Ames Housing Price Prediction and Recommendations

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Problem Workflow

1. The problem
2. Data and data dictionary
3. Explorating the data
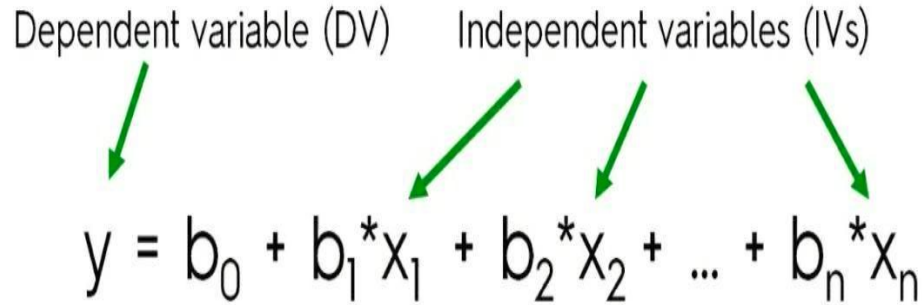4. Modeling
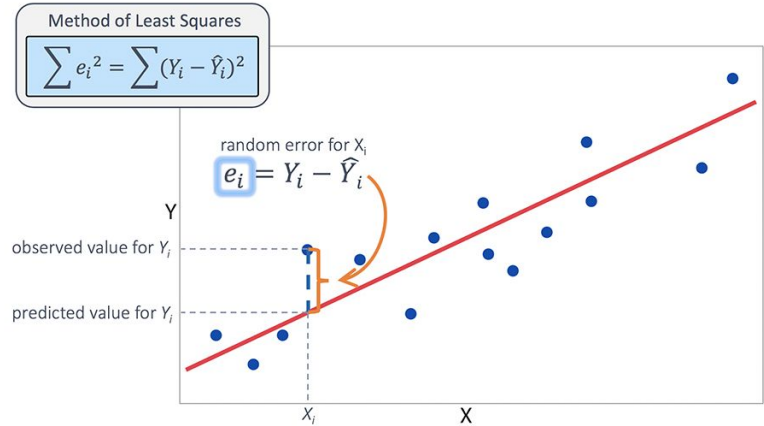5. Conclusions and recommendations

Problem/Data

1. The Ames house dataset with over 70 columns of different features relating to house is provided
2. Fit a model that can predict the house price based on provided features
3. The model is tuned based on the provided data and then applied to new data to predict the house price

Model(Linear Regression)

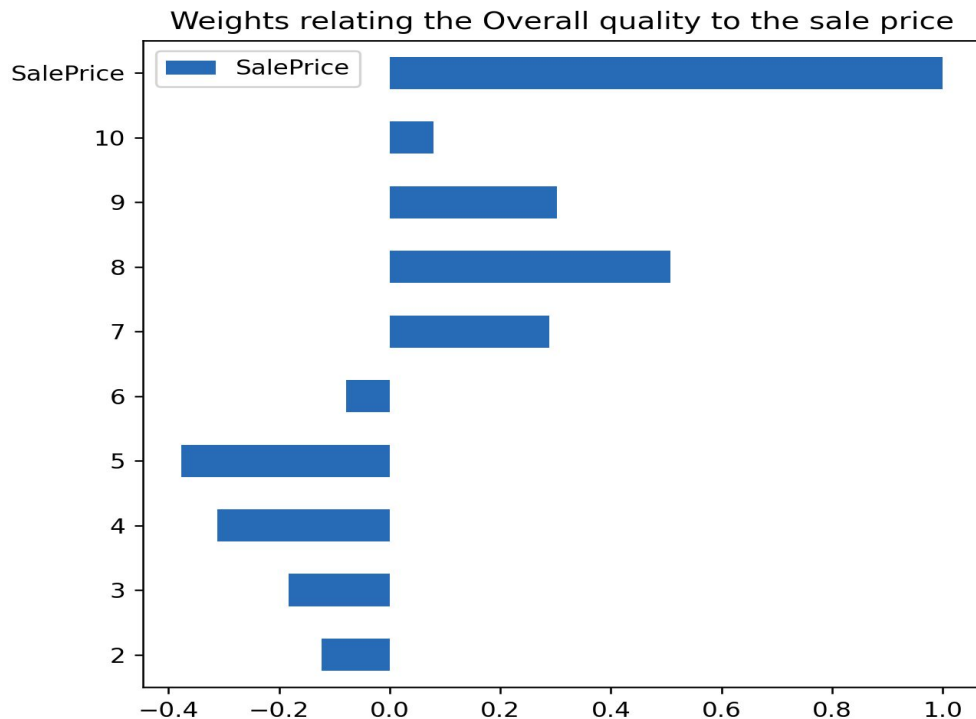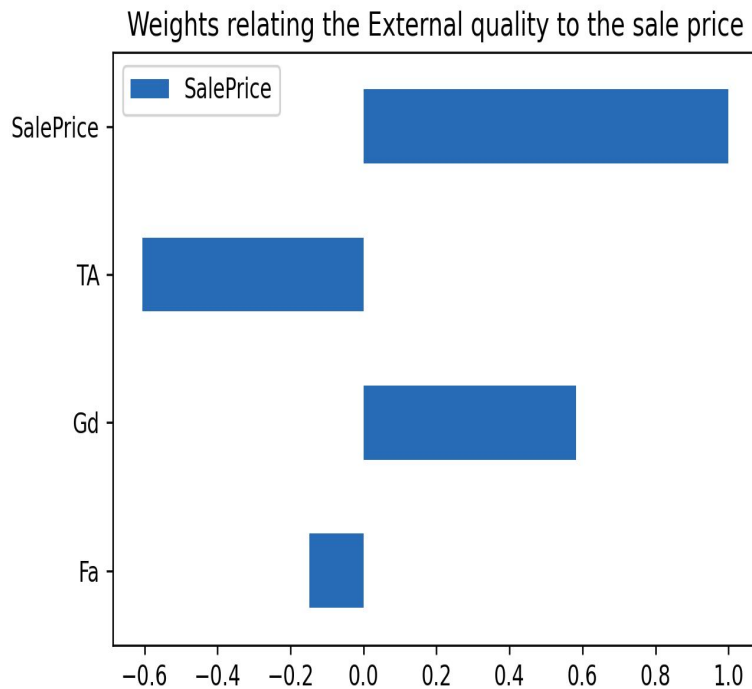Dependent variable (DV)   Independent variables (IVs)
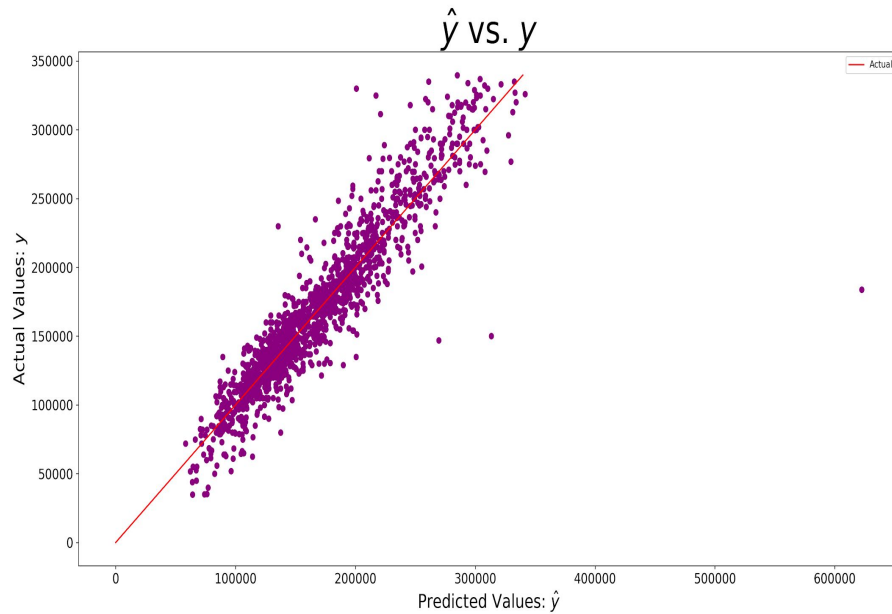
$$y = b_0 + b_1 * x_1 + b_2 * x_2 + ... + b_n * x_n$$

Method of Least Squares

$$\sum e_i^2 = \sum (Y_i - \hat{Y}_i)^2$$

random error for X_i

$$e_i = Y_i - \hat{Y}_i$$

Y

observed value for Y_i

predicted value for Y_i

X_i X

Sale Price=Base Price+b1*feature 1+b2*feature 2+...+bn*feature n

Some Trends in data

Weights relating the External quality to the sale price

Weights relating the Overall quality to the sale price

Basic Model

$\hat{y}$ vs. y
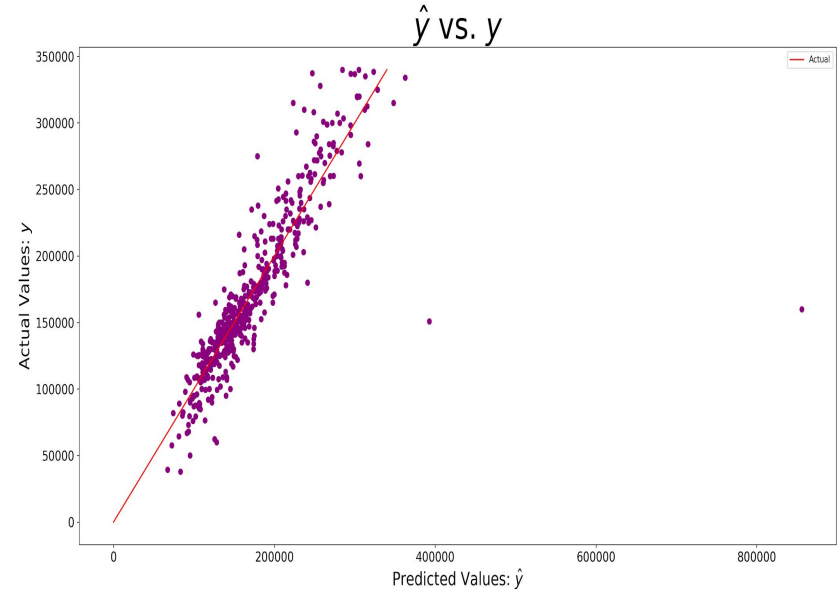
Model fitted for train data
Model metrics:
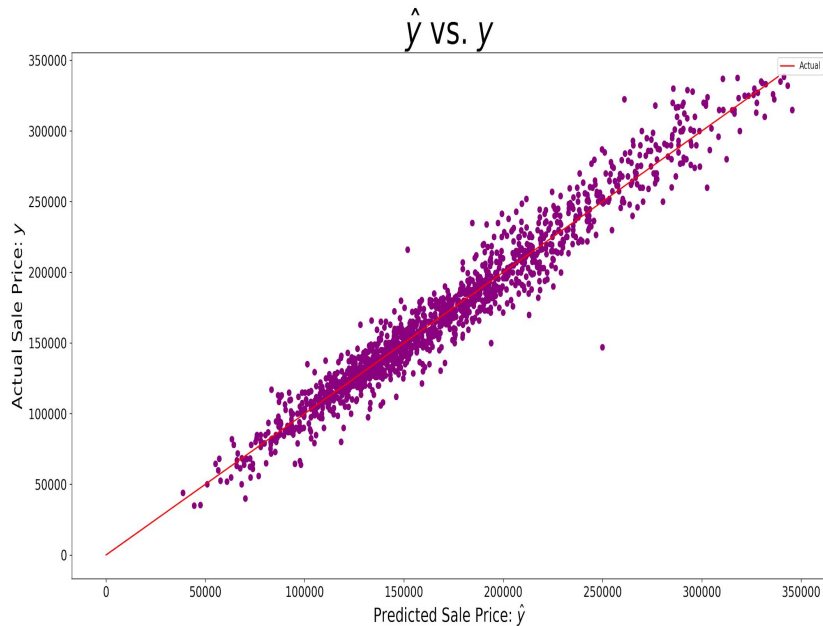R2= 84 %
RMSE=$ 22895

Model fitted for test data:
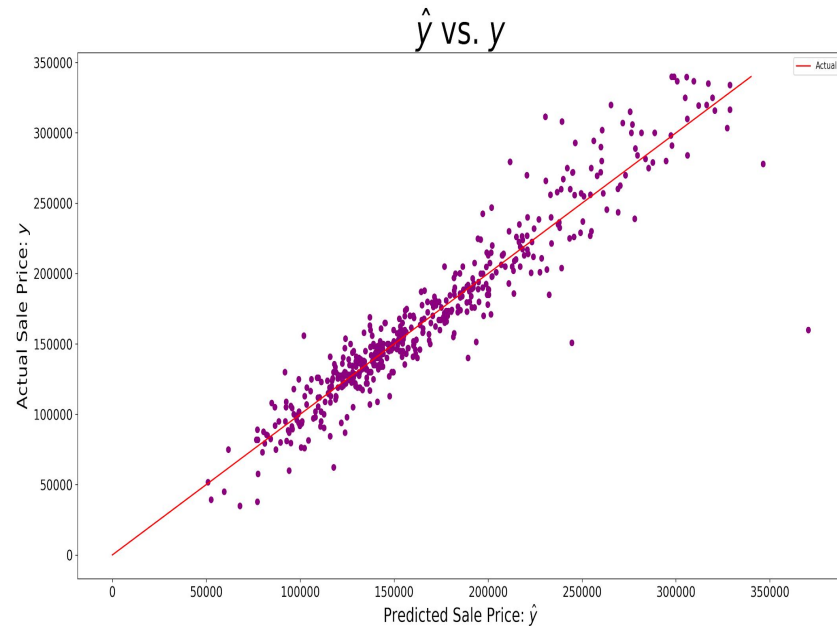Model metrics:
R2= 56%
RMSE= $39328

Feature Engineering

1. Combining features
2. Interaction terms
3. Use Sklearn feature polynomial(it provides a huge amount of features)
4. Applying variance threshold to remove low variance features(from the previous steps)
5. Manually dropping collinear features
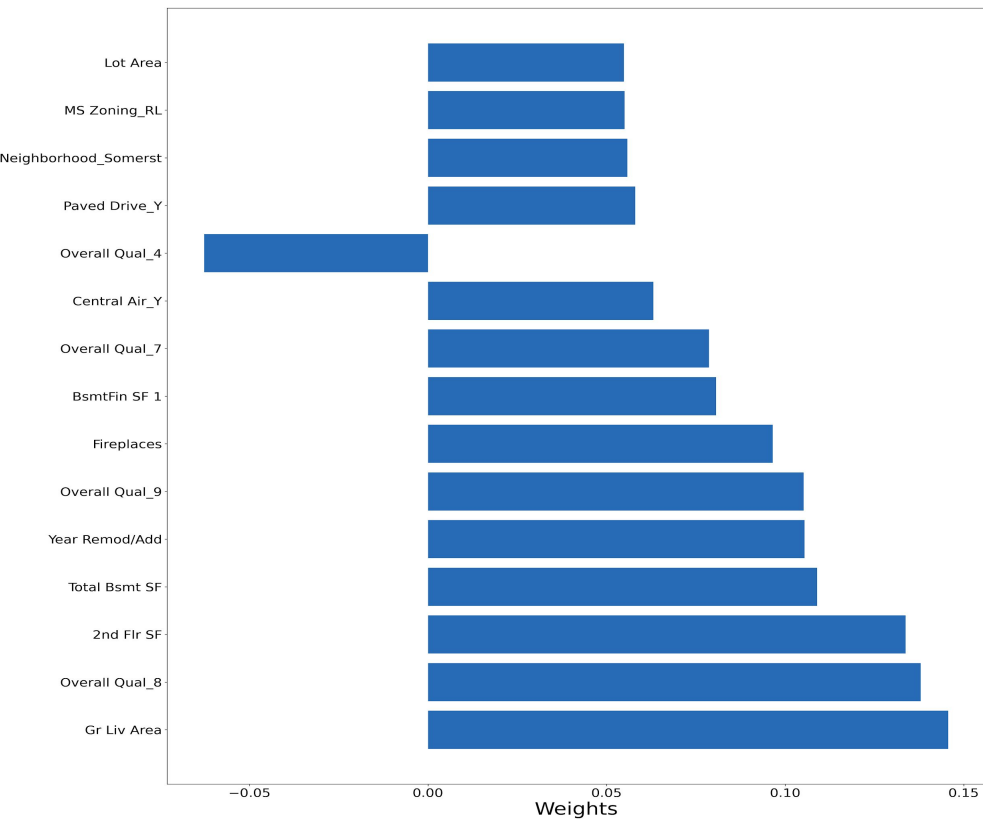6. Using the automated feature selection(regulazition like Lasso)

Improved Model

$\hat{y}$ vs. y (train data plot — left)

$\hat{y}$ vs. y (test data plot — right)

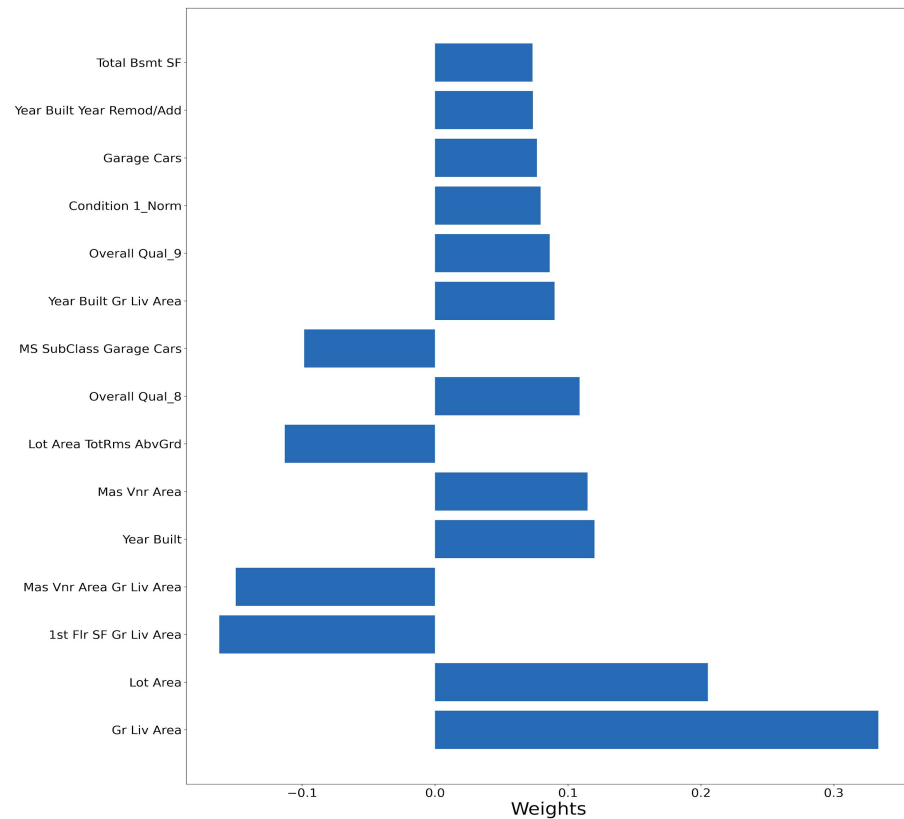Improved Model for train data
Model Metrics:
R2:95%
RMSE: $12933

Improved model for test data
Model Metrics:
R2:84%
RMSE: $19995

Models Coefficients

Basic model coefficients

Improved model coefficients

Conclusions\Recommendations

❖ Features that appear to add most value to a home:

Large living area, High Overall quality,the year remodel added and Large Lot area

❖ Features which hurt the value of a home the most

Low overall quality, low kitchen quality and low exterior material quality

❖ The things that homeowners could improve in their homes to increase the value

Increasing the quality of the exterior material, kitchen and remodel the house before they want to sell their house

❖ Future work: **Making the model more universal by choosing the best features**