A Predictive Model for Real Estate Prices to Generate Investment Returns in Ames, Iowa

Iowa Real Estate Investment Fund

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Executive Summary

Background

- The Executive Committee of the Iowa Real Estate Investment Fund (IREIF) identified Ames as a high potential target to invest in.

- We seek to understand why real estate in Ames is attracting attention as well as develop a model to predict the intrinsic value of houses in Ames.

- The model can then be used to identify houses are that undervalued and subsequently drive investment returns for the Fund.

Model & Conclusions

- Using Ames housing dataset that contains over 2,400 transactions, we identified features that could better predict house prices

- Our model generates good predictive ability for house valuations up till $300,000 and subsequently tend to under-predict valuations for prices above this range.

- We believe the model is still useful as it provides a margin of safety and subsequently generate higher returns for the fund

Ames: The 9th Best City to Live In

BEST PLACES TO LIVE *Money's list of America's best small cities*

9th Overall

MAIN STREET BECOMES YOUR MAIN HANGOUT.

Home to Iowa State University

More than 30 Parks and Golf Courses

Vibrant Community

DOWN TOWN AMES

# Ames: An Undiscovered Sub-Urban Town

- With a population of more than 65,000, Ames offers cultural, recreational, educational, business, and entertainment amenities more common in bigger metros.

- Named one of the "15 Cities That Have Done the Best Since the Recession" by Bloomberg Business

- Ranked No. 8 by Niche Ranking for "Best Towns for Millennials in America."

- Additionally, USA Today named Ames as the healthiest city in America

Feature	Value
2019 Population	66,258
Area	71.69 Sq Km
Median Household Income	46,127
Median Housing Value	196,400
Total Housing Units	26,754
Number of firms	4,202
No. of students in Iowa State Uni	33,391
Top Employer	Iowa State Uni (16,811)

Source: https://www.cityofames.org/about-ames/about-ames

Getting Around Ames

- Ames housing districts are spread into 4 main locations:

- Central: the first to developed, coinciding with main activities in Ames in the past

- Expanded into the West, beyond Iowa State University and South areas, which is near Ames Municipal Airport, before finally expanding further north

- Surrounded by amenities, parks and golf courses
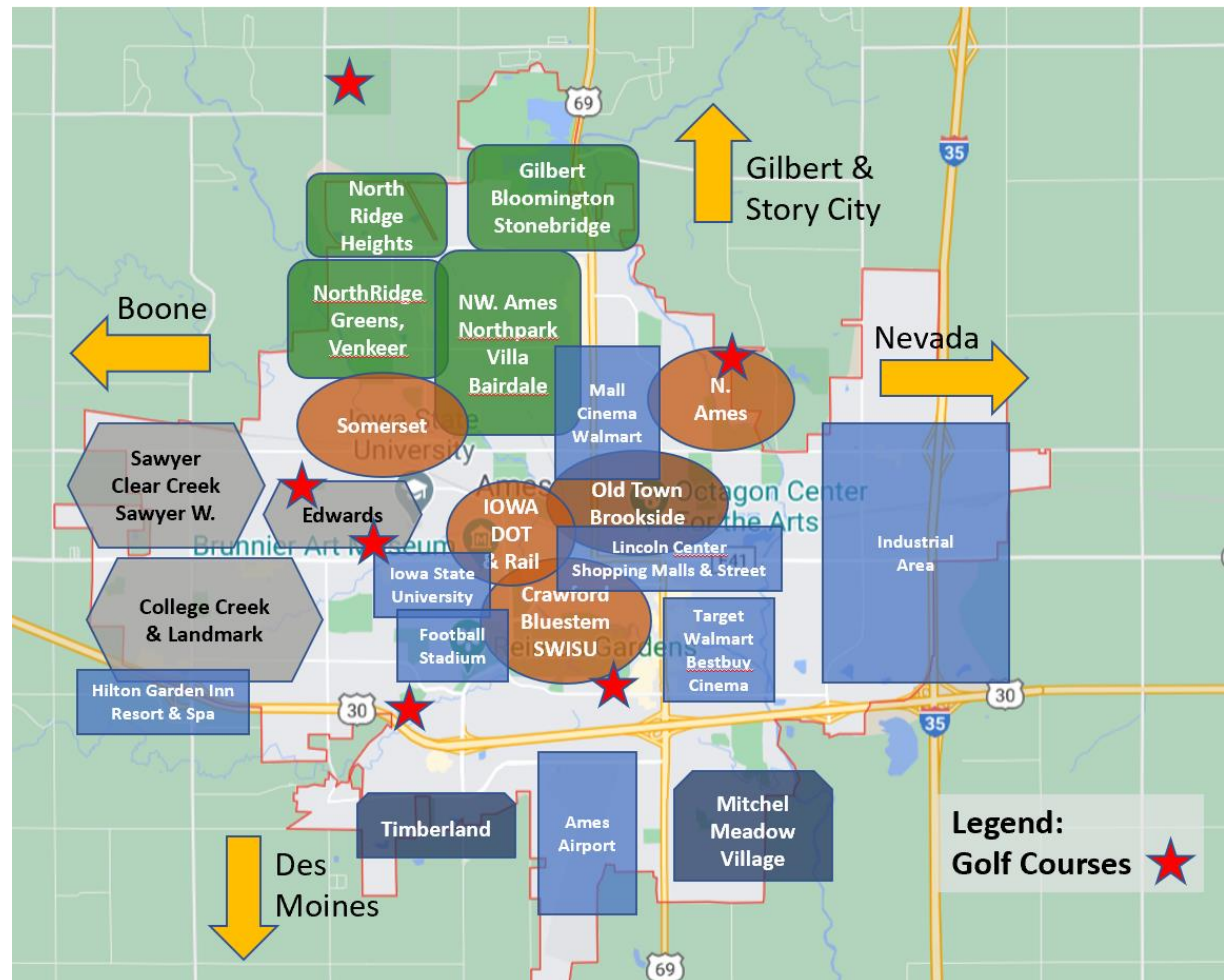
Categorical Features Selection

- We developed a methodological approach, looking at each feature and judging their ability to explain and affect sale price by grouping or converting the underlying data to better fit our business case:

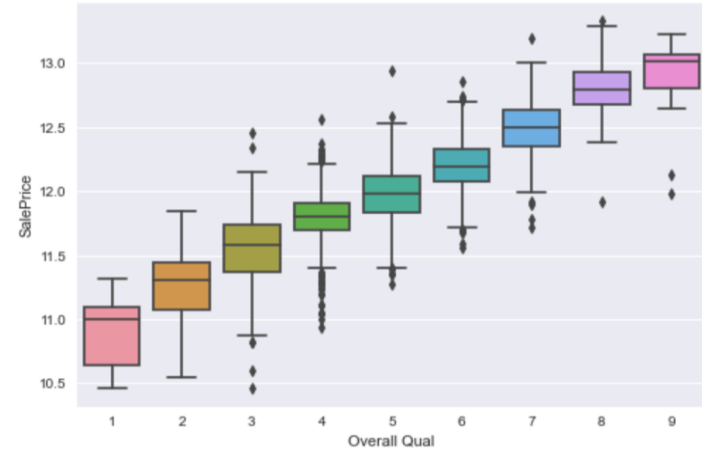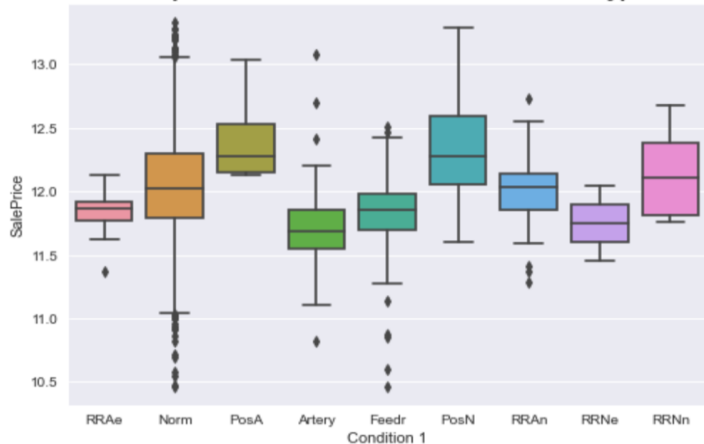Boxplot of Sale Prices in each Overall Quality Type
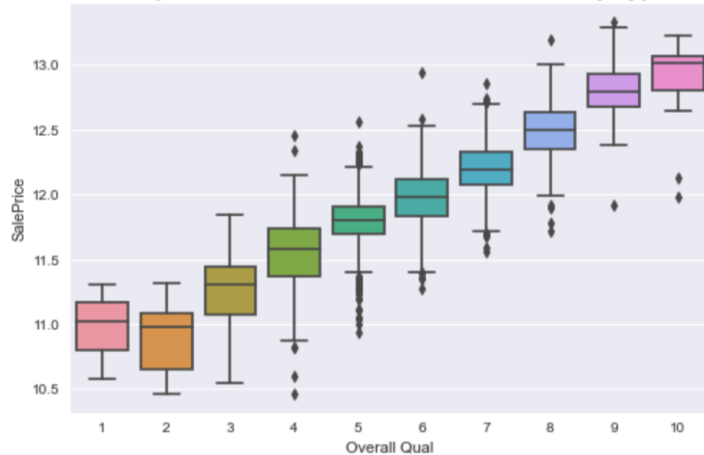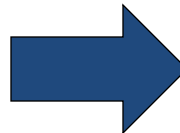
Original 10-pt scale...

Boxplot of Sale Prices in each Overall Quality Type After Conversion
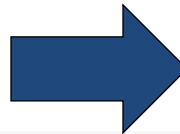
... converted to a 9-pt scale

Boxplot of Sale Prices in each Condition 1 Type

9 categories ...

Boxplot of Sale Prices in each Condition 1 Type After Conversion

... grouped into 3 categories
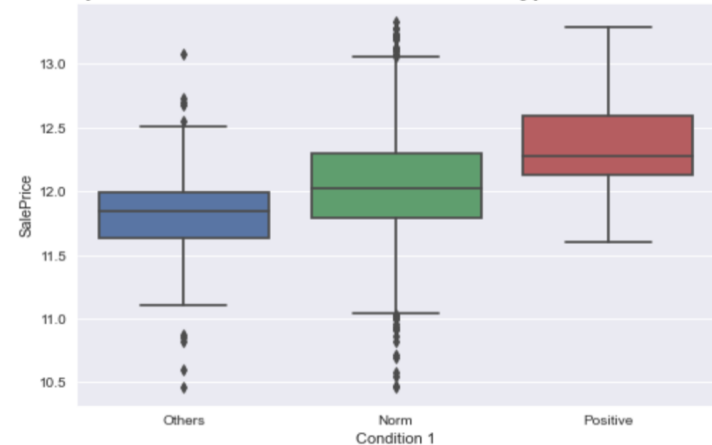
Quantitative Features Selection

▪ Selecting quantitative features based on their correlation with sale price and pair-wise scatter plot diagrams:

Correlation of features with Sale Price
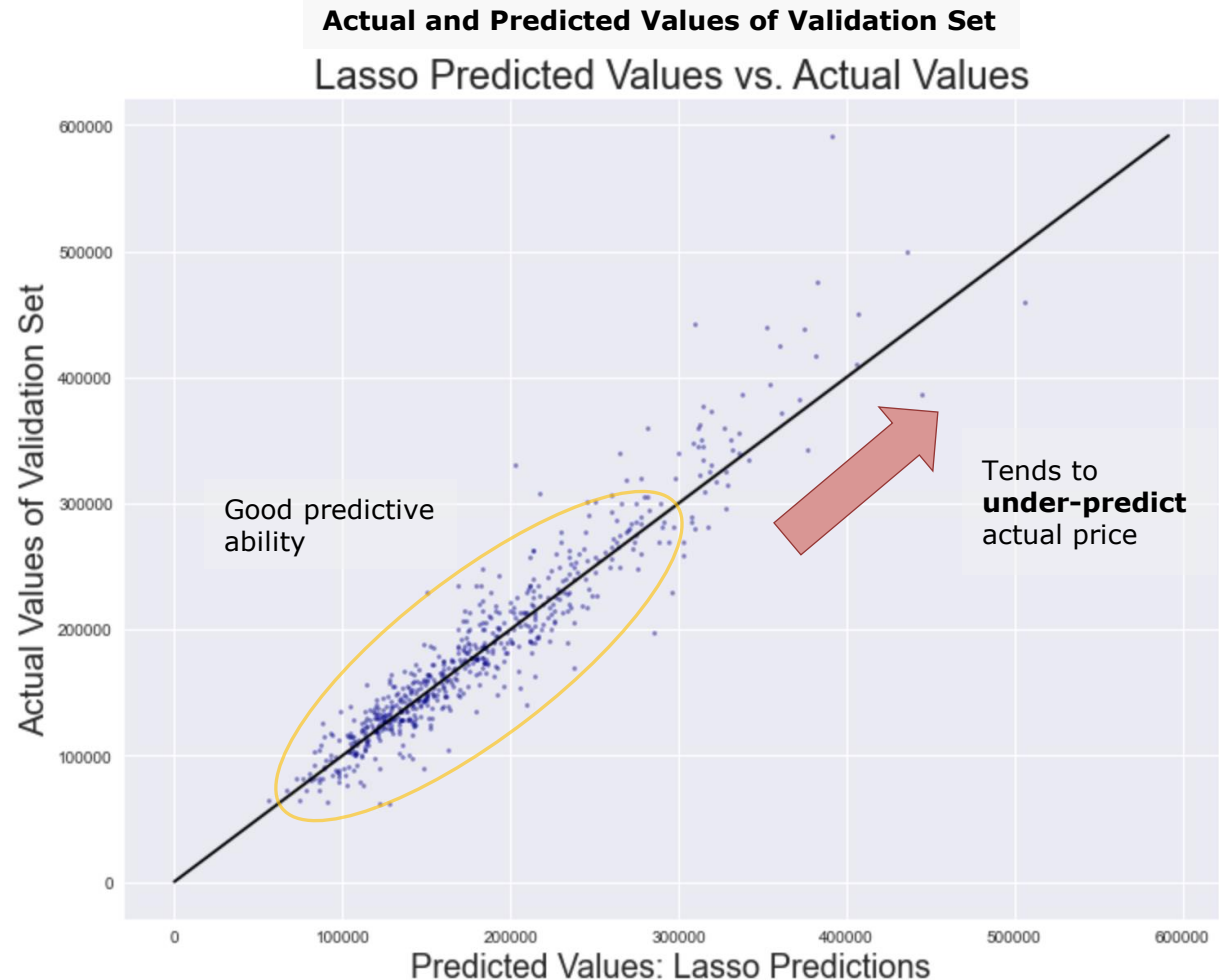

Gross Living Area Vs Sale Price

Overall Quality and Gross Living Area Vs Sale Price

Model Comparison
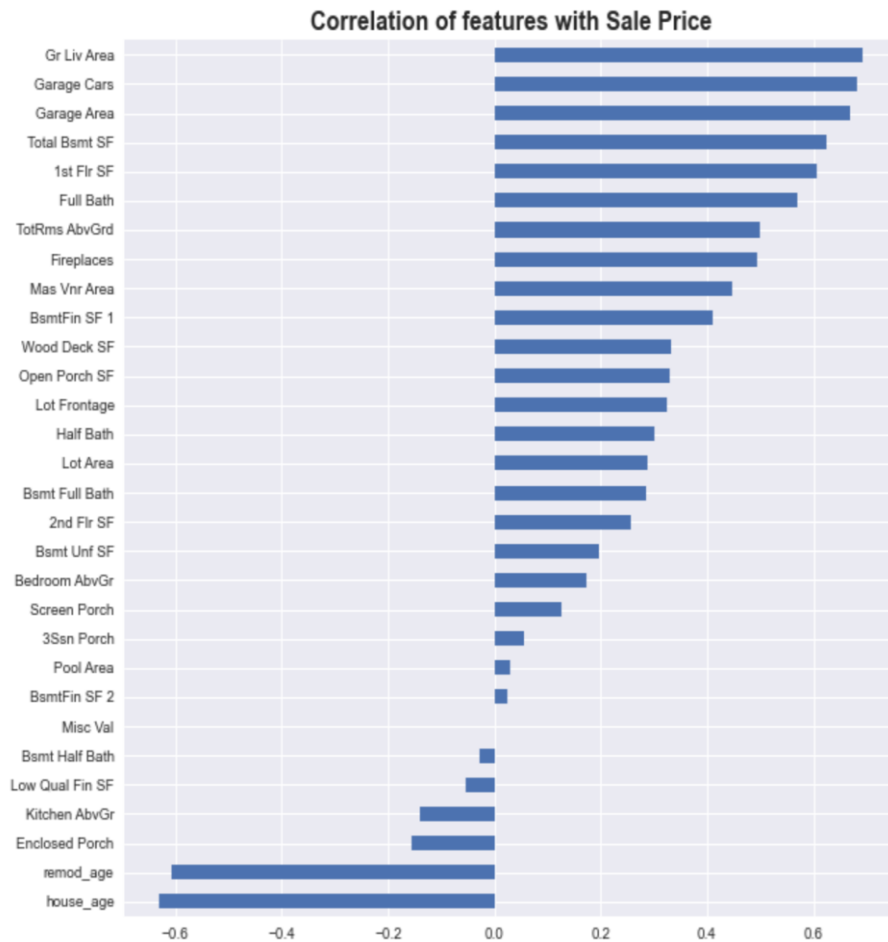
Scoring on Validation Set

Model	RMSE
Linear Regression	25,705.4
Ridge Regularization	25,654.7
Lasso Regularization	**25,219.5**
ElasticNet	25,227.6

- 28 main features were selected (before conversion to dummy variables)

- Lasso Regularization converted 6 of our features to 0, effectively simplifying the model as well as achieving the lowest RMSE scores on our validation set

- Hence, we chose Lasso as our final model to base our predictions on

Lasso's Predictions & Limitations

- Our Lasso model has good predictive value up till the $300,000 valuation

- Thereafter, the model under-predicts the actual values, generating higher variance as a result, especially after the $350,000 valuation mark

Actual and Predicted Values of Validation Set

Lasso Predicted Values vs. Actual Values

Good predictive ability

Tends to **under-predict** actual price

9

Conclusions: Is Our Model Useless?

- **Strengths:**

  - Excellent Predictive Ability until $300,000

  - For house prices predicted within this valuation, we are confident that the house's **intrinsic value** is within a comfortable margin of error

- **Limitations:**

  - Under-predicting most of the time for houses above $300,000 valuation

  - We can treat this as a margin of safety from the intrinsic value of the house

  - Implying a greater upside, and higher positive returns

- **Improvements:**

  - Collecting more data, especially for prices that are above $300,000

  - Recall that our dataset only represents approx. 8% of the total number of houses in Ames