AMES HOUSING DATA & NEXRES' NEXT STEPS

DSI-SG-33
Project 2: Group 1
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Background: Ames, Iowa

People

2,484 people
per square mile

41% are families

Income

26.60%
poverty rate

$67,026 average

Climate

humid
continental

▲ *74.0°F (23.3°C)*
▼ *20.4°F (-6.44°C)*

Problem Statement

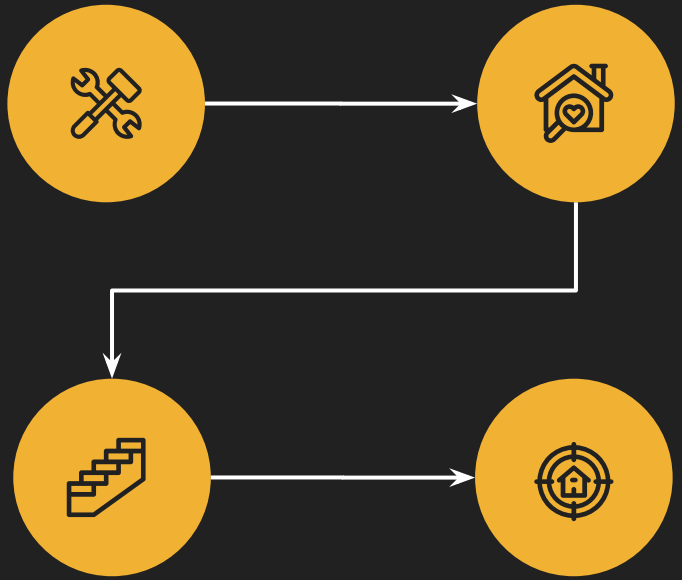
Existing Portal	Increased Competition	Develop Model	Deploy API	Maintain Status
But it **lacks** a unique feature!	*Differentiation needed!*	Forecast prices & features **80% accuracy**	**Empower agents** • negotiate for fairer valuations • advise on property optimisation for sale	**Provide top value to clients** • Cement our status as top RE agency

METHODOLOGY

Building a Predictive Model

Data Cleaning

Dealing with “missing” values



Analysis

A closer look at features that relate to higher selling prices

Modelling

Create models and evaluate performance

Insights

Interpretation and recommendations

DATA CLEANING

Process

Imputation of null values

Median, Mode, “None”, “0”

Dropping of features

Identifiers

Feature Engineering

Creation of new features using existing features

Dataset

Obtained from the Ames Assessor's Office.

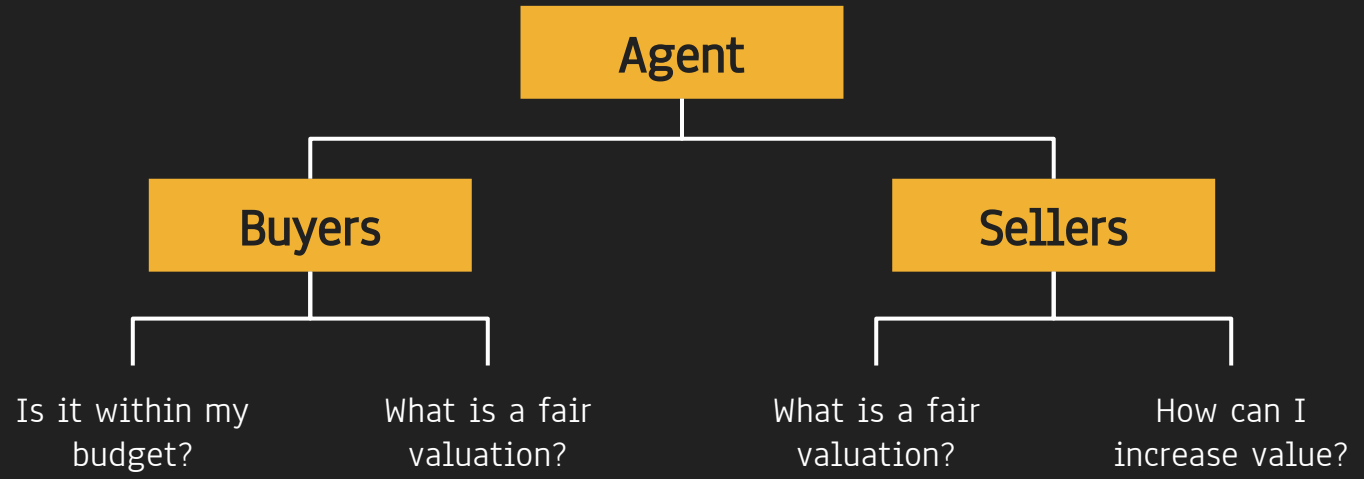
Record of sales for residential properties sold in Ames, Iowa from 2006 to 2010.

After cleaning and feature engineering:

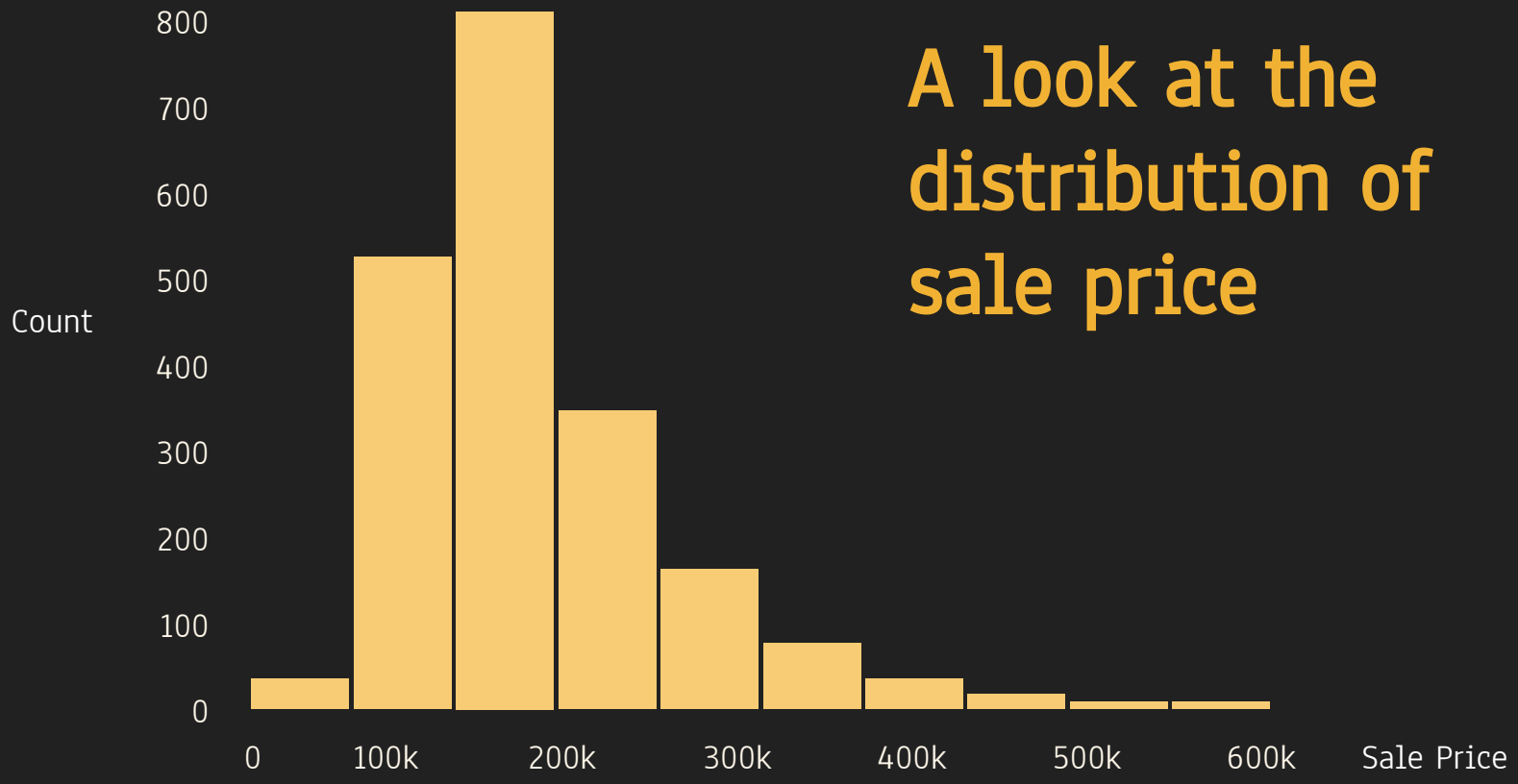
Valid House Observations	Original Features	New Features	Target
2049	77	2	Sale Price

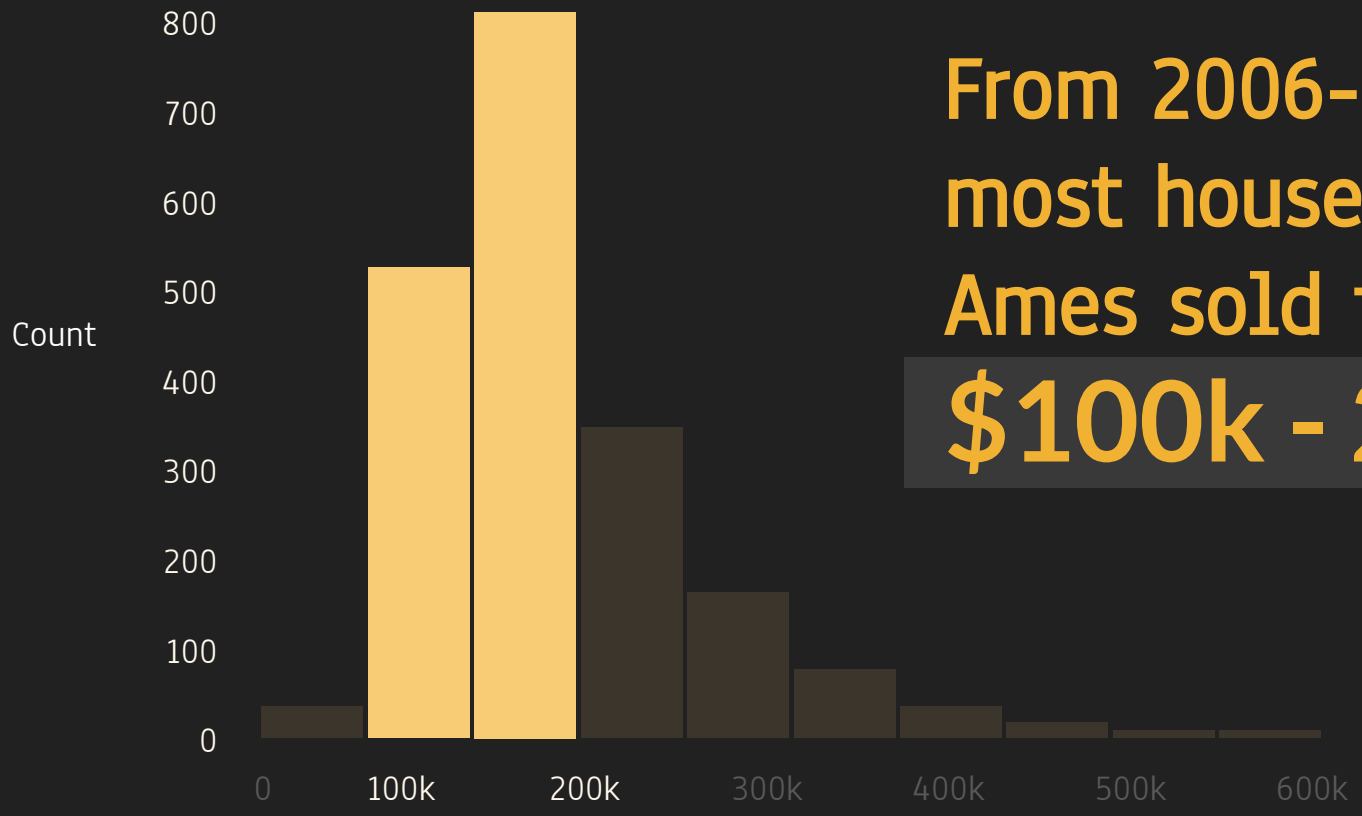
EXPLORATORY DATA ANALYSIS

Guiding Principle



A look at the distribution of sale price





From 2006-2010, most houses in Ames sold for

$100k - 200k

Higher Selling Price - 3 Key Features

Neighborhood

Houses in certain locations command the higher average prices

Overall Quality

Houses with better overall material and finish sell for higher

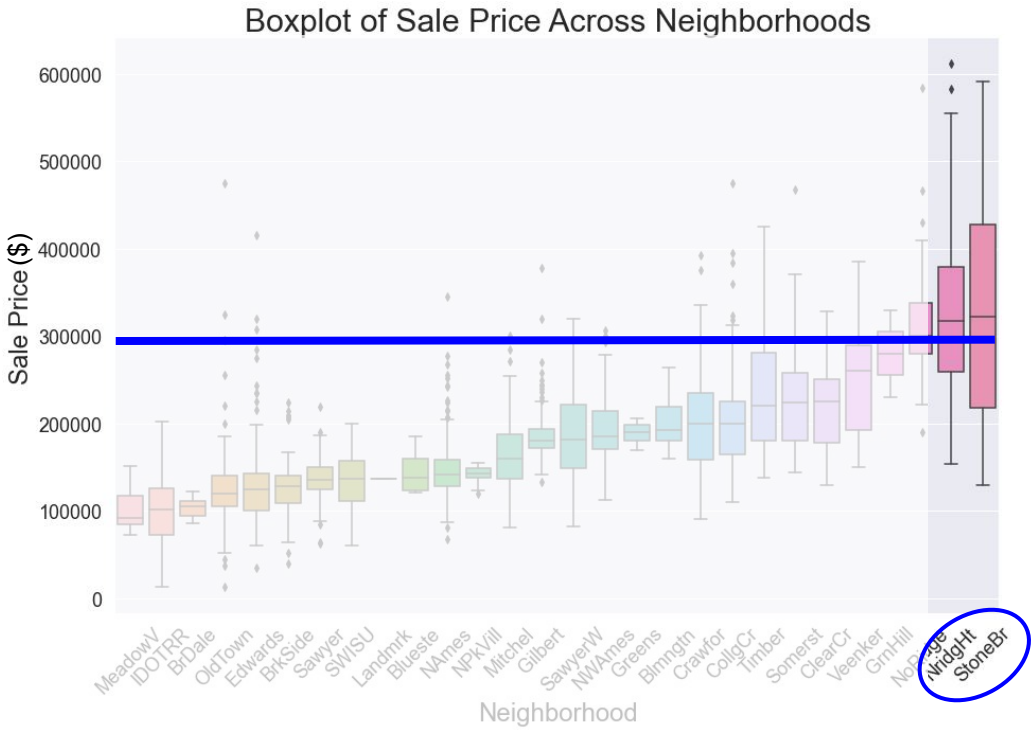
Total Built Area

The amount of “useful” area above ground is a familiar valuation metric

Neighborhood

Stone Brook and **Northridge Heights** homes have a higher median sale-price of above **$300K**

- Proximity to Iowa state university and Gilbert school district [1]
- Full range of amenities [2]



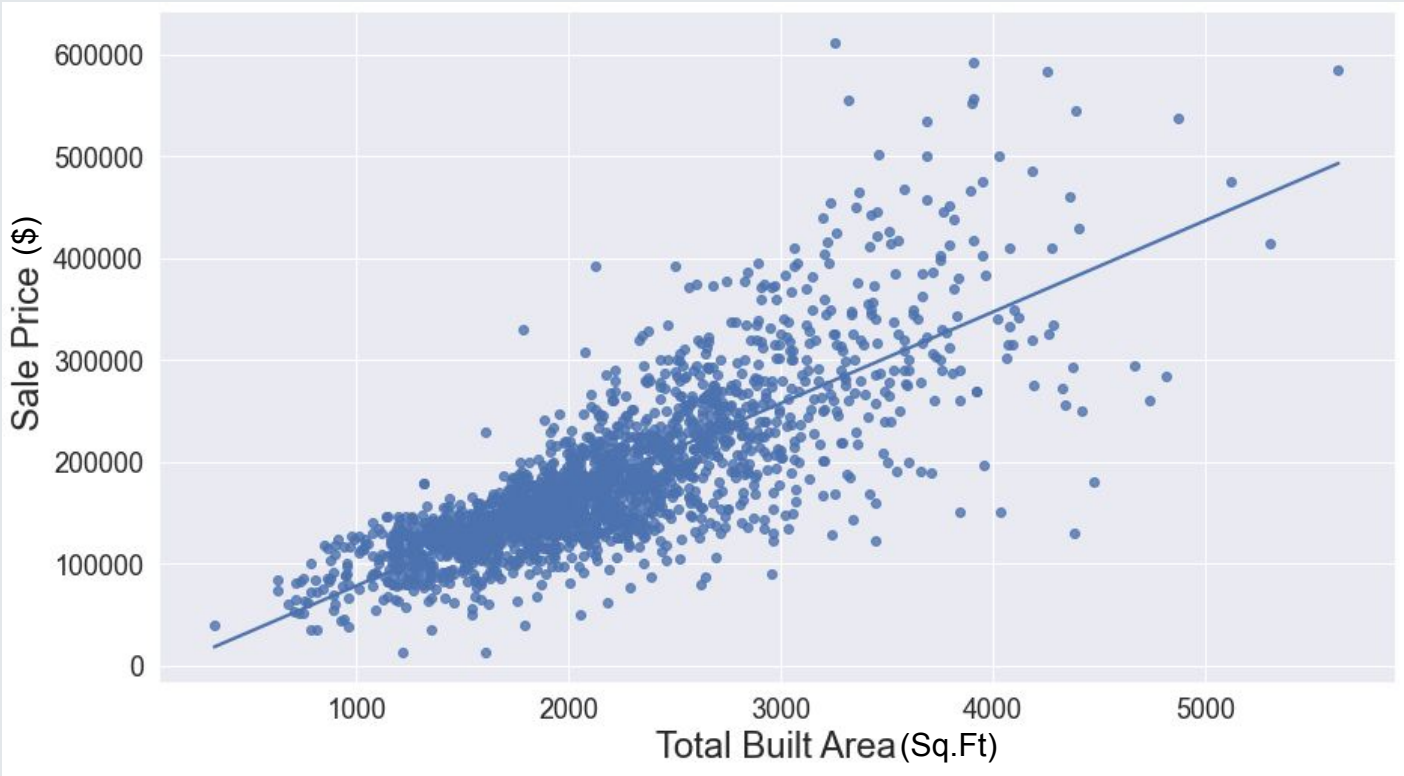
[1] About Ames, City of Ames
[2] Northridge Heights, Hunziker Development.

Overall Quality (1-10 Scale)

Houses with **better overall** materials and finish **sell for higher**

- An **increment in quality by 1 point** from 7-8 sees a marginal median sale price **increment of 35%**
- On average, the price of a house **rated as a 10** commands **more than 2x** that of **a 7**

Positive Correlation between Total Built Area and Sale Price



Fireplace Quality

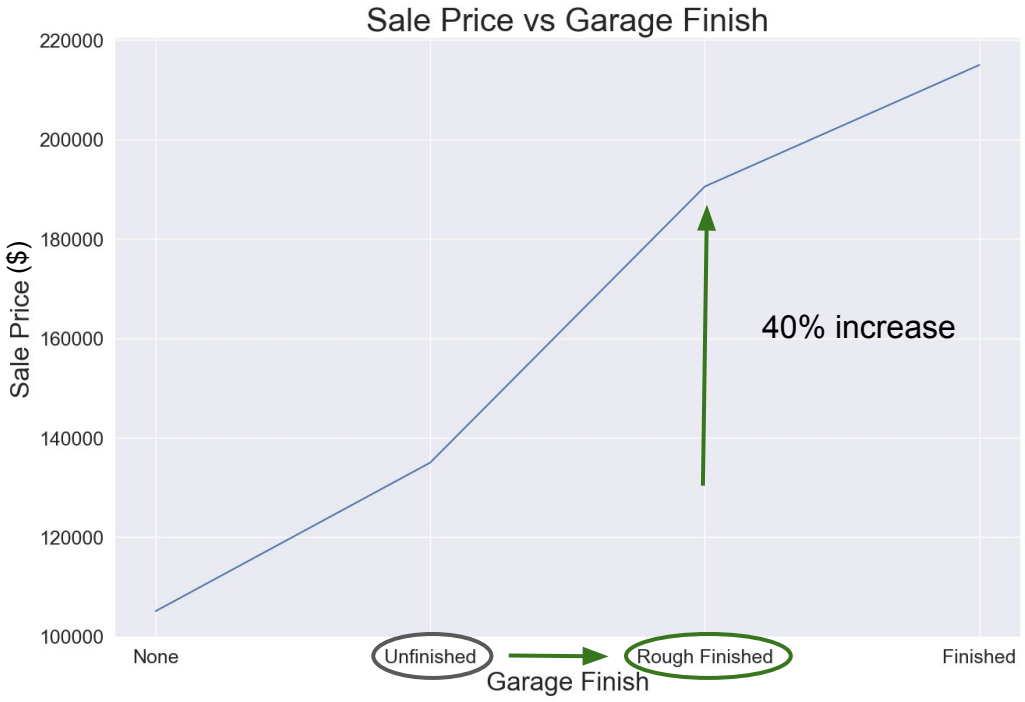
Sub-zero (°C) temperatures during winter

- **Better quality** fireplaces → **Higher** prices
- **Excellent** fireplace → **50% higher** median sale price!

Garage Finish

Average **car ownership is relatively high** at 2 per household

Biggest jump in median sale price of **40%** between an **unfinished** and **roughly finished** garage.



Machine Learning Models

Regression Model Analysis

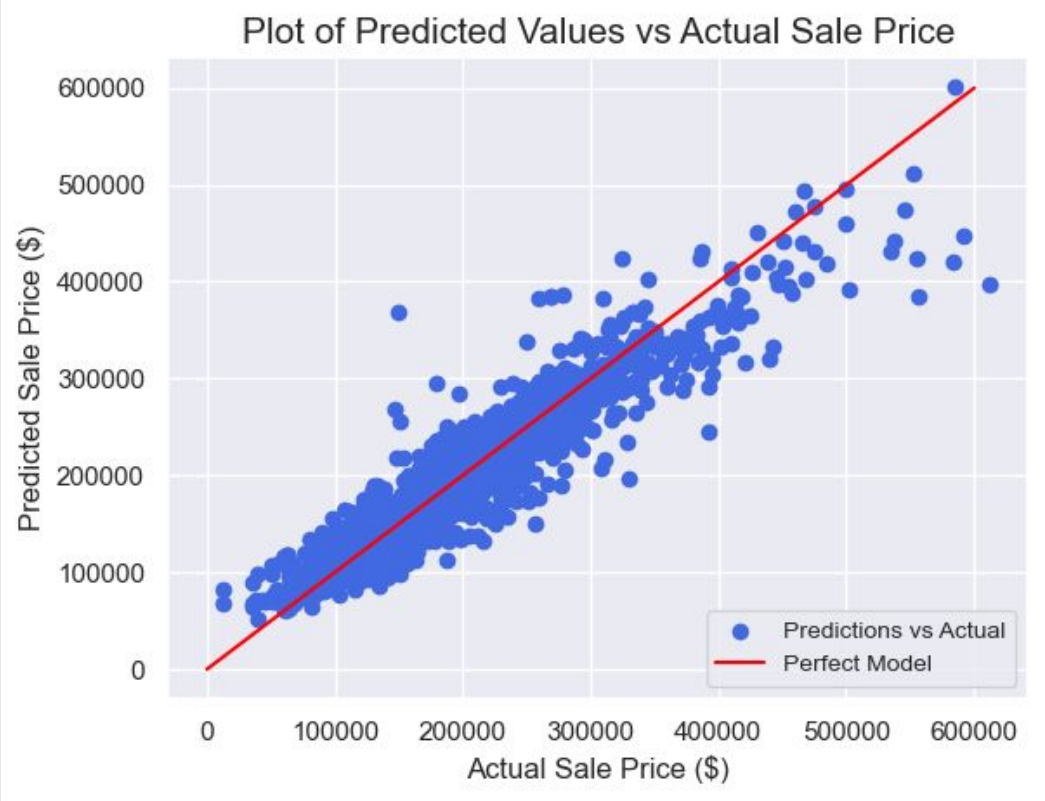
A regression model works by examining whether changes observed in the dependent variable are associated with changes in one or more of the explanatory variables.

We built 3 kinds of regression models: Linear Regression, Ridge regression and Lasso Regression and found that our Lasso model works best in learning and predicting sale prices of homes.

Regression Model Performance

	R^2	RMSLE	% Error	Selection
Linear	83.96%	0.2353	17.71%	
Lasso	**84.44%**	**0.2316**	**17.42%**	✔
Ridge	84.30%	0.2326	17.49%	

High Accuracy of Model in Predicting Sale Price

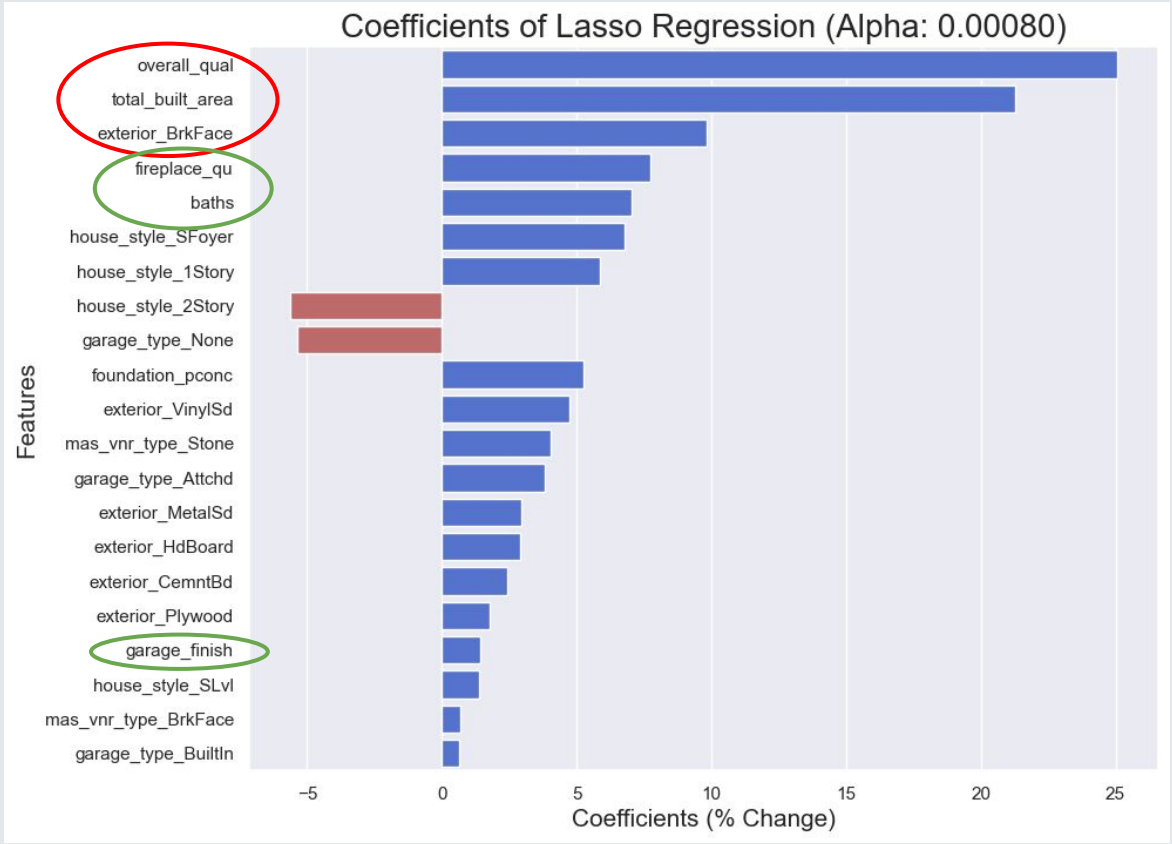


Does it actually work?

Stone Brooke	NW Ames	Edwards
Predicted Price $346,631	Predicted Price $179,338	Predicted Price $83,849
• Overall Condition - 8 • Foundation - P Concrete • Fireplace - Good	• Overall Condition - 6 • Foundation - C Block • Fireplace - Typical	• Overall Condition - 4 • Foundation - Brick & Tile • No Fireplace
$349,265	$181,000	$86,000

RECOMMENDATIONS

% Change in Sale Price per Feature



The top 3 **positive** features

Improve the value of a home

Negotiate for better prices

FUTURE WORK

Limitations

Outdated Dataset

Significant changes to neighborhoods since

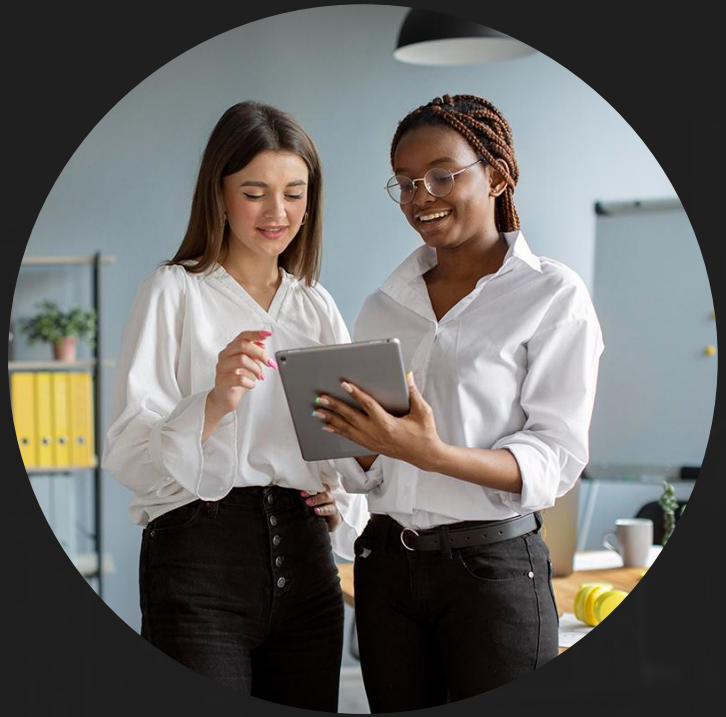
Socio-Economic Factors

Recession periods from 2007 - 2009

Lack of Certain Features

Amenities, nearby schools

Future Uses



Build an in-house app (for Agents only)

Advise clients on house features

Conclusions

We managed to:

- Build an effective model
- Understand which and to what extent various features affect sale price
- Advise agents to negotiate better transactions

Thank you!