Ames House Price Prediction

Group 1
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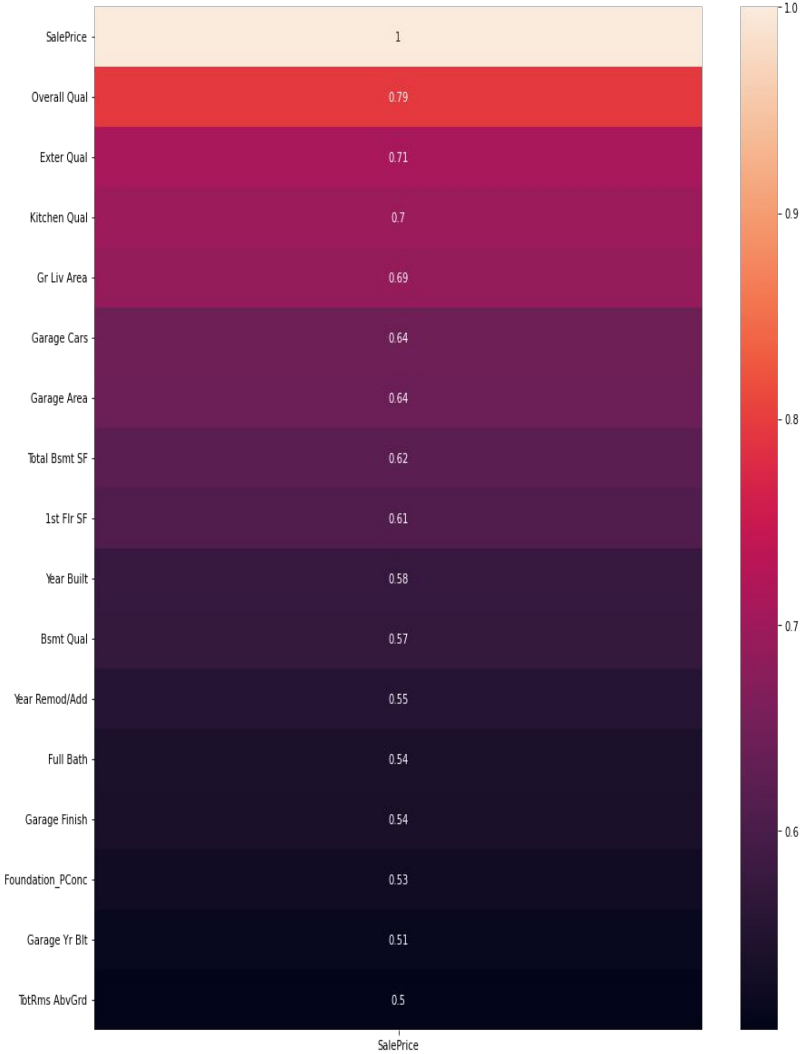
Background and Problem Statement

Objective: Purchasing a house can be a huge commitment . As a real estate agent, we would like our clients

1. to find out which features have greater impact to the house value
2. to find out how much they probably need to spend on purchasing a house with features that they want

Target Audience: Home buyers in Ames

Disclaimer: Data was taken from houses sold in 2006-2010. Probably we will need to retrain our model with a more updated data to ensure better predictions

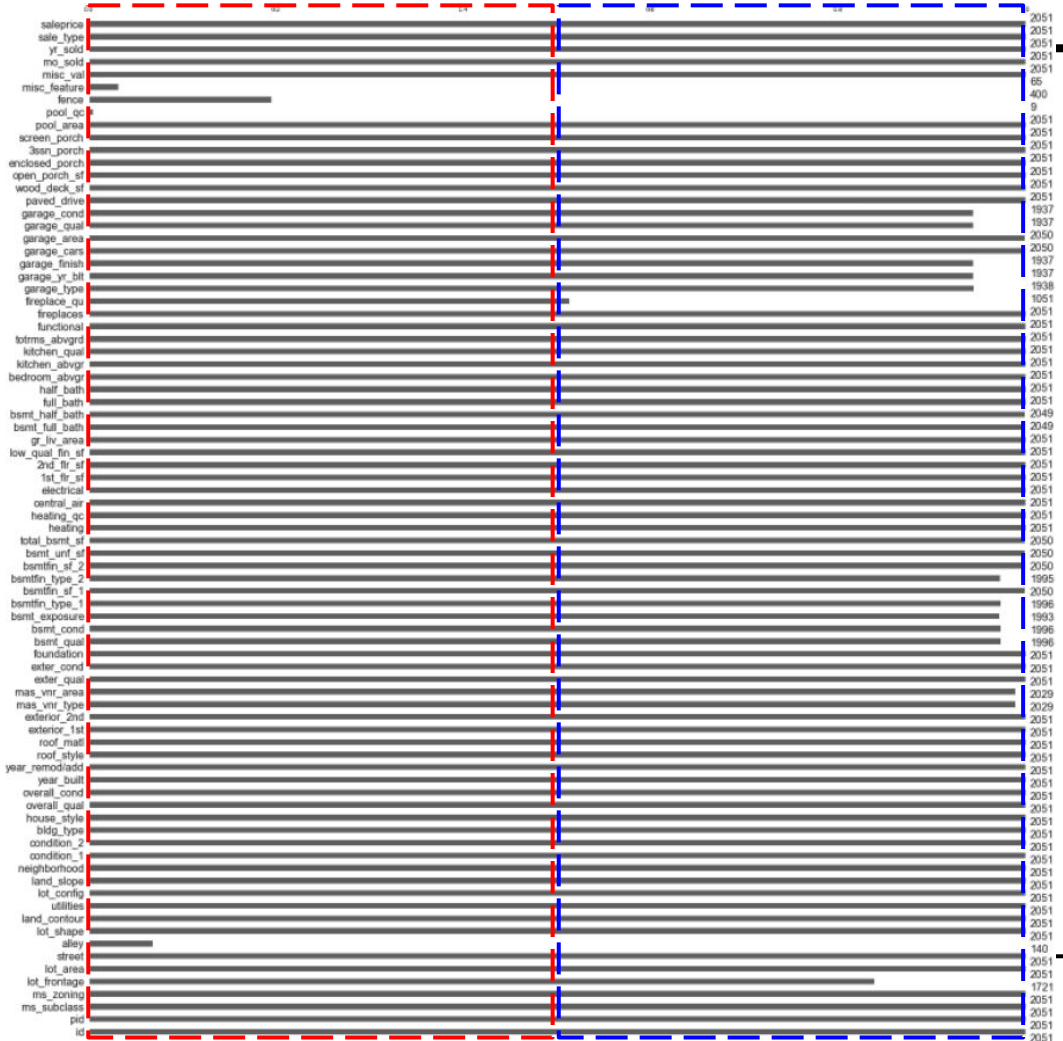


Data Overview

2051 samples of residential properties sold between 2006 to 2010 in Ames, Iowa.

7 Categories of Data:

1. Location and Proximity
2. Square Footage
3. Quality and Condition
4. Parts of the Home
5. Utilities and Intangible Factors
6. Time Factors
7. Home Price [Target]



Pre Processing

1. Our model will fail if we have too many missing values

2. Columns with >50% null values are removed

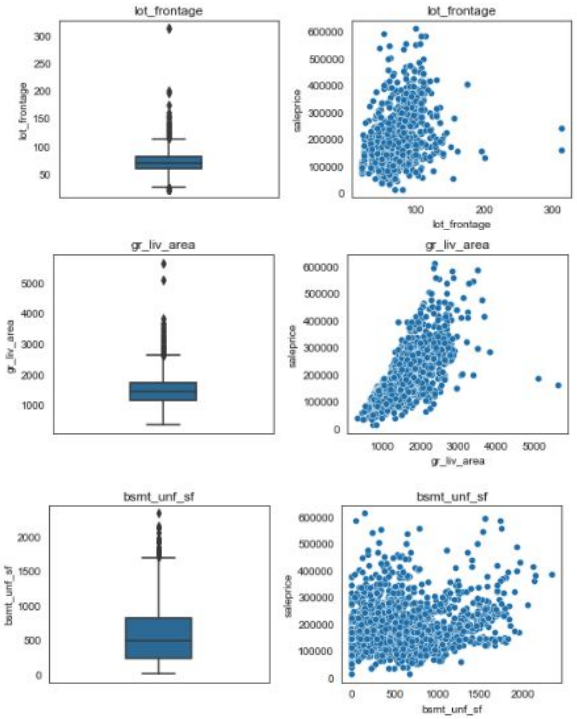
3. Filling up Missing Values

- Imputing Median value for numerical features

- Imputing ‘NA’ for categorical features

Effect: those imputed values might skew the data as they are treated as actual observations

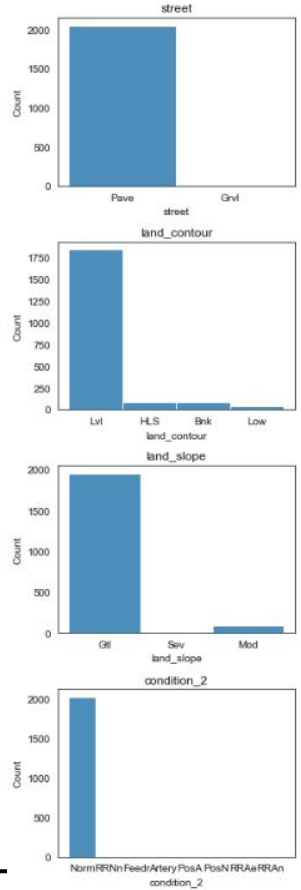
Feature Engineering



Feature Engineering:

1. Some of the data have outliers. Therefore, we are going to scale using the Robust Scaler for numerical values.
2. One Hot Encoding: preprocessing step to convert categorical features to 0 and 1 that can be processed by machine.
3. House age: year sold- year built

Limitation: When most of our data resides on one of the categorical feature, this feature can't be used as a good predictor because there is not much differences for our machine to learn



Best Model: Linear Regression

Reason

We want to predict the value of a variable based on the values of other variables, so we decided to use linear regression.

The Score

R^2: R-squared is the percentage of the dependent variable variation that a linear model explains.

The Root Mean Square Error

Measure of the differences between values (sample or population values) predicted by a model and the values observed

Criteria for Good Model

How near our predicted value to true value in our Training Data

Takeaway

Finding Undervalued Homes based on the Model


Housing Price - Predicted Vs. Actual
Predicted Price per square Feet
Actual Market Price Per Square Feet
0
20
40
60
80
100

Takeaway
Factors Affecting Price

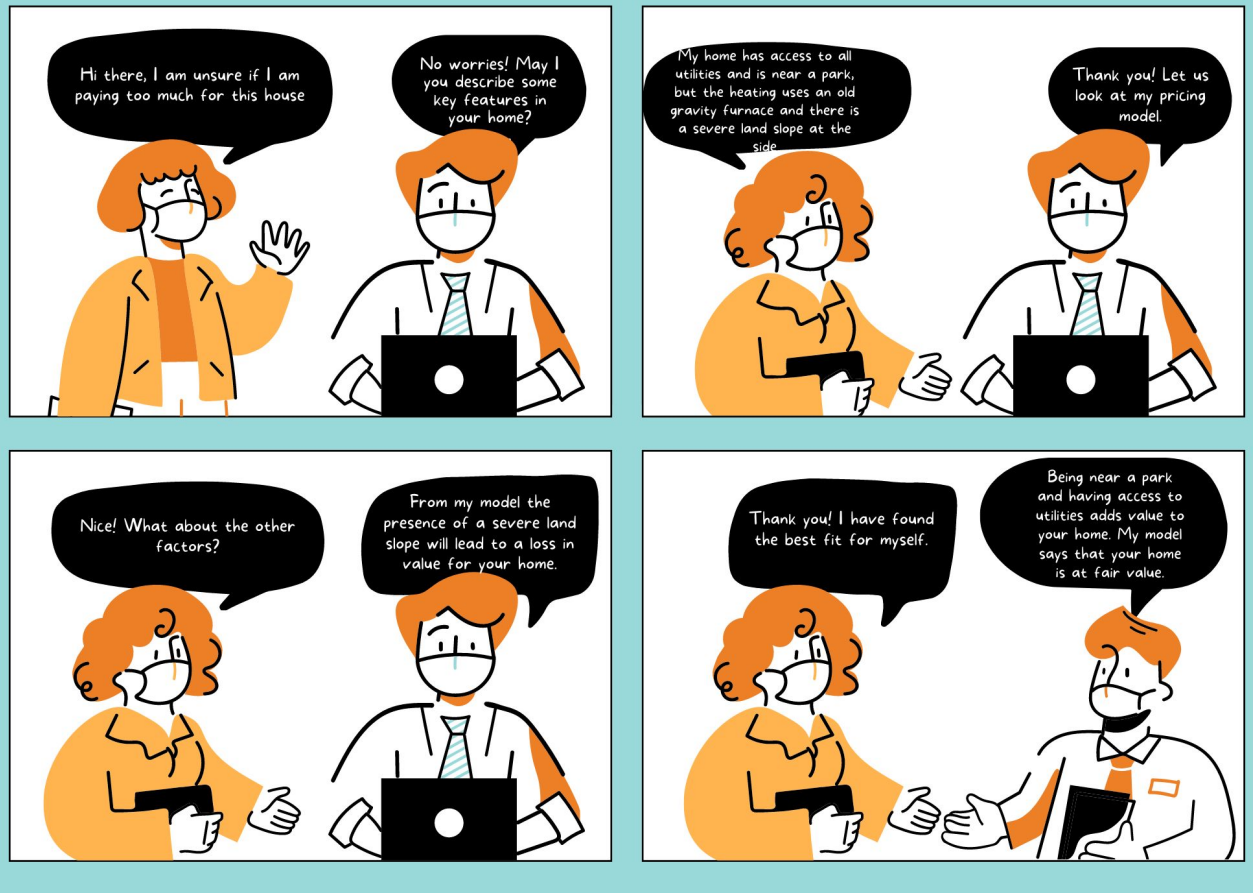
Factors with Positive Effect on Price Per Square Feet

Factor	Effect on Price per Square Feet
Wood Shakes Roof Material	22.19
2-Storey PUD 1946 and newer	21.63
Floating Village Residential	6.129
Near Positive Off-Site Feature - parks, greenbelt etc	4.039
Availability of all Utilities	3.14
Paved Street	2.13

Factors with Negative Effect on Price Per Square Feet

Factor	Effect on Price per Square Feet
Irregular lot shape	-6.89
Frontage on 3 sides of property	-6.02
Gravity Furnace	-4.94
Adjacent to East West Railroad	-4.64
Land contour low depression	-4.31
Severe Land Slope	-2.81

CHOICES


Hi there, I am unsure if I am paying too much for this house
No worries! May I you describe some key features in your home?
My home has access to all utilities and is near a park, but the heating uses an old gravity furnace and there is a severe land slope at the side
Thank you! Let us look at my pricing model.
Nice! What about the other factors?
From my model the presence of a severe land slope will lead to a loss in value for your home.
Thank you! I have found the best fit for myself.
Being near a park and having access to utilities adds value to your home. My model says that your home is at fair value.

Thank You 🙂

Slides Dump

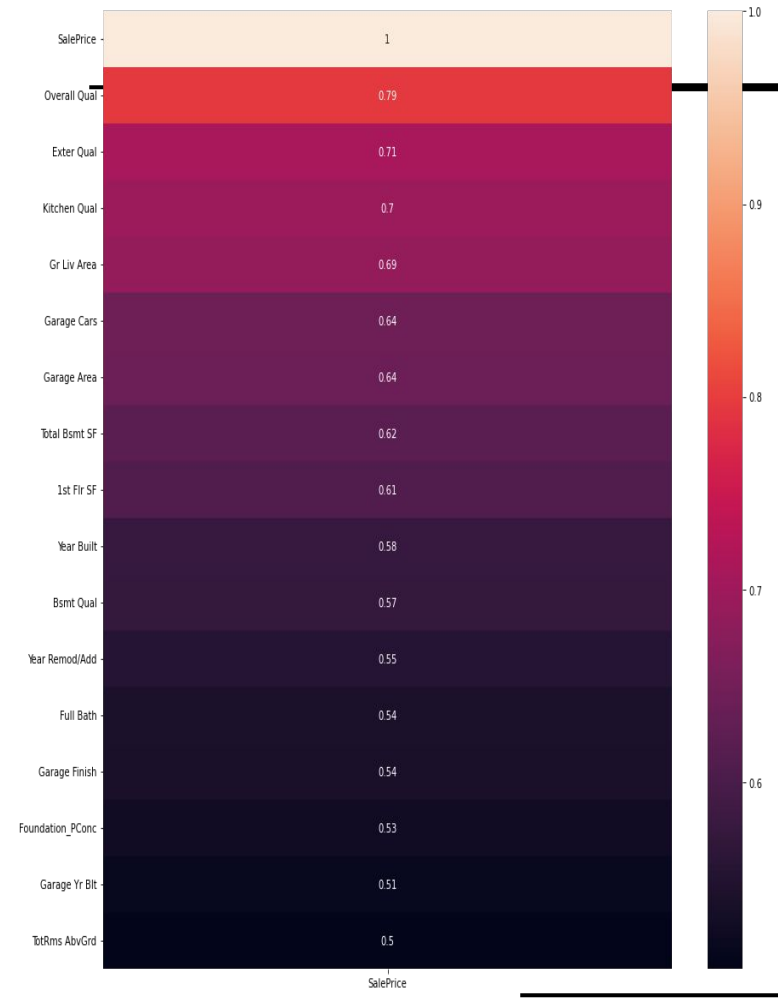
Conclusion

Possible Improvements

Outliers can cause the data to be skewed and affect our model

Effect: those imputed values might skew the data as they are treated as actual observations

Data Overview



First, we are looking at the correlation between sale price and the 80 features. Ranking those from the highest to lowest correlation.

The top 3 features are coming from quality point of view starting from overall (material and finishing), external quality and kitchen quality.

Then, followed by features related to area such as how big is the general living area, garage size, and basement size.