

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Problem statement

- How is the current Airbnb market in Austin?
- How to maximize income in this market?
- What are investment opportunities for short term rentals in Austin?
- Main objectives?
- Who benefits?
- Why is it important?



Our data

- Quarterly scraped Airbnb data
(insideairbnb.com)
- Home price information (Zillow.com\data)
- How did we deal with missing/unavailable info?
 - Data extracted from details, descriptions, and texts
 - Looked at previously scraped data



Our approach

- **Objective:**

Estimate yearly (or quarterly) income

- **How?**

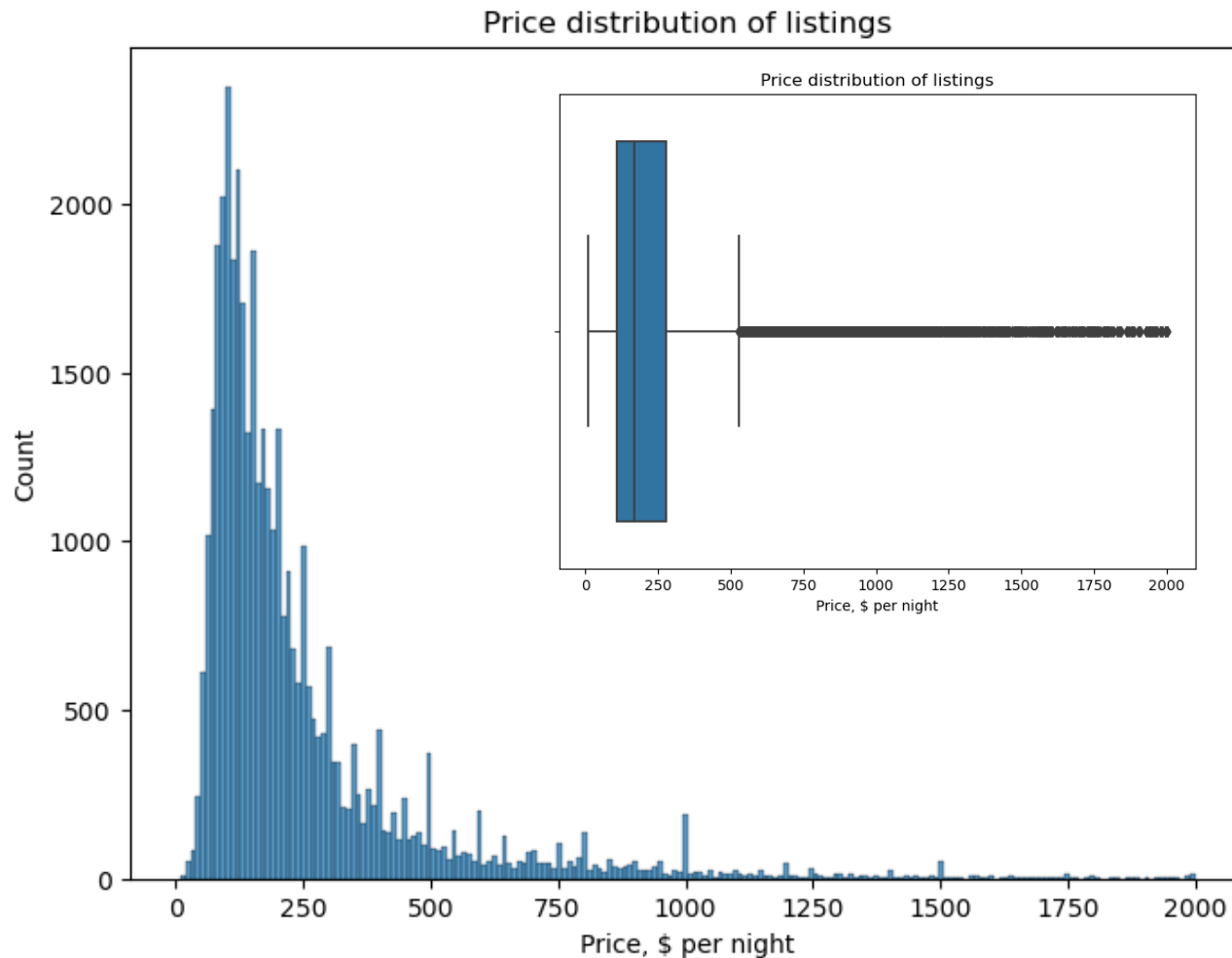
Income = price × occupancy rate × days

- **Target variables:**

- Listing price
- Occupancy rate



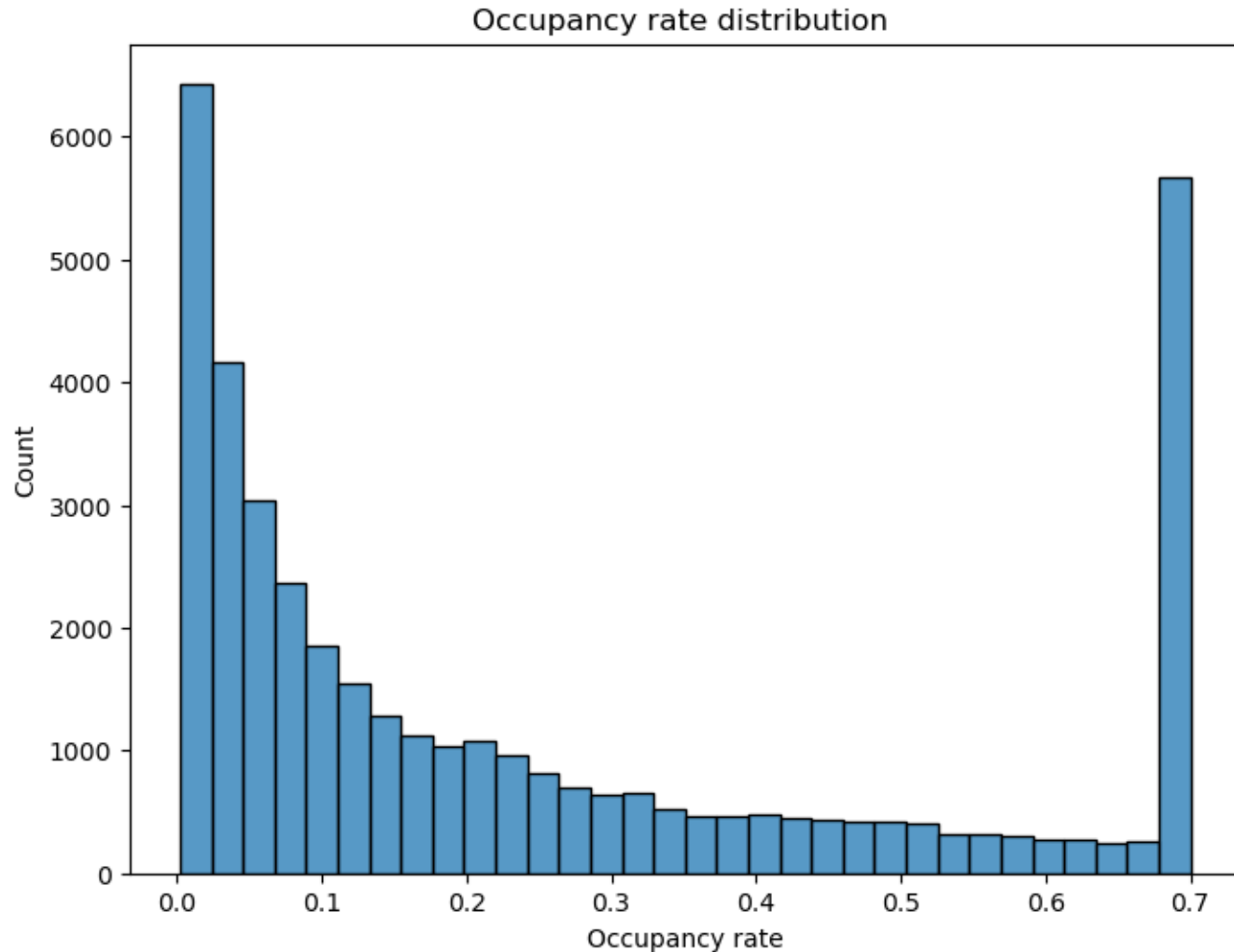
Listing price



- Average = \$280/night
- Min = 1
- Max = \$65k
- Cut-off value: \$2000/night



Occupancy rate



- We estimated it (how?)
- Max set to be 0.7 (why?)
- Average = 0.25
- Challenges:
 - Hard to verify
 - Hard to model (hardly correlated with our features)



What features to use?

Neighborhood
Typical home price



Sweet East Side Bungalow | Walk 2 Moody + UTexas

Share Save

Number of bedrooms
Number of beds
Number of baths



Amenities:

- Pool
- Workspace
- Free Parking
- Gym
- Pet Friendly



Reviews
Host experience



Entire bungalow in Austin, Texas
4 guests · 1 bedroom · 2 beds · 1 bath
★ 4.87 · 120 reviews



Hosted by Meshelle
Superhost · 7 years hosting



Dedicated workspace
A common area with wifi that's well-suited for working.

\$532 \$272
Total before taxes

CHECK-IN
2/20/2024

CHECKOUT
2/22/2024

GUESTS
1 guest

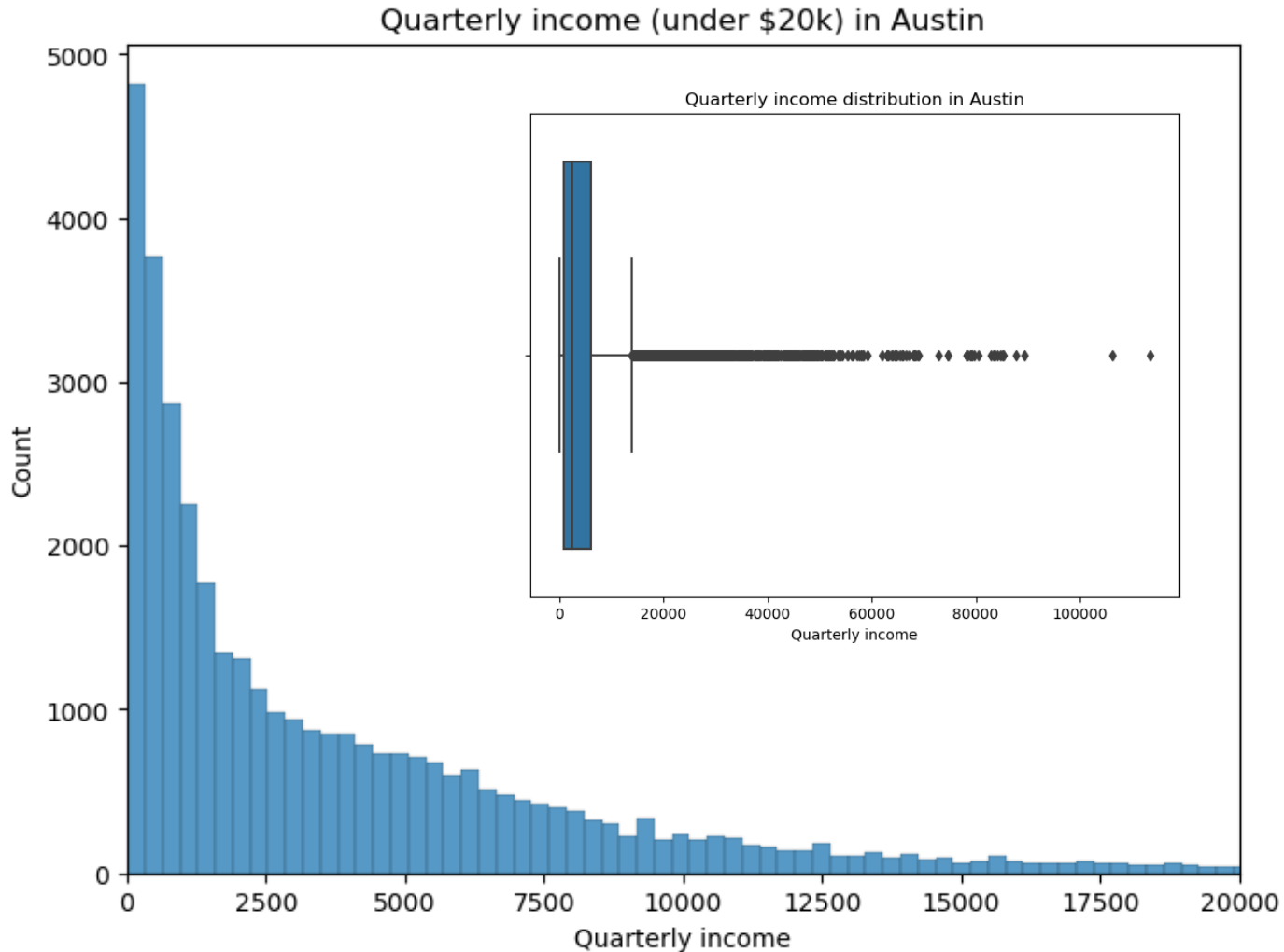
Reserve



Time of the listing



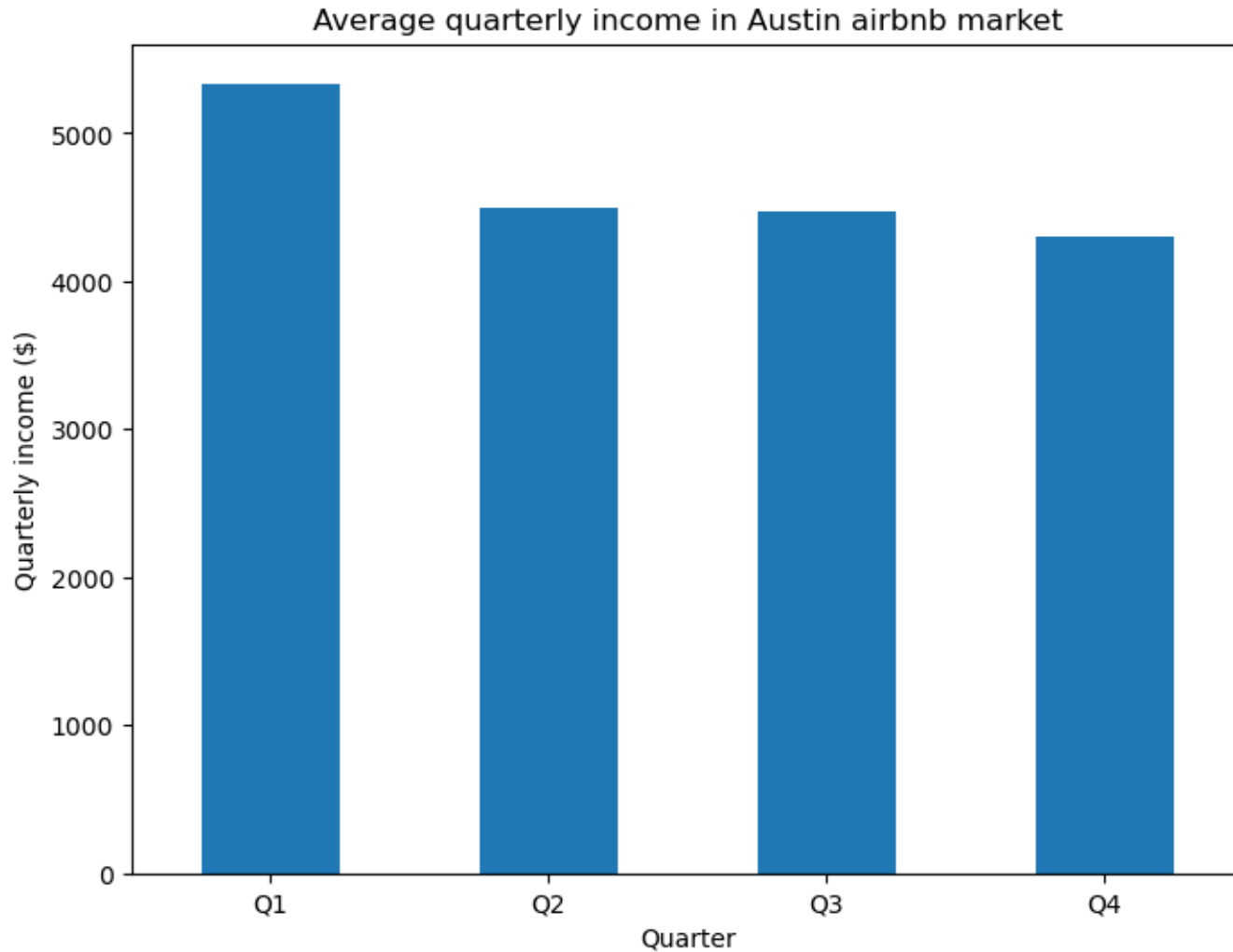
Quarterly income



- Very right-skewed
 - Mean: \$4600/quarter
 - Median: \$2400/quarter



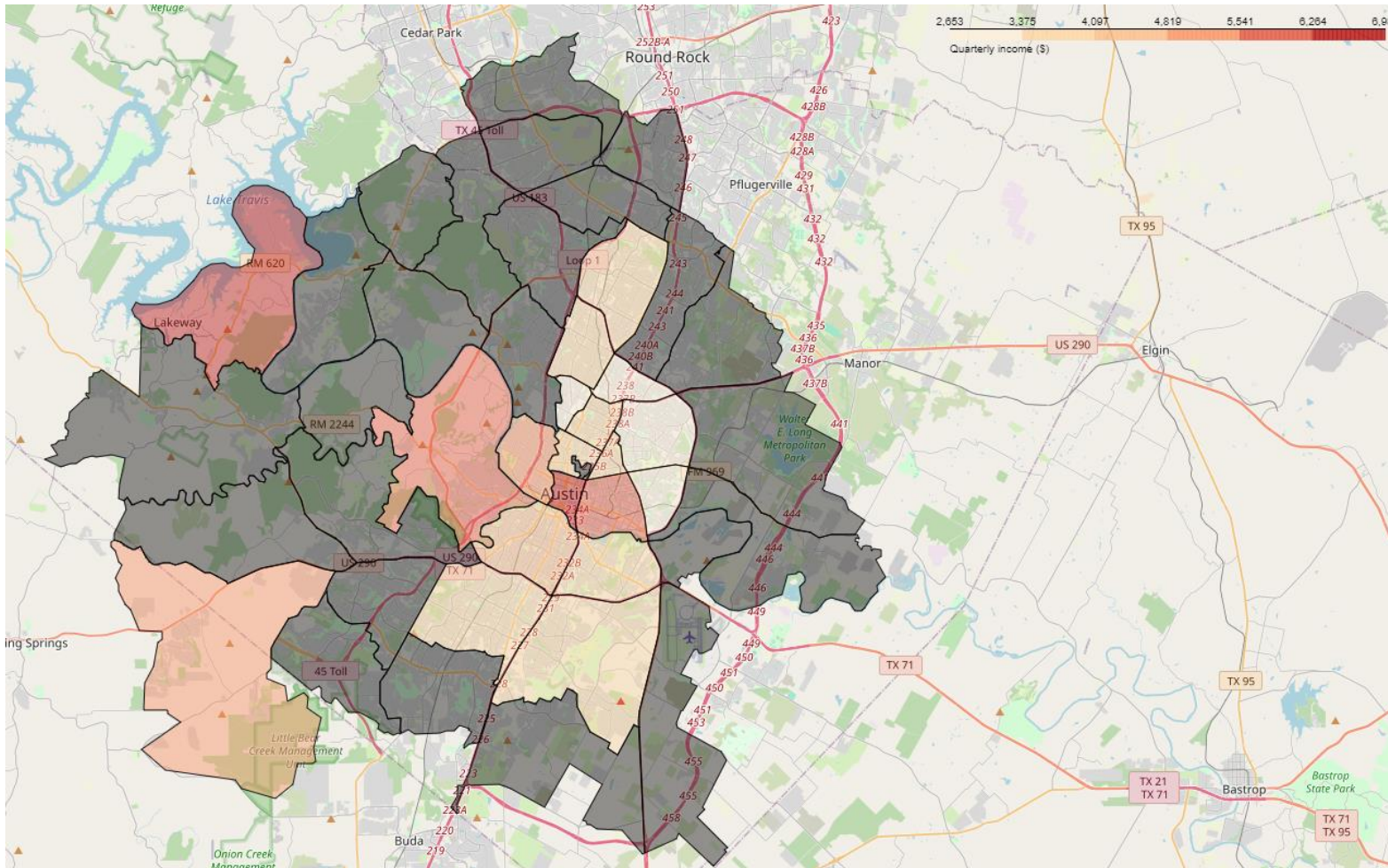
Quarterly income



- Highest income in Q1
 - Higher occupancy rate
 - Higher prices
- Holiday time!



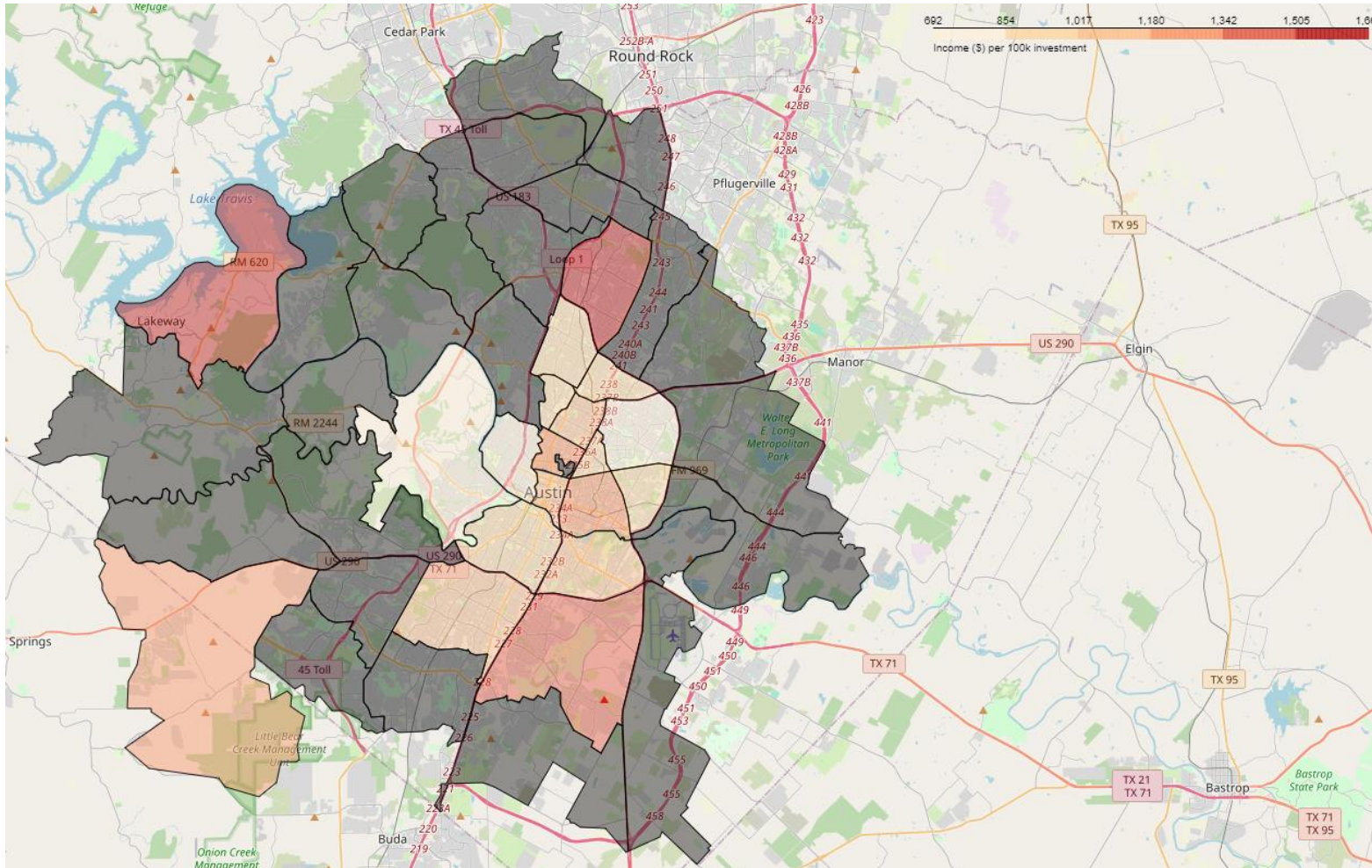
Highest income regions



- Neighborhoods with 125 + homes
- Highest income:
 - Downtown area
 - Lake Travis area



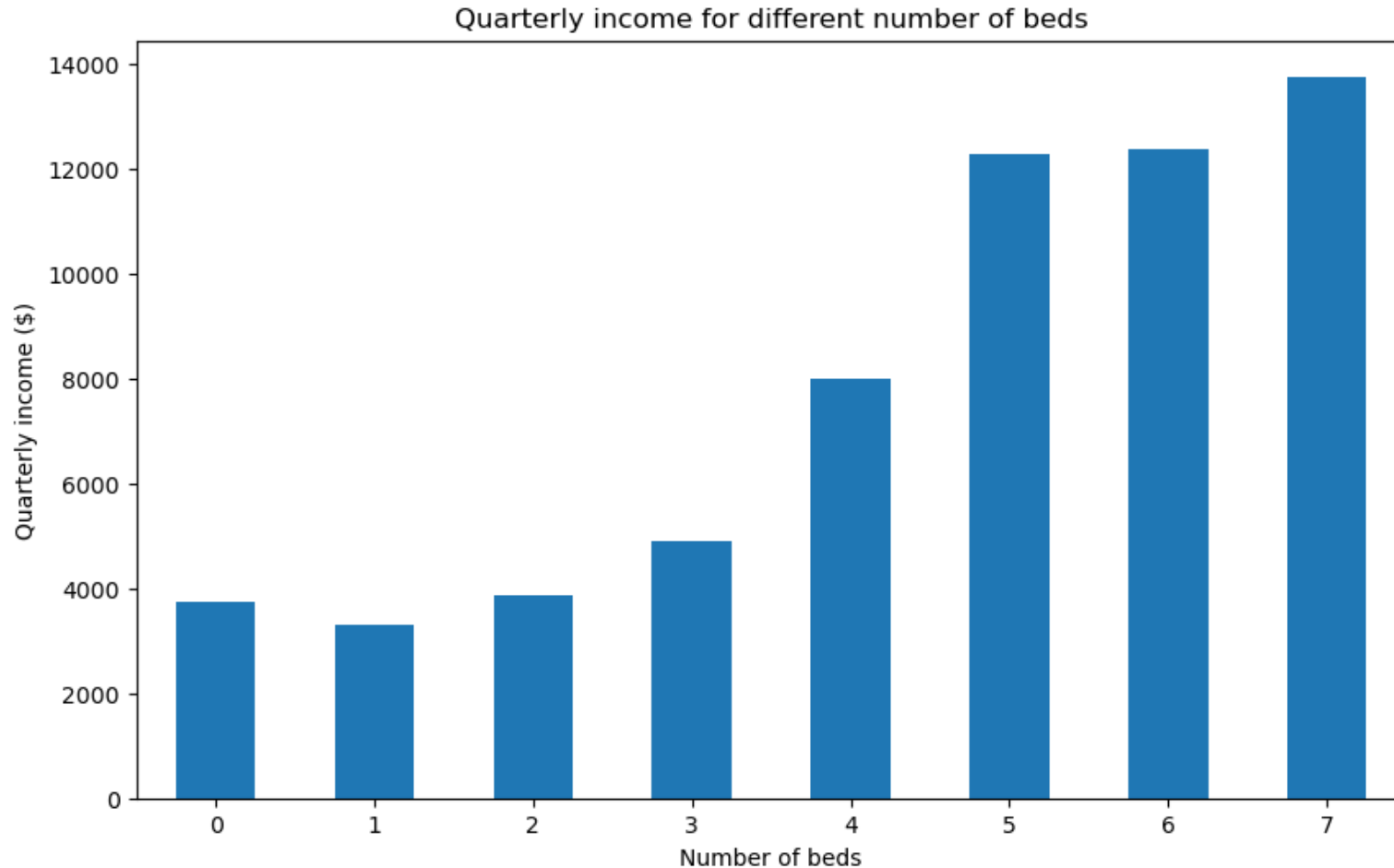
Best investment regions



- Income per 100k investment
- Best for new investors
- Some regions are very expensive
- Away from the center!



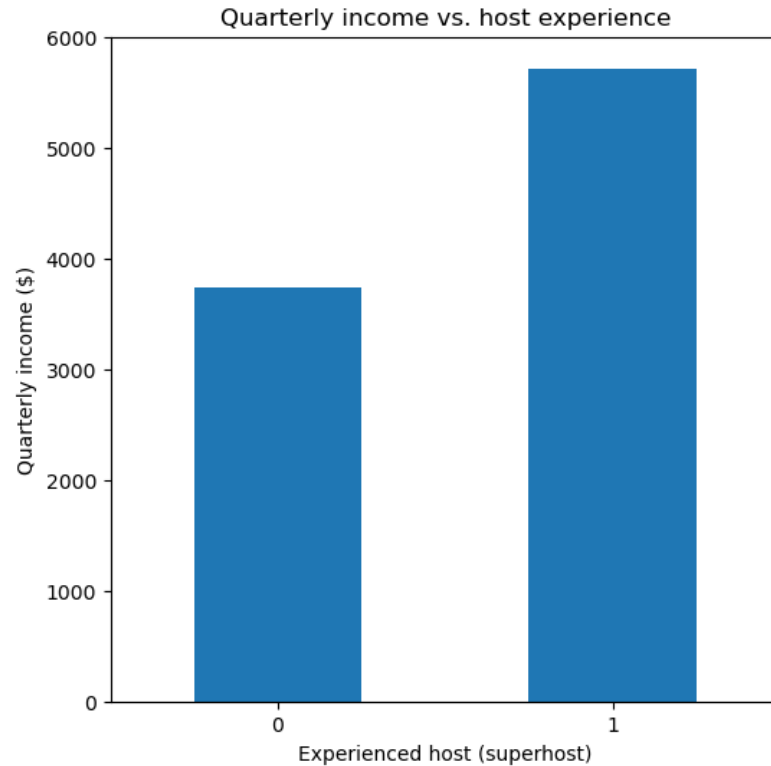
Income vs. number of bedrooms



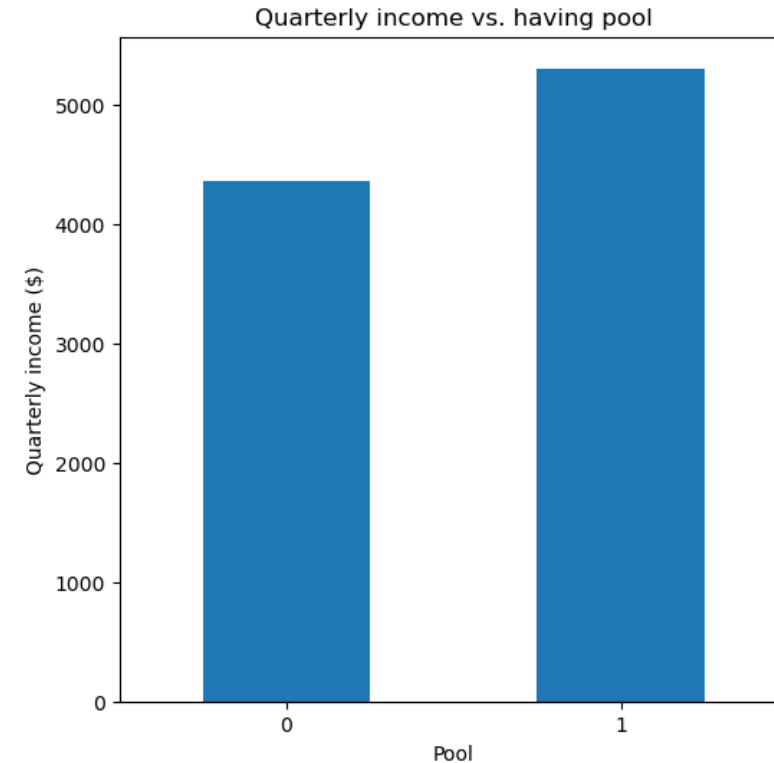
- Income jumps for 4+ bedrooms



Other important features



- Host's experience impacts income



- Having pool bumps up the income (for 2+ bedroom houses)



'Listing price' modeling

- Linear regression, Neural Network, and XGBoost

Regressor	Specifics	R2 score (train data)	MAE (train data)	R2 score (test data)	MAE (test data)
<u>Linear regression</u>	Polynomial features, Ridge	0.56	\$93	<u>0.52</u>	<u>\$97</u>
<u>Neural Network</u>	4 hidden layers (32- 256 nodes)	0.71	\$73	<u>0.58</u>	<u>\$88</u>
<u>XGBoost</u>	BayesSearchCV for hyperparameters	0.90	\$42	<u>0.71</u>	<u>\$72</u>



'Occupancy rate' modeling

- Very challenging modeling and poor performance
- Linear regression and XGBoost

Regressor	Specifics	R2 score (train data)	MAE (train data)	R2 score (test data)	MAE (test data)
<u>Linear regression</u>	Polynomial features, Ridge	0.17	0.18	<u>0.13</u>	<u>0.19</u>
<u>XGBoost</u>	BayesSearchCV for hyperparameters	0.66	0.11	<u>0.45</u>	<u>0.14</u>



Demo Time!



Conclusions

- The average quarterly income from airbnb in the city of Austin is \$4600.
- First quarter of the year usually generates more income than other times.
- Houses with 4+ bedrooms show a jump in the income, compared to smaller properties.
- Being an experienced host (a.k.a. superhost) significantly impacts the yearly income of listings.

Future work?

