# King County Real Estate Predictive Modeling

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# Cleaning

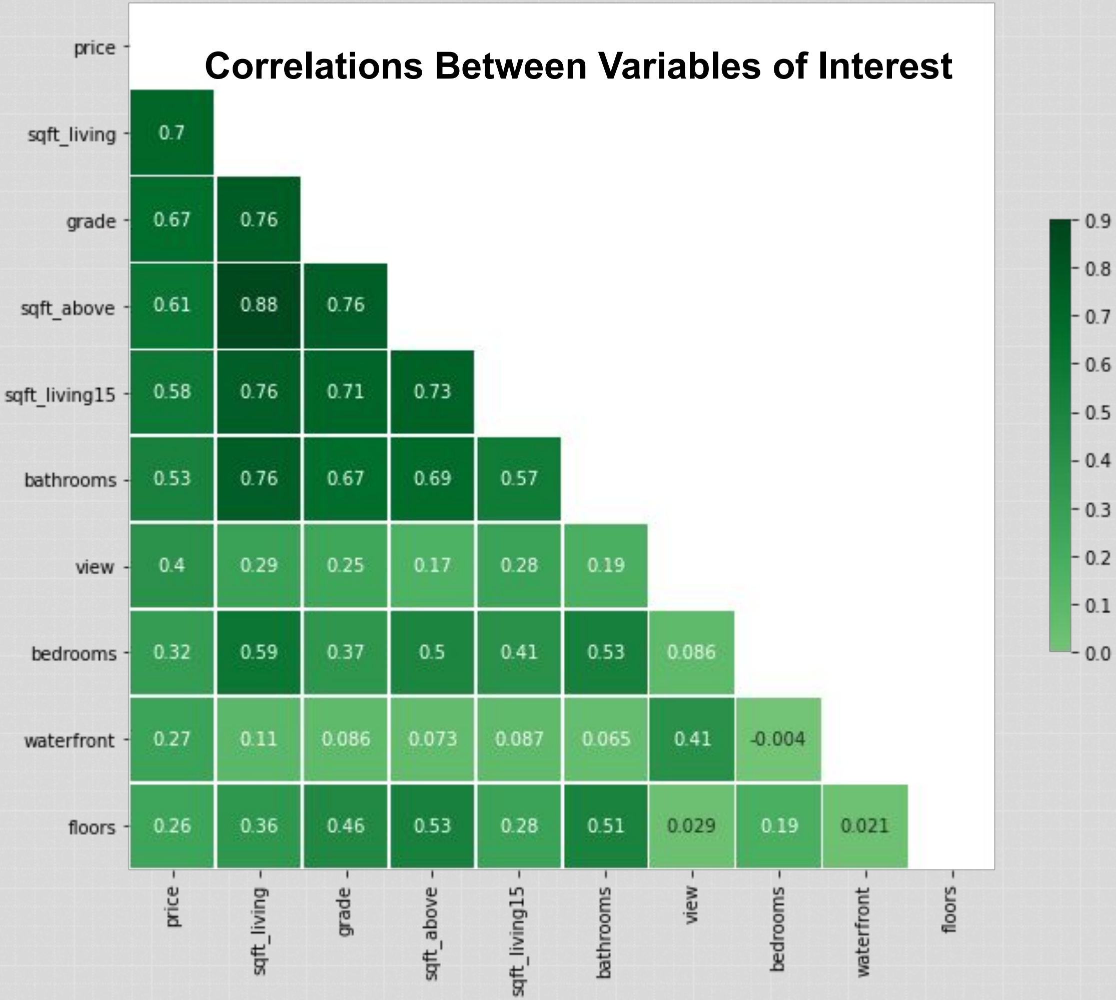
- I replaced all ‘?’ with NaN values

- Checked for null values and dropped the ones found
  - 18 of the 21 column did not have missing values
  - Year renovated had 17% values being missing
  - Waterfront had 11% values being missing
  - View had .2% values being missing

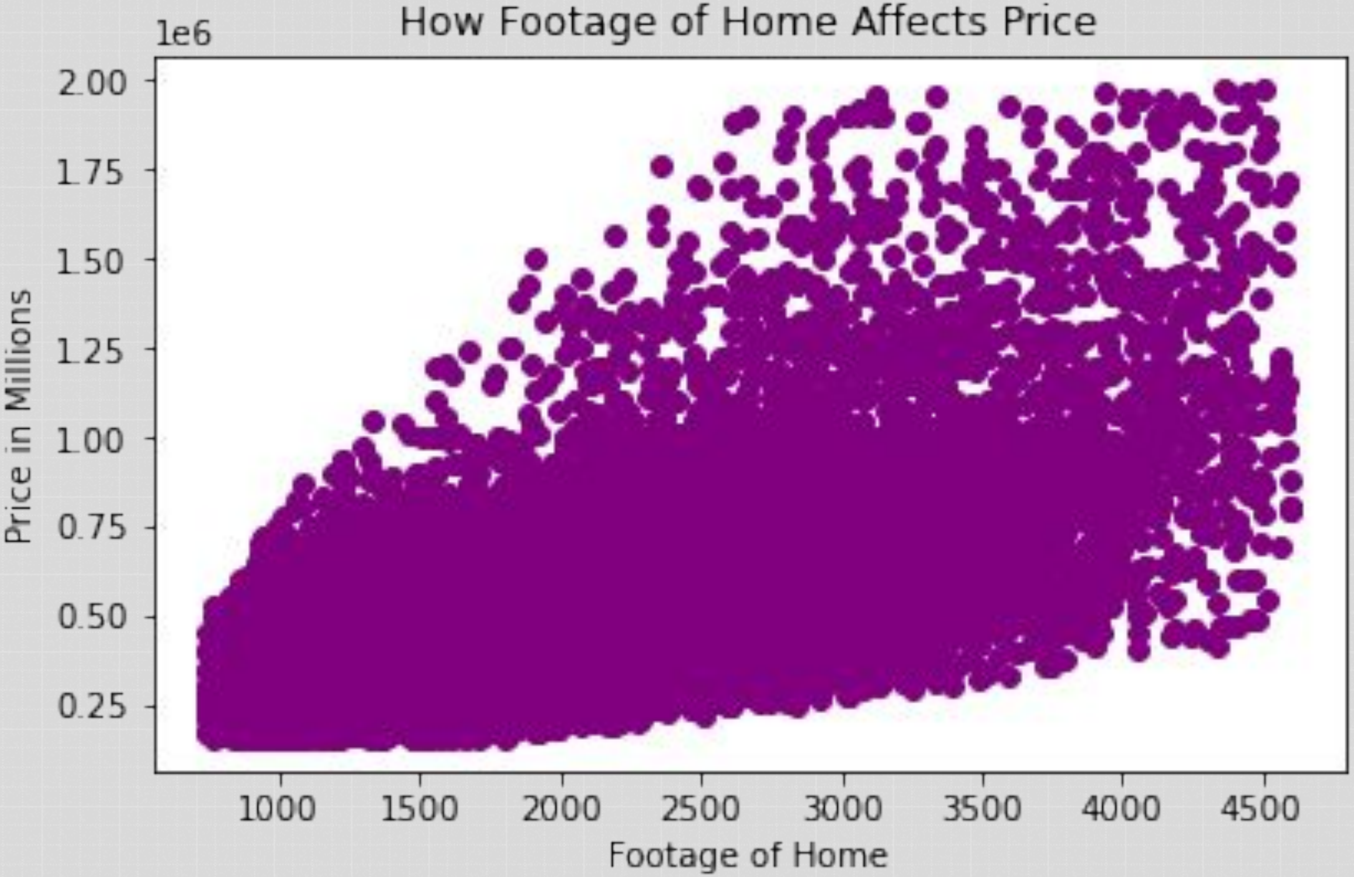
- Removed the entry that had 33 bedrooms

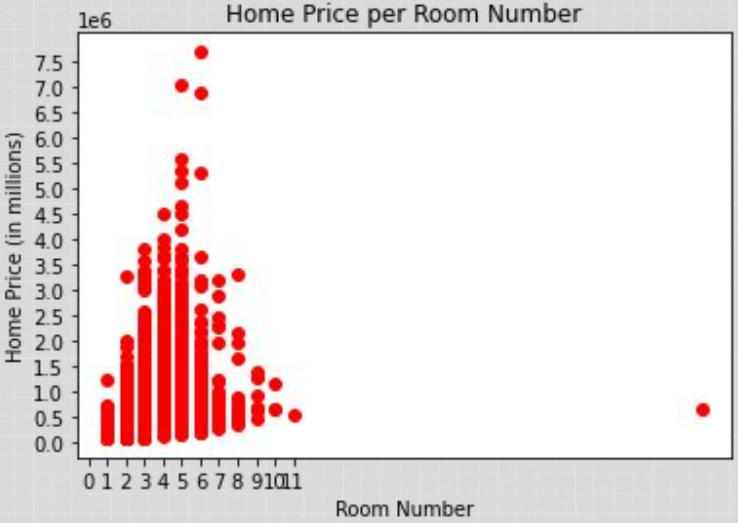
- Turned date from a string to a int using just the year

# Correlations Between Variables of Interest

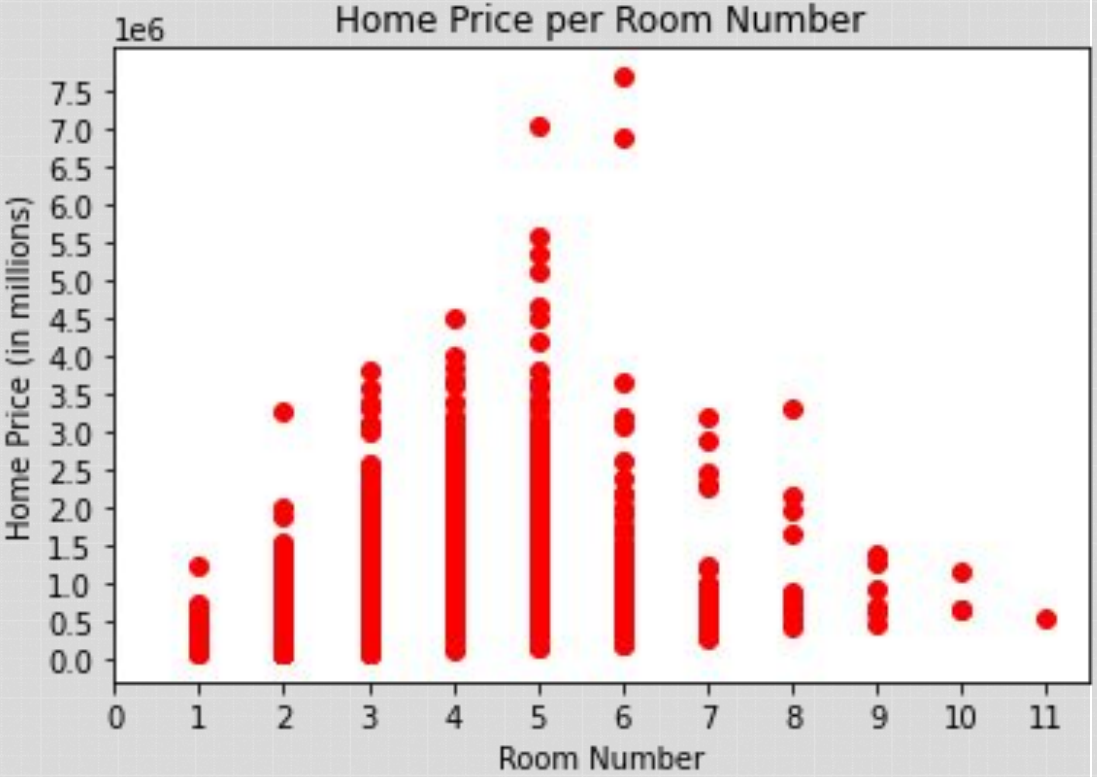


|  | price | sqft_living | grade | sqft_above | sqft_living15 | bathrooms | view | bedrooms | waterfront | floors |
|---|---|---|---|---|---|---|---|---|---|---|
| price |  |  |  |  |  |  |  |  |  |  |
| sqft_living | 0.7 |  |  |  |  |  |  |  |  |  |
| grade | 0.67 | 0.76 |  |  |  |  |  |  |  |  |
| sqft_above | 0.61 | 0.88 | 0.76 |  |  |  |  |  |  |  |
| sqft_living15 | 0.58 | 0.76 | 0.71 | 0.73 |  |  |  |  |  |  |
| bathrooms | 0.53 | 0.76 | 0.67 | 0.69 | 0.57 |  |  |  |  |  |
| view | 0.4 | 0.29 | 0.25 | 0.17 | 0.28 | 0.19 |  |  |  |  |
| bedrooms | 0.32 | 0.59 | 0.37 | 0.5 | 0.41 | 0.53 | 0.086 |  |  |  |
| waterfront | 0.27 | 0.11 | 0.086 | 0.073 | 0.087 | 0.065 | 0.41 | -0.004 |  |  |
| floors | 0.26 | 0.36 | 0.46 | 0.53 | 0.28 | 0.51 | 0.029 | 0.19 | 0.021 |  |


How Footage of Home Affects Price
1e6
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
Price in Millions
1000
1500
2000
2500
3000
3500
4000
4500
Footage of Home



**Dropped the outlier of 33 bedrooms for a better visualization and more precise data**



# Baseline Model

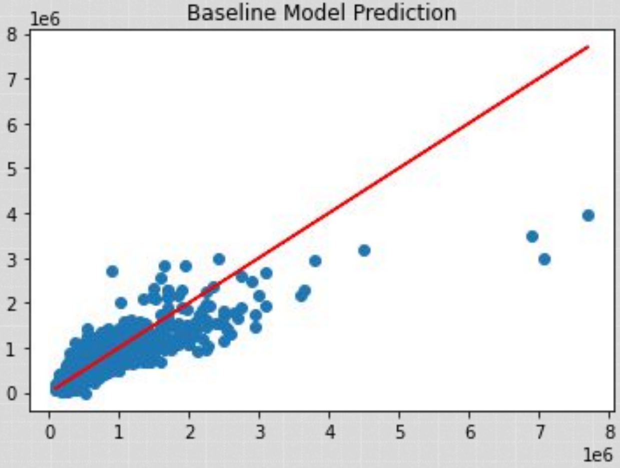
- For the baseline model, we included every variable except for id.
- The scores we got for our testing and training data were:

**Training $R^2$: 0.7339**

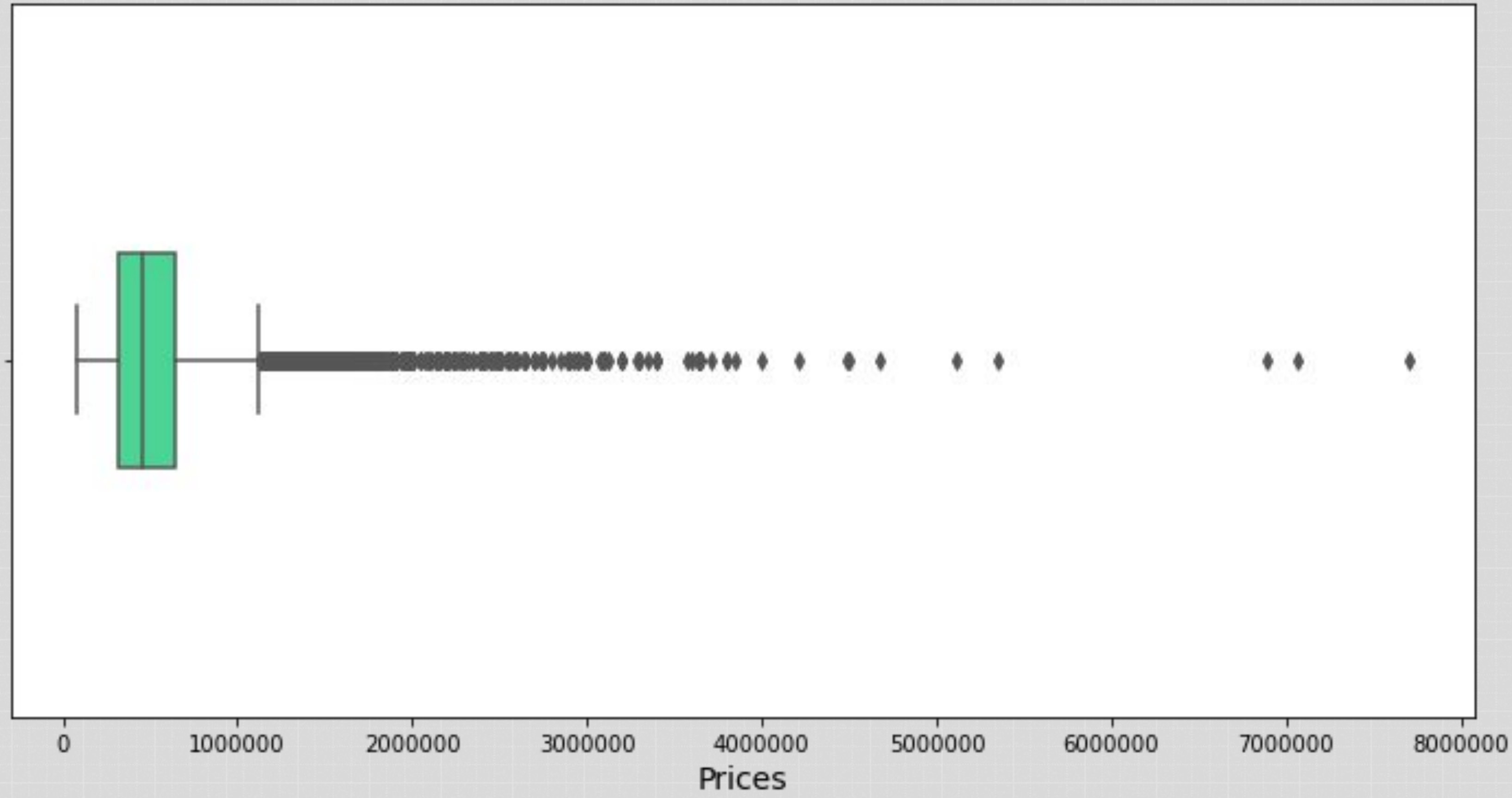
**Testing $R^2$: 0.7184**

**Training RMSE: 185625.8124**

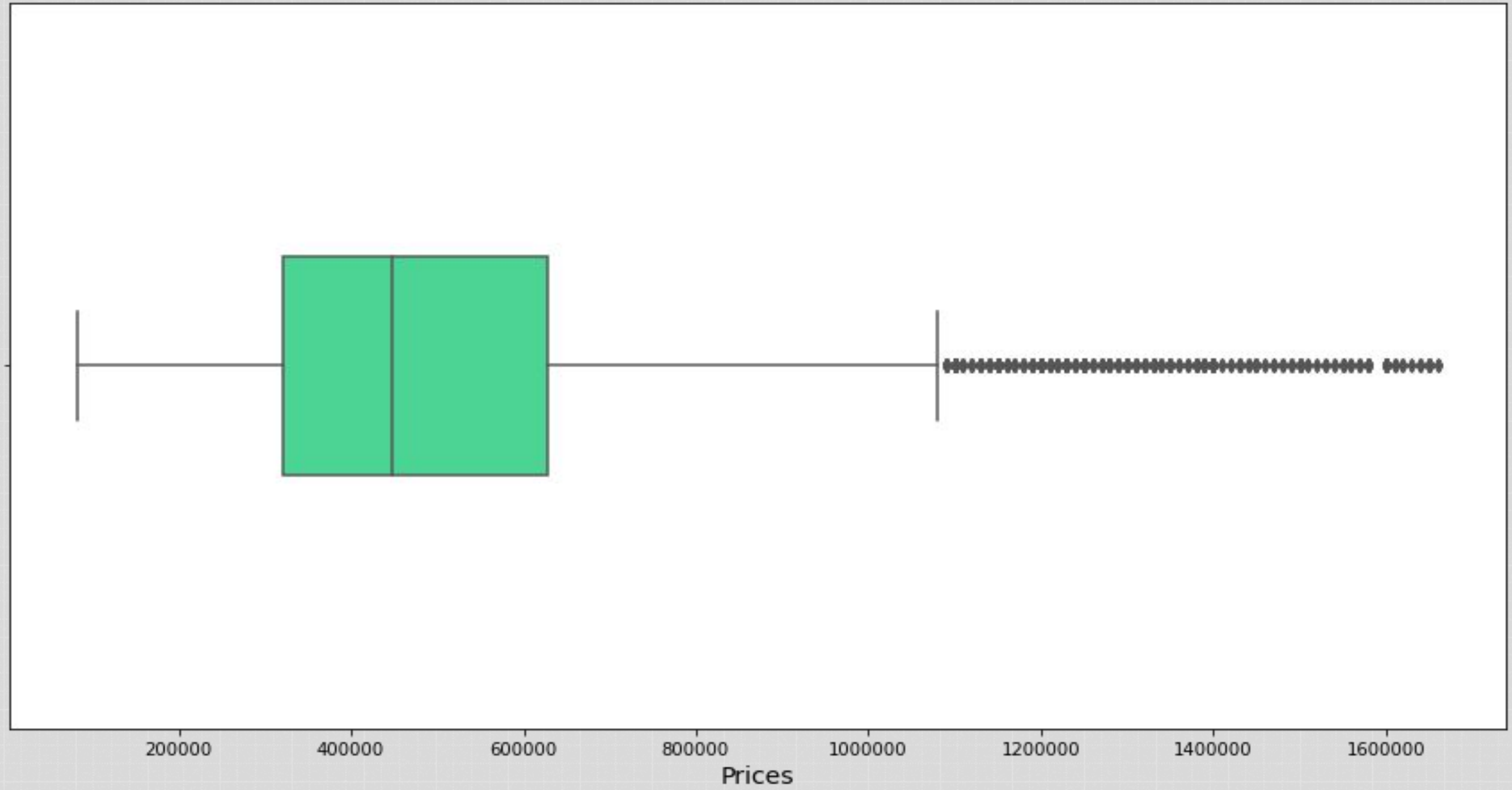
**Testing RMSE: 217398.4034**



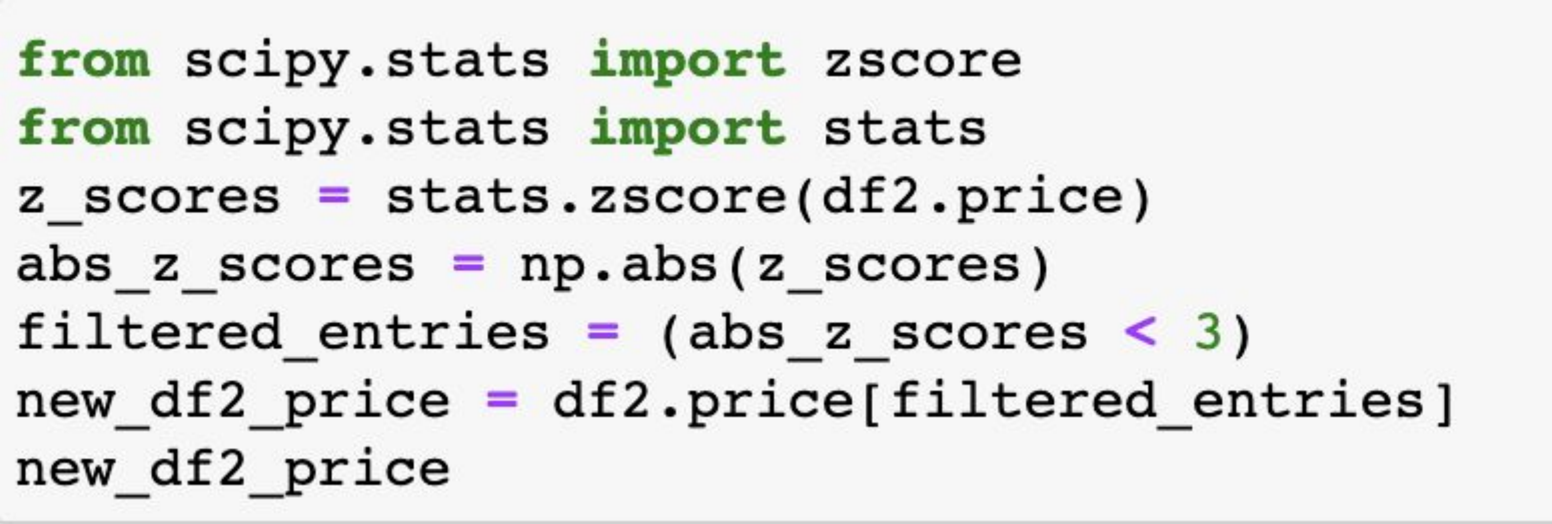
# Price Column Before Outliers Taken Out



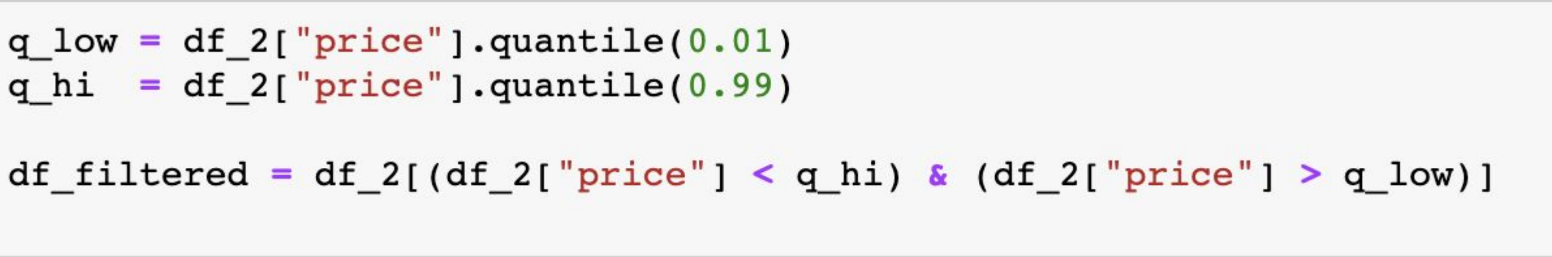
# After Outliers Taken Out



# Better Way to Clean Outliers



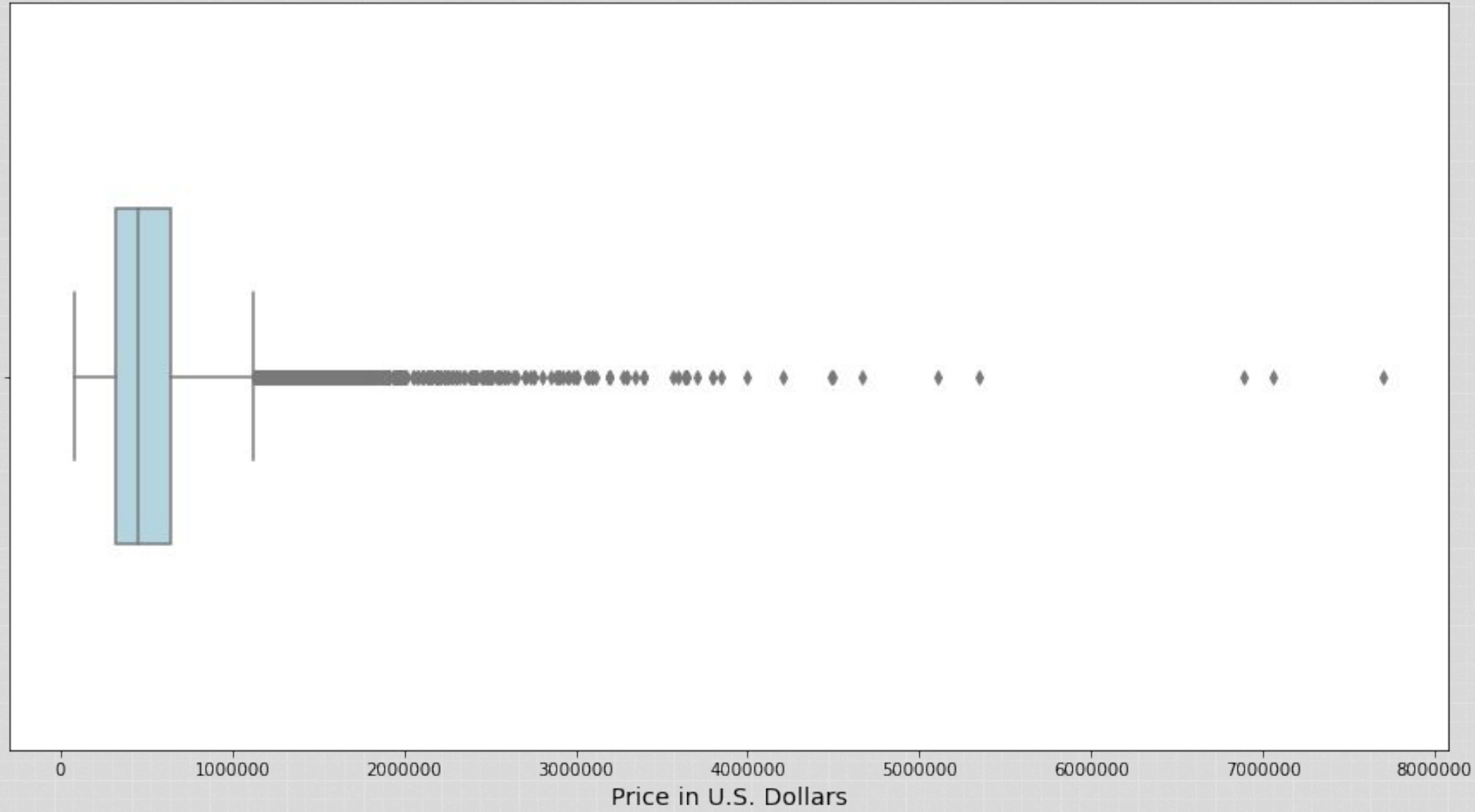
```
from scipy.stats import zscore
from scipy.stats import stats
z_scores = stats.zscore(df2.price)
abs_z_scores = np.abs(z_scores)
filtered_entries = (abs_z_scores < 3)
new_df2_price = df2.price[filtered_entries]
new_df2_price
```



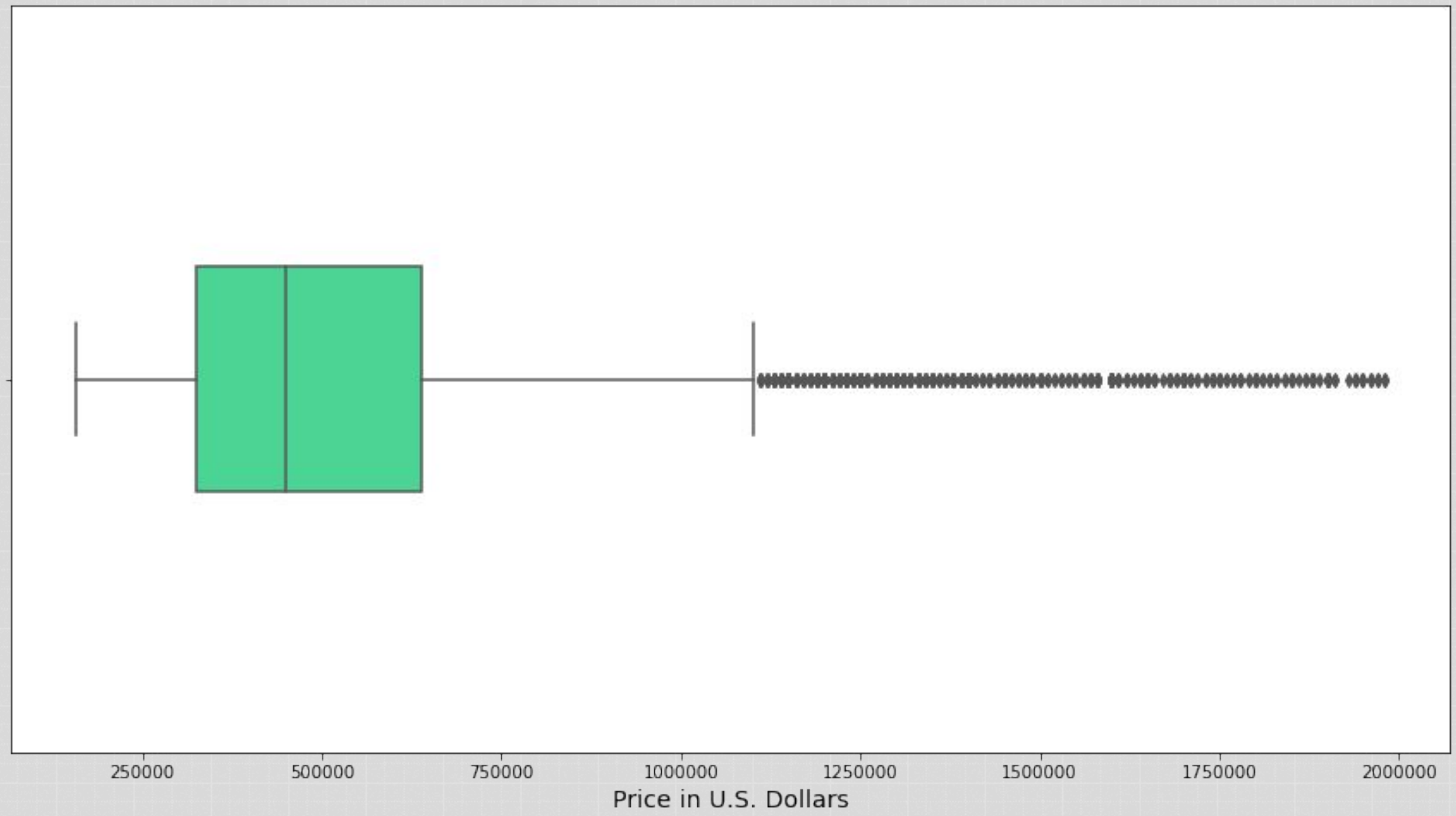
```
q_low = df_2["price"].quantile(0.01)
q_hi  = df_2["price"].quantile(0.99)

df_filtered = df_2[(df_2["price"] < q_hi) & (df_2["price"] > q_low)]
```

# Before Outliers Taken Out



# After Outliers Taken Out



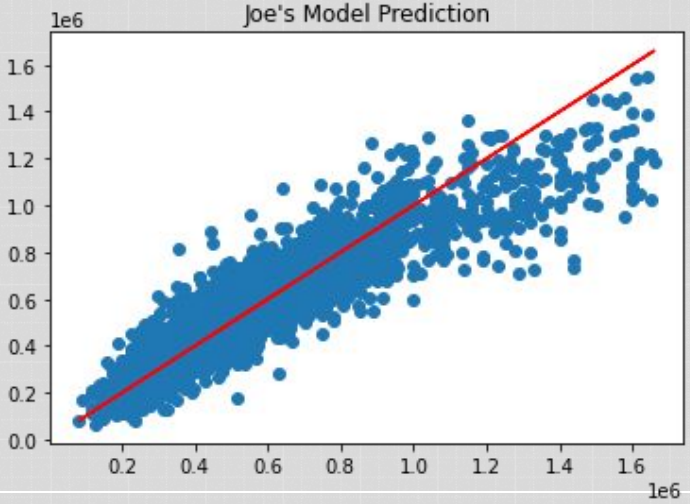
# Joe’s vs. Katie’s

Training $R^2$: 0.8477

Testing $R^2$: 0.8473

Training RMSE: 101155.68

Testing RMSE: 105763.01

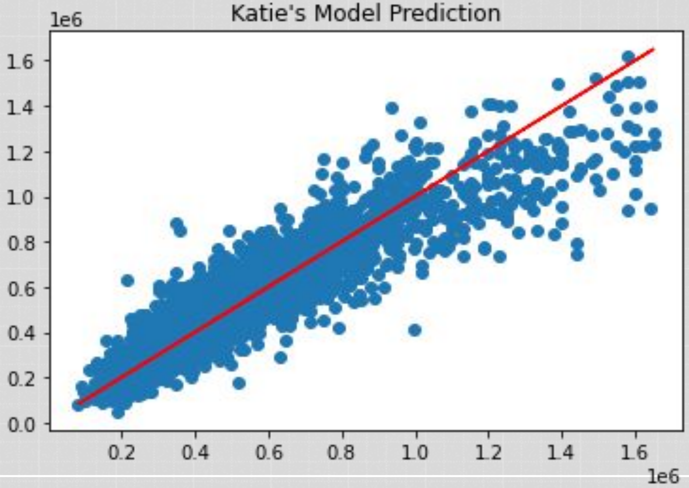


Training $R^2$: 0.8493

Testing $R^2$: 0.8557

Training RMSE: 109665.08

Testing RMSE: 109613.52



# Preprocessing

- Dropped year renovated column
- Did not improve the model once

# Preprocessing

- Bathrooms are categorical, not continuous.

- Included every column except id, but tried encoding bathrooms along with the other variables from earlier.

- Improved the model

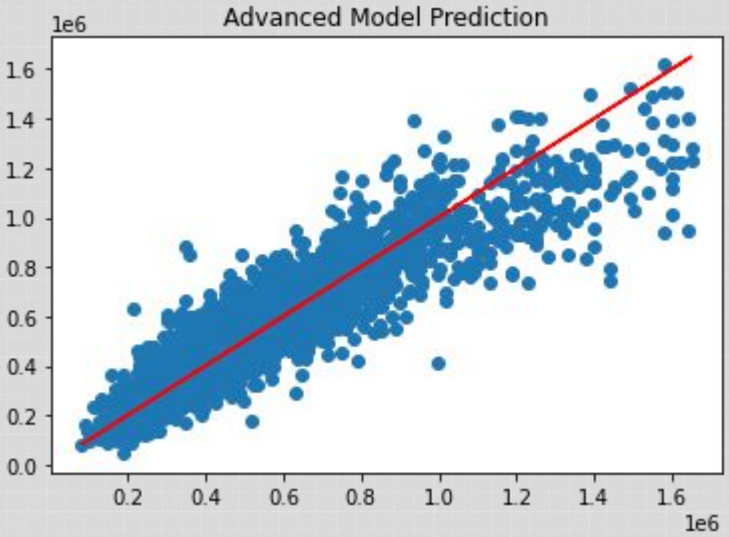
# Advanced Model

Training $R^2$: 0.8503

Testing $R^2$: 0.8467

Training RMSE: 101415.6435

Testing RMSE: 102664.7123



# If We Had More Time...

Create algorithms to account for each house owner’s individual experience

Prospective house buyers could input values for various features and would receive an estimate of how much a house with those features would cost.

# THANK YOU!

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