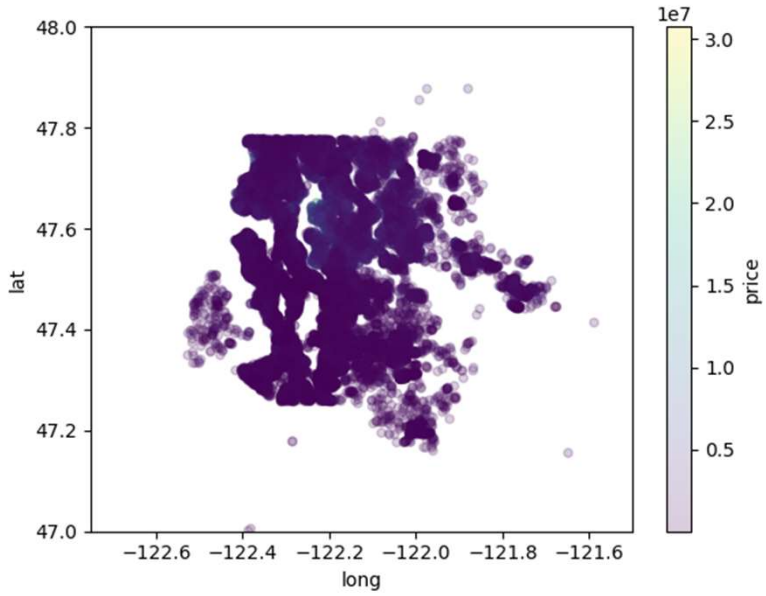
Analysis of housing prices

Business understanding

- The client is a housing planner
  - Must set prices and wants to use market data
  - It is necessary to know the impact on the housing price of various real estate metrics

Data understanding

- Housing data from a Northwestern county.
- Key variables: price, square footage and quality.
- Each row of data represents a different house sold.
  - Within past few years
  - About 30,000 in data set.
- nearly all observations within Greater Seattle, outliers cut.
  - high price center zone

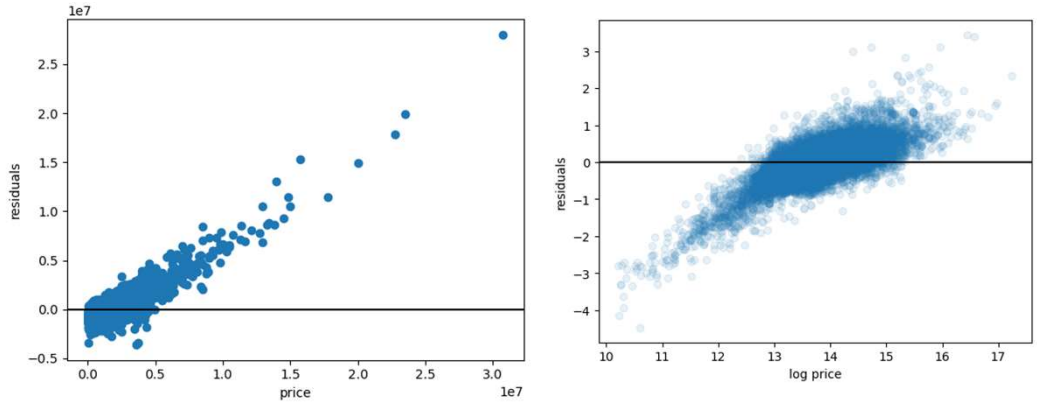


Modelling Overview: Linear regressions

- Baseline model
  - 'sqft_living’
- Intermediate models:
  - Add new numeric variables and conservatively log transform move variables with each iteration.
  - to improve on linearity issue and heteroskedaticity issues and non-normality issues and to improve rsquared.
- Final model:
  - Log all numerical variables from prior model
  - Add categorical variables Waterfront and Jumbo to increase rsquared.
  - to improve on non-normality(despite improvement) and some heteroskedaticity

Linear regression model assumptions

- Final model heteroskedacities, linearity, and normality of residuals are improved from the baseline model.



- Residual histogram appears normally distributed, and is improved from previous model, however J-B test still failed suggesting non-normality.

- Multicollinearity is low, all correlations below .75.

Final model & Results

OLS Regression Results	
	coef
const	7.07
sqft_living_log	0.48
sqft_garage_log	-0.10
sqft_patio_log	0.04
WaterFront_Yes	0.30
grade_num_log	1.67
view_num_log	0.10
Jumbo	0.57

Results contd.

- Model Evaluation
  - Rsq: **0.51**
    - This means the model accounts for **51% of the variation** in the dependent variable.
    - Compared to baseline model of 0.38.
  - Mean squared error: **0.41.**
    - This is a measure of how far off the predictions of log(price) are from the actual log(price).
  - Root mean squared error: **0.64**
    - This is about the average of how far off the predictions of log(price) are from the actual log(price).

Interpretation of Coefficients

Interpretation of coefficients table	
Categorical Variables	% Effect of its presence on price
WaterFront	39.68
Jumbo Area	76.84
Numeric Variables	% Effect of its 1% increase on price
sqft_living	0.5
sqft_garage	-0.11
sqft_patio	0.042
grade_num	1.78
view_num	0.11

Recommendations

- To determine a price of a house, take a similar house with about 10% less sqft of living area and add 4.85% to that price.

- To determine a price of a house with a waterfront, take a similar house without a waterfront and add 39.68% to the non-waterfront price.

- To determine a price of a house in the Jumbo area, take a similar house not in the Jumbo area and add 76.84% to the non-Jumbo price.

Next Steps

- Establish a better interpretation of the root mean squared error.
- Further analyze the negative coefficient of garage size variable.
- Testing interaction variables (e.g. differing lot sizes and house sizes for different geographic areas.)

Thank you/Questions?