



GENERAL ASSET INVESTMENTS

Investment Cycle Planning

GA-DSIF2: Group 6 – Project 2

AMES Housing

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Agenda

Executive Summary &
Problem Statement

Project Scope

House Price Prediction
Approach & Model

House Value Determinants

Investment Recommendations &
Next Steps



Executive Summary & Problem Statement

Problem **Statement**

- Develop **predictive model** forecasting house-selling price
- Data-driven identification of **high-return investment** opportunities through remodeling / renovation

Business implications

- Identify actionable **renovation levers** that increase value in short-term with appropriate investment & risk
- Develop **investment plan** comprising funding needs and return expectations for General Asset Investments

Recommendation

- Invest in real estate with renovation upside in:
 -  Overall house quality
 -  Exterior quality
 -  Kitchen quality
- **46 suitable properties** identified over investment period of 4 years that can be remodeled with **1.7m USD profit** on an investment of 4.6m USD for a 37% return with very limited cost of capital



Agenda



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Project Scope

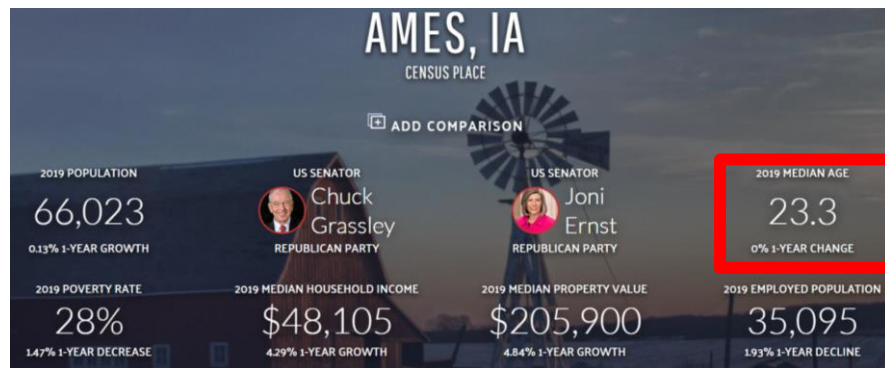
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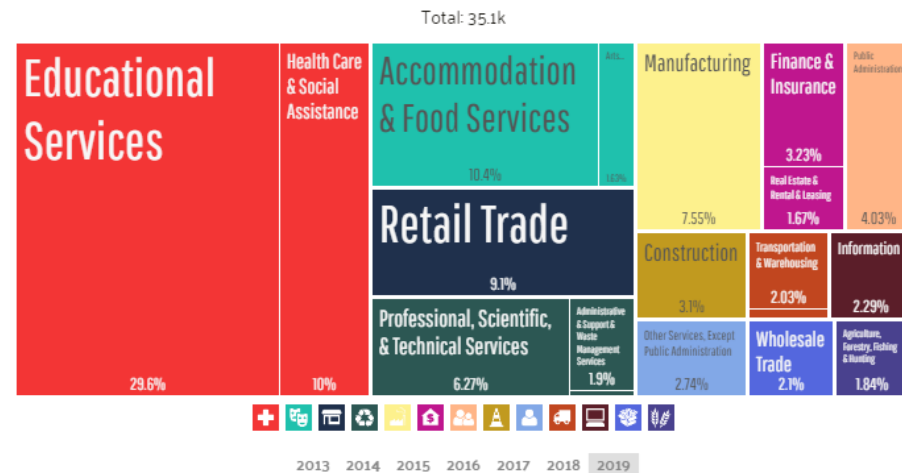
Project Scope

Demographics



- Very young population
- Comparably low household incomes
- Strong dynamic growth indicates interesting investment opportunities

GDP drivers



- Education is the key anchor of the local economy



Project Scope

House ownership drivers

Ames is a college town and the Iowa State University is the largest employer

Rent vs Own

40.7%

2019 HOMEOWNERSHIP

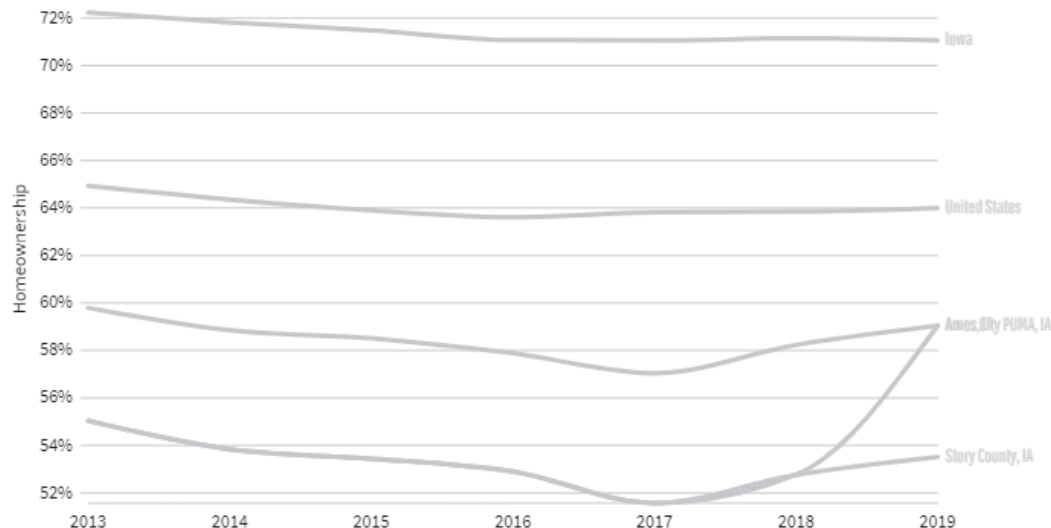
40.8%

2018 HOMEOWNERSHIP

In 2019, 40.7% of the housing units in Ames, IA were occupied by their owner. This percentage declined from the previous year's rate of 40.8%.

This percentage of owner-occupation is lower than the national average of 64.1%. This chart shows the ownership percentage in Ames, IA compared to its parent and neighboring geographies.

Data from [the Census Bureau ACS 5-year Estimate](#).



Retrieved from: <https://datausa.io/profile/geo/ames-ia>

Point to consider:

Features that appeal for investment property (student rentals) may be dissimilar to owner-occupied property



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Approach & Model

Approach & model

Significant effort invested to increase quality of dataset through extensive feature engineering, inclusion of domain knowledge and comprehensive model tuning



Data consolidation

Based on categories with low frequency, multicollinearity analysis, missing data



Data imputation

Based on domain knowledge and other features

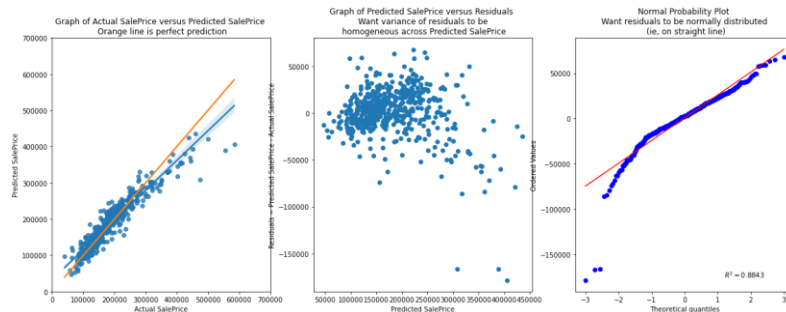


Feature engineering

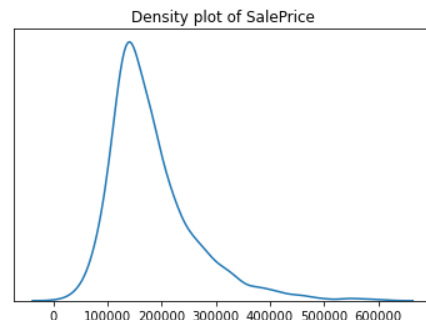
Transformation and encoding of ordinal features based on domain knowledge



Findings



Developed model seems fit to predict house price value drivers with **significant confidence**



- Distribution of house values skewed towards properties on the **lower end**
- Demand for medium-value properties visible allowing exploration of **remodeling / renovation opportunities**



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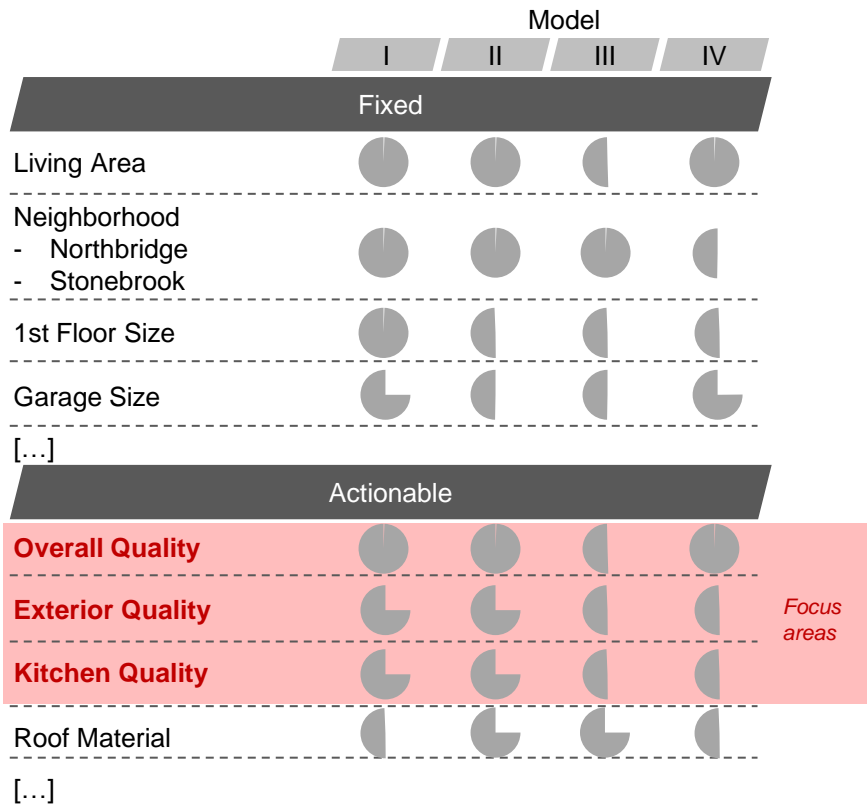
House Value Determinants

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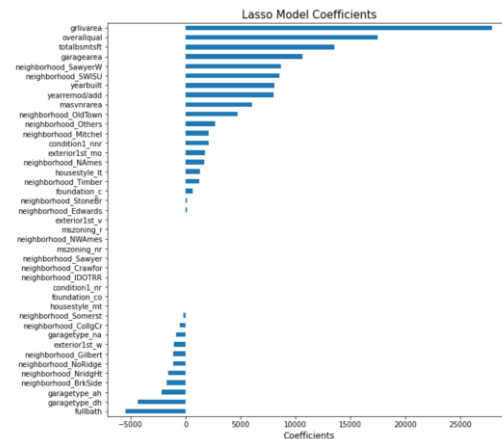


House Value Determinants

Value driver assessment



Key findings



- Ensemble method to identify key predictors identified **common features with strong significance** to determine house prices
- Actionable** ones are “**Overall Quality**”, “**Exterior Quality**” and “**Kitchen Quality**”



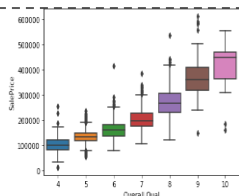
House Value Determinants

Investment options

Business case



Overall
quality



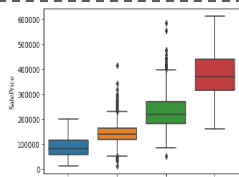
~17500 USD

- Windows
- Shutter
- Porch
- Paint
- [...]

+3
~30000 USD



Exterior
quality



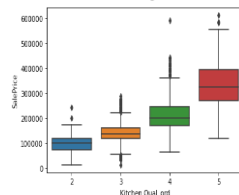
~6300 USD

- Stone Veneer
- Garage Door
- Front Door

+2
~6000 USD



Kitchen
quality



~5700 USD

- Minor kitchen remodeling

+2
~4000 USD

- Acquisition of properties with **renovation potential** in key categories promising **significant returns**
- Fast turn-around of renovation activities reduces cost-of-capital, however significant **capital outlay** required
- 46 suitable properties identified in baseline of 2051 properties



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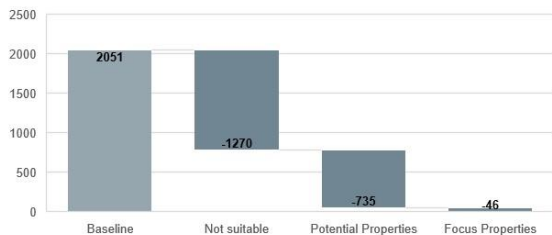
House Value
Determinants

Investment Recommendations &
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Recommendation & next steps

Investment opportunity



- **46 clear investment opportunities** (out of 2051 houses) identified over **4 year period** matching renovation criteria with conservative assumptions
- **~37% margin** expected after accounting for renovation cost
- Investment of 4.6m USD for **return of 6.3m USD** (after cost)
- Scaling to other geographies possible but requiring **validation**

Risks

- **Refreshing of model** with more recent data required to consider effect of external anomalies (e.g. Financial Crisis 2008)
- Include additional factors in line with best practices in **real estate domain** knowledge (e.g. distance to transportation)
- Secondary effects of investment opportunity **profitability erosion** due to inflation of up-scale properties

Recommendation / Next steps



Investment opportunity

- Recommendation to allocate funds to pursue real estate remodeling opportunities as they emerge (~ 1.2m USD annually for AMES region)



Set-up real estate team

- Scale-up data science resources to further develop model, explore scaling to other geographies and validate potential properties