



Predicting Housing Prices with Machine Learning

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Introduction

Buying a home is likely the largest and most important purchase a typical American would make in their life. Using data science and machine learning techniques, we will make predictions of home prices in Ames, Iowa according to several different methodologies.

Specifically, we consider a couple different linear methods and tree-based methods, and evaluate and adjust them based on the particulars of each methodology. We do L1-regularization of the standard multiple linear regression (LASSO), with the intention of preventing model overfitting. We also add a term structure adjustment to a standard Random Forest again hoping to improve the model accuracy. We also compare accuracy and feature importance of a Gradient Boost tree model with a standard Random Forest

In addition, we also look use some neighborhood distance-based aggregation methods to get a sense of the demographic history of Ames housing development.

Description of Dataset:

Objectives



PREDICT

Predict home prices in Ames, Iowa.



IDENTIFY

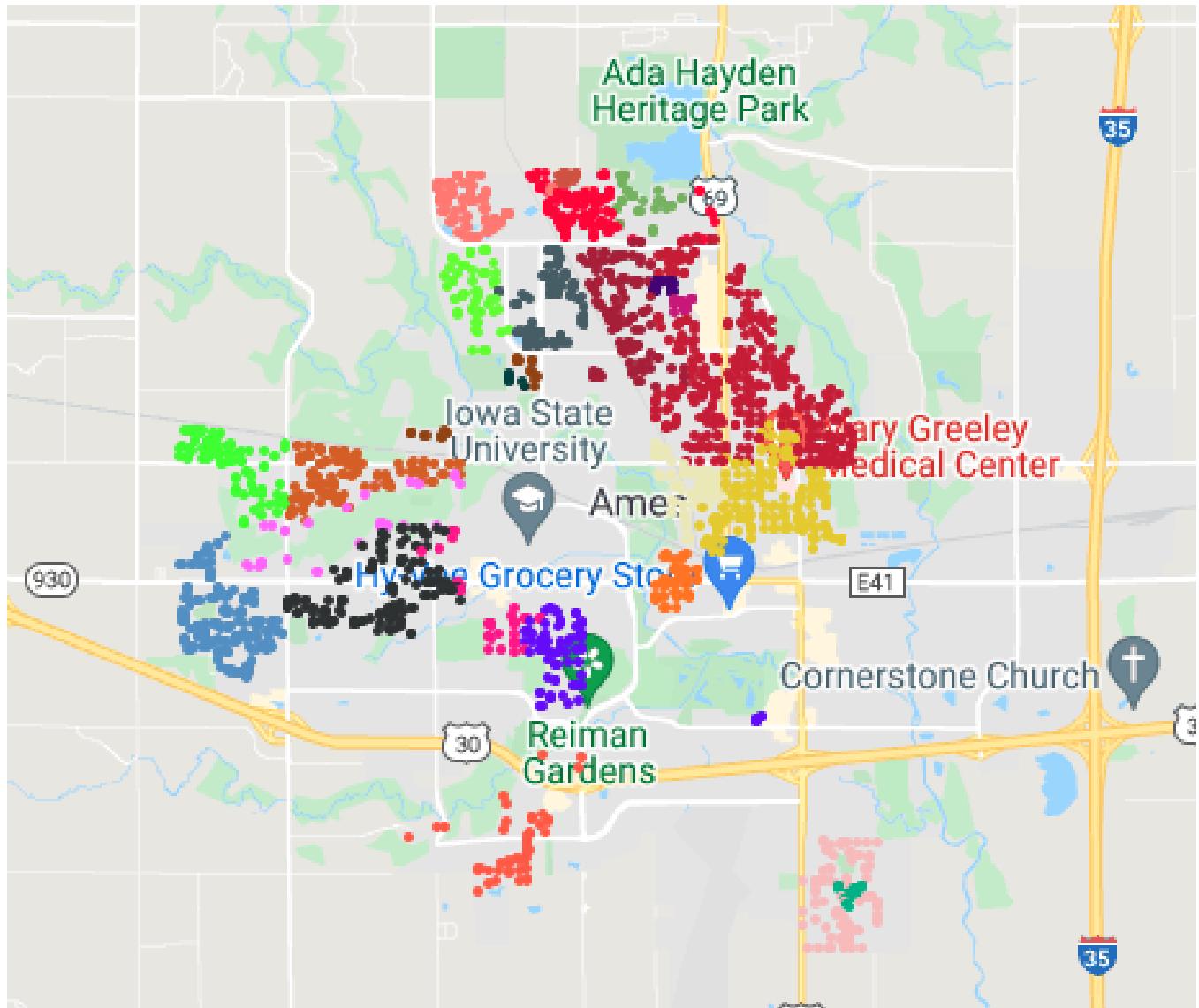
Identify the best methodologies.



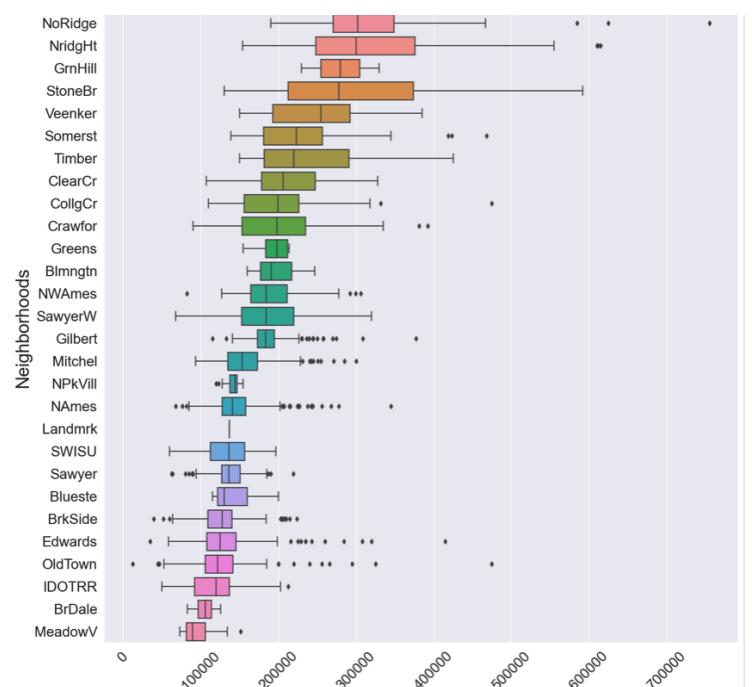
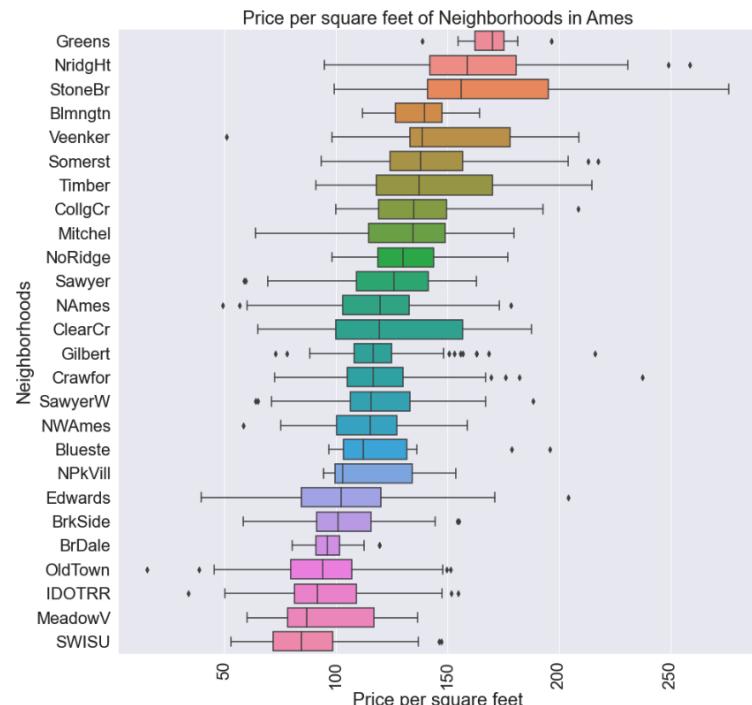
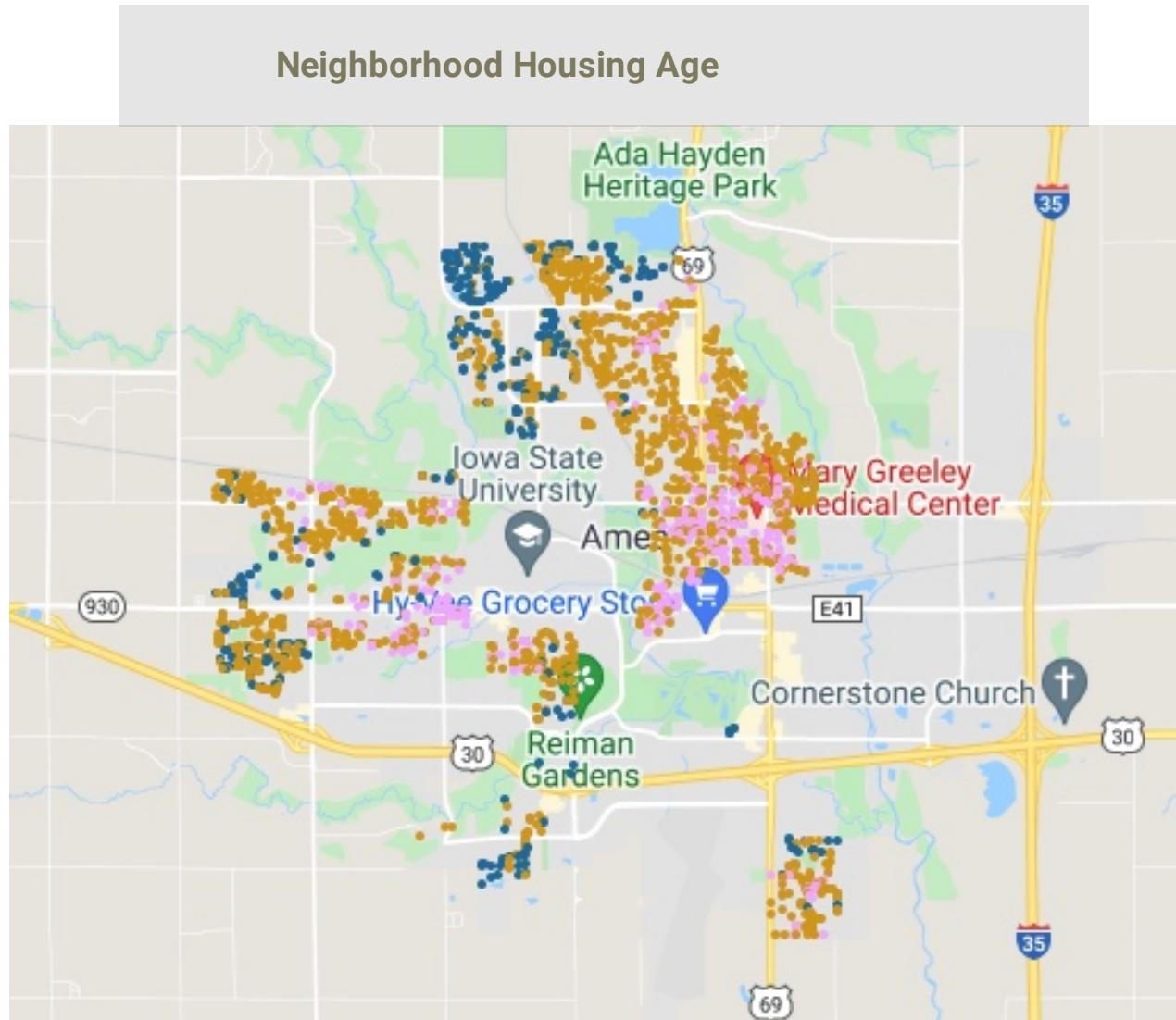
IMPLEMENT

Implement machine learning models.

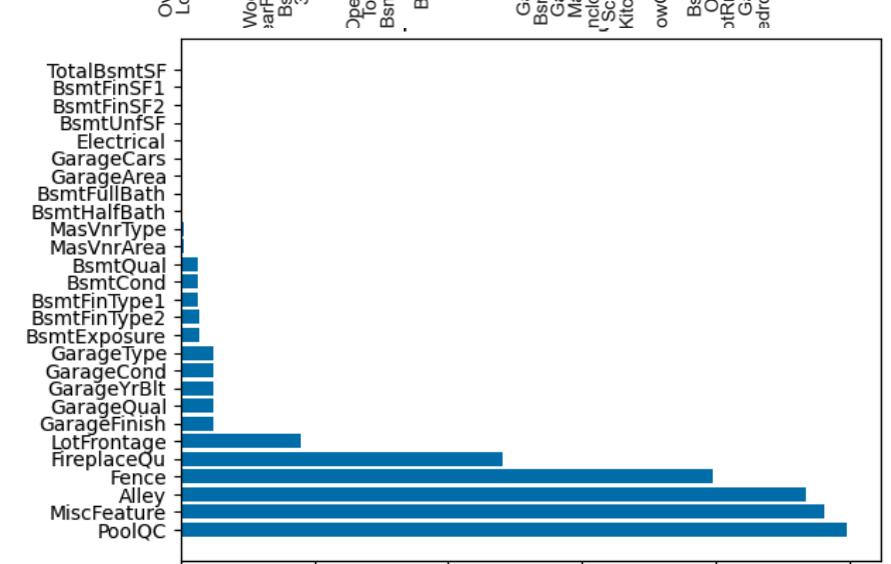
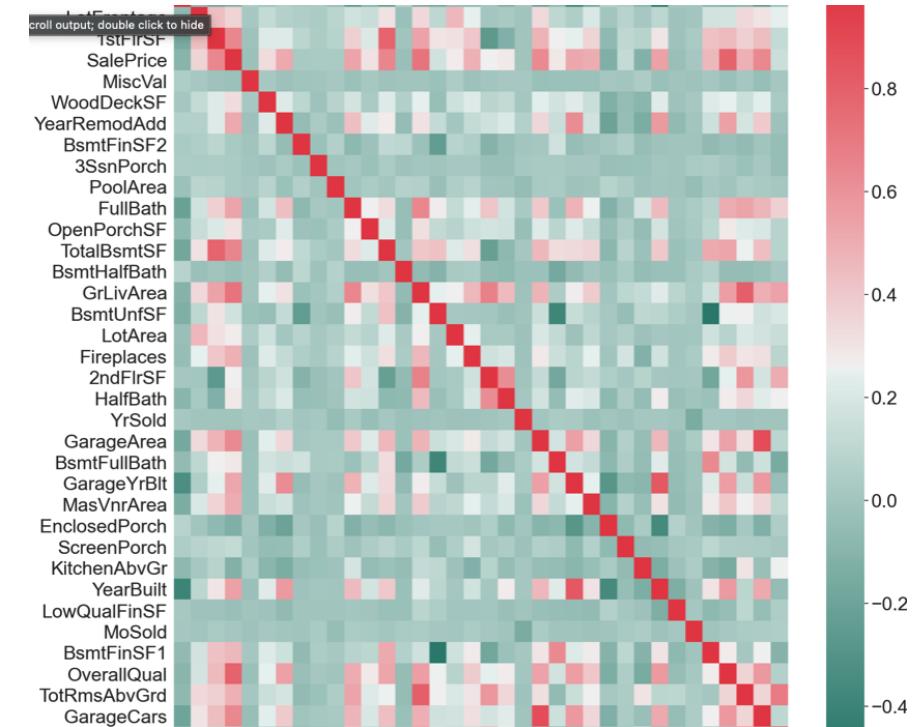
Ames Neighborhood Demographics



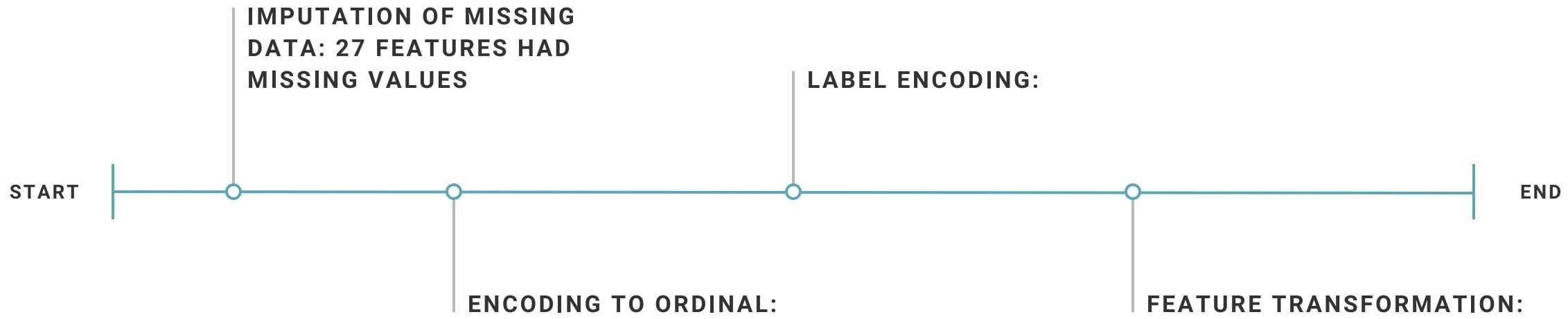
Exploratory Data Analysis



Price vs. Above Ground Living Area Aquare Feet (log scale)



Pre-Processing





Feature Engineering

Aggregation:

Simplification:

Removal:

Machine Learning Models

Linear Regression Models

- Multiple linear regression
- Lasso Regularization

Tree-Based Models

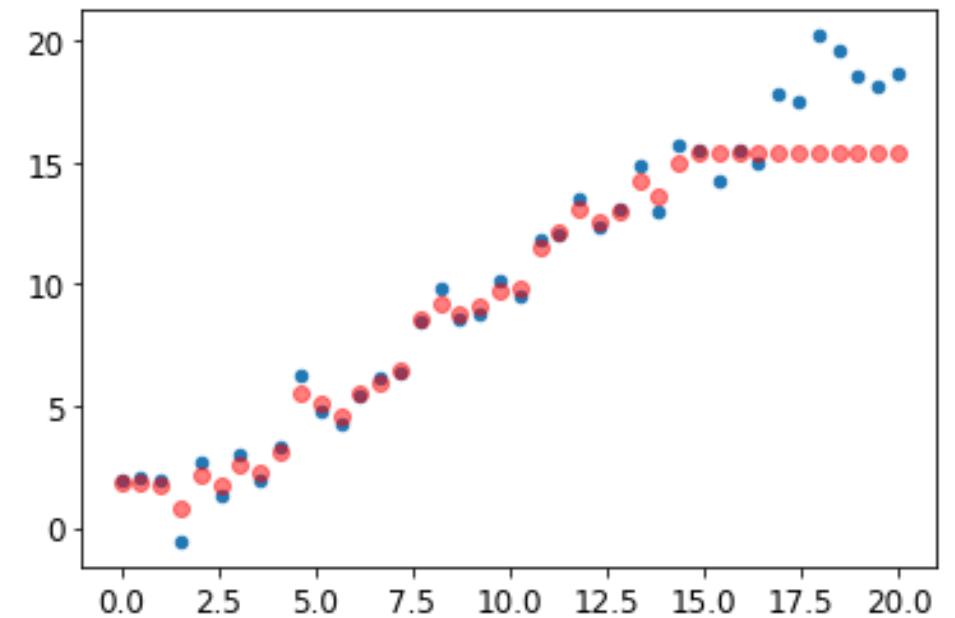
- Random Forest
- Gradient Boosting

Linear Models

OLS

Tree Models

Term Structure of Tree Model



Conclusions



Future Work



GATHER AND APPLY MORE DATA ON
HOME FEATURES



APPLY ADDITIONAL MACHINE
LEARNING ALGORITHMS



IMPLEMENT MORE SPECIFIC MODELS
TARGETING DEMOGRAPHICS AND
AGE GROUPS TO GET A MORE
ACCURATE ASSESSMENT OF HOME
VALUES IN AMES, AND OTHER
GEOGRAPHICAL REGIONS

Thank You



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