

Project 2: Ames, IA

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Overview

- Ames Population: 66,427 ISU Population: 33,391 [Source](#)
- Student home ownership (25 - 34 at 37%) [Source](#)
- It's hard!

“In fact, according to the Zillow Group Consumer Housing Trends Report, 64 percent of sellers lower their price at least once. The key is to recognize quickly that you’ve overpriced, and make an accurate adjustment.” [Source](#)

Problem Statement:

Build a predictive linear regression model for real estate company to help give the local Ames, Iowa property owner, an idea of how much their home will sell for using features that are easily determinable.

Looking at Features

variables north-south paved ages material density exterior adjacent fair railroad article access street poor na square city home porch unfinished values number sf typical ta nominal lot quality unit gravel newer finished bsmt garage type continuous set shingles feature bsmt pool data area good discrete normal po wood story split low sale general property price condition excellent gd nd ordinal off-site unf inches deductions grade living level one house brick one-half masonry siding slope residential stucco observations regression quarters exposure dwelling family used

1. Overall Qual,
 2. Total Bsmt SF
 3. Gr Liv Area
 4. Full Baths
 5. TotRms AbvGrd
 6. Garage Cars
 7. Central Air
 8. Fireplaces
 9. topqual ***
 10. rooms_per_sq_score ***
 11. tophoods ***
 12. good_elec ***
 13. newness ***
-

*** engineered

1. Overall material and finish of home
 2. Basement square footage
 3. Rest of house square footage
 4. Number of full bathrooms
 5. Number of non-basement rooms
 6. Number of cars garage can fit
 7. Central Air
 8. Number of fireplaces
 9. Ranking of quality compared to other homes
 10. Scores the effect of rooms on sq. footage
 11. Neighborhood in Ames
 12. Standard Circuit Breaker
 13. Most recent construction event
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Early correlations

Correlation of Chosen Features

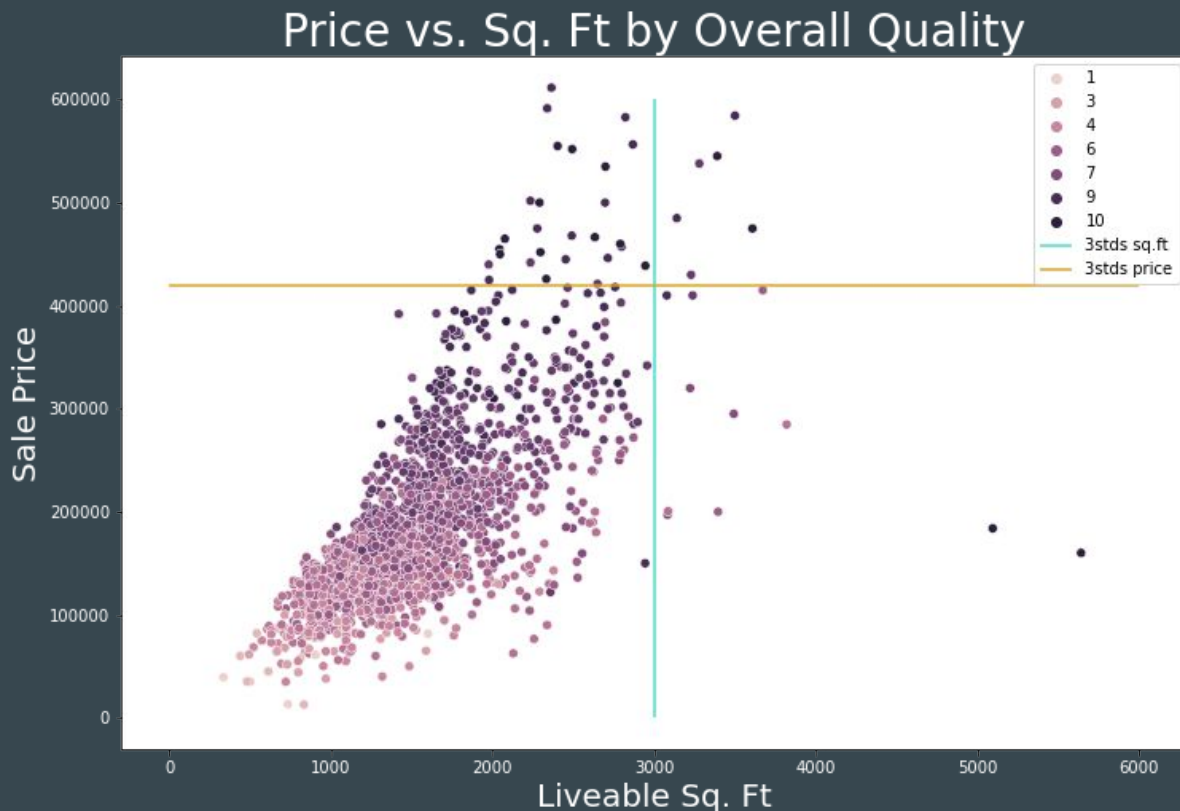


	column	coef
0	Overall Qual	18488.485744
1	Total Bsmt SF	43.455278
2	Gr Liv Area	172.845515
3	Full Bath	-9363.309129
4	TotRms AbvGrd	-28006.625072
5	Garage Cars	9441.825322
6	Central Air	-6348.402571
7	Fireplaces	6243.821647
8	topqual	-9449.072800
9	rooms_per_sq_score	-171574.816581
10	tophoods	11540.449081
11	good_elec	-3801.216748
12	newness	-448.245204

Baseline Features

Square Feet and Quality

- Largest correlations
- Outliers
- Simple Linear Regression $R^2 = .48$



True Sale vs. Predicted Sale Model 1



Basic Model

- Features
- No PolynomialFeatures
- $R^2 = 0.843$
- $MAE = 21,456.02$
- $RMSE = 31,271.81$

True vs. Predicted Sales Ridge



Ridge Model

- Features & PolynomialFeatures
- $R^2 = 0.903$
- MAE = 17,190.61
- RMSE = 24,612.01

Sample Questionnaire

Question 1	• How many square feet is your basement?
Question 2	• How many square feet is the rest of your home?
Question 3	• How many full bathrooms do you have?
Question 4	• How many rooms (excluding basement) do you have?
Question 5	• How many cars fit in your garage?
Question 6	• Do you have central A/C?
Question 7	• How many fireplaces do you have?
Question 8	• Do you have a standard circuit breaker?
Question 9	• Which Ames neighborhood do you call home?
Question 10	• When was your most recent major home improvement?
Question 11	• With all previous questions in mind, how would you rank the overall quality of your home from 1 to 10?

Conclusions and Next Steps

- Model has some success
 - 90% of variance can be explained
 - Predictions are within ~\$17k of true prices
- Growth Opportunities
 - Carve down outliers
 - Simplify engineered features
- Looking to the future of Ames
 - Turn questionnaire into a program that can collect and return information i.e. app, website, etc.

Citations

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- “How to Price Your Home to Sell: Zillow.” *Home Sellers Guide*, 1 Nov. 2021, <https://www.zillow.com/sellers-guide/how-to-price-home-to-sell/>.

Thanks!