Modelling for Ames Housing Data

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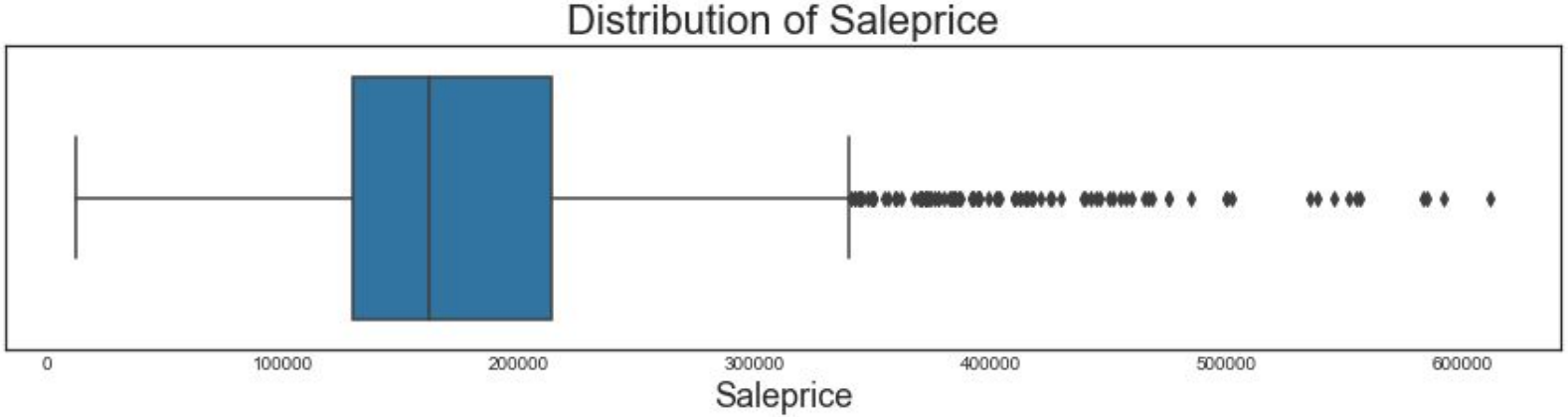
Problem Statement

What is the best regression model, with

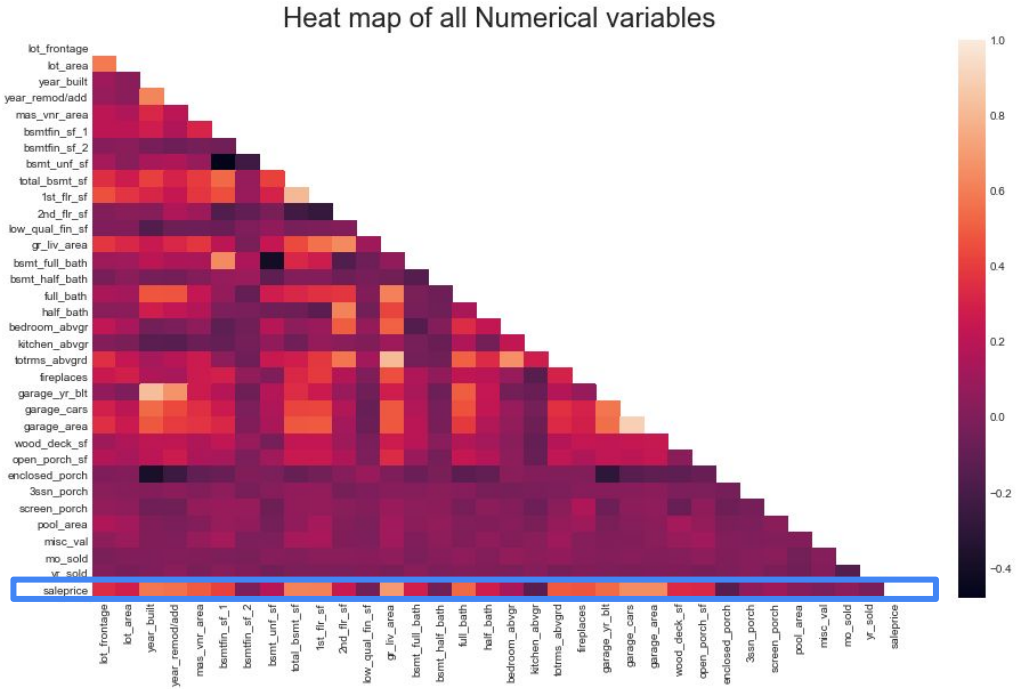
1. an upper limit of 30 variables, that can predict house sale price in Ames Iowa to
2. a RMSE of less than $40,000 and
3. what are its top 3 influencing factors.

EDA - Target variable : Saleprice



Distribution shows presence of outliers, which need to be removed to avoid skewing the model.

EDA - Numerical variables



- Some variables are collinear
  - Needs to be identified and only one variable to be suitably select to represent the others
- A number of variables have moderate and strong correlation to saleprice

EDA - Numerical variables

- Boxplots against saleprice used to evaluate suitability
- Good distinct distribution between each unique values used as criteria.

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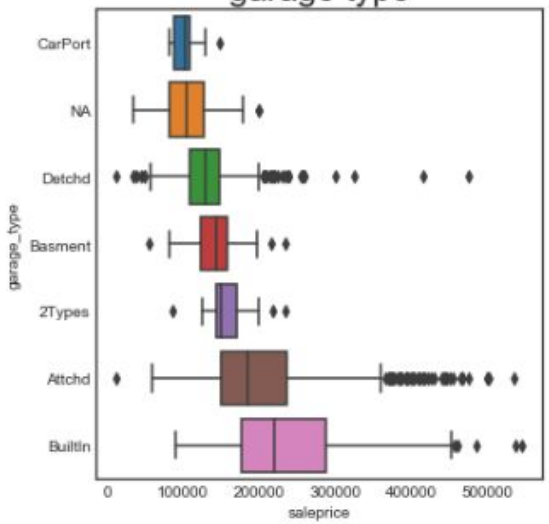

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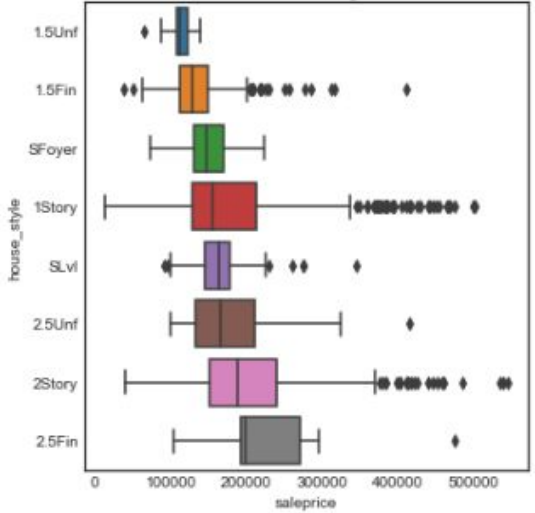

EDA - Ordinal variables

- Similar criteria to nominal variables
- Additional requirement for them to be monotonic
- Collinearity also needs to be assessed

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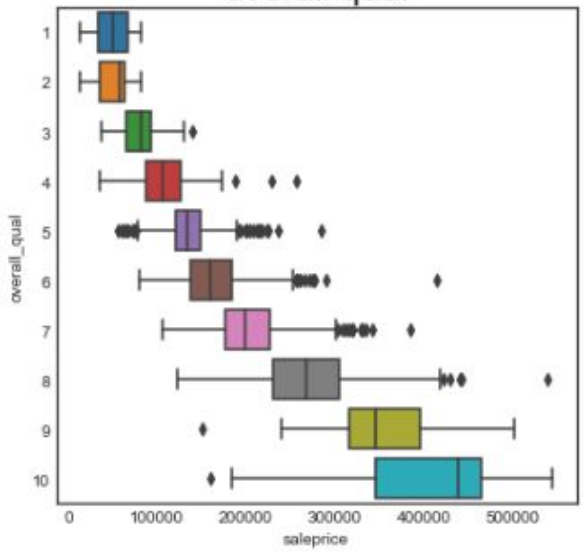

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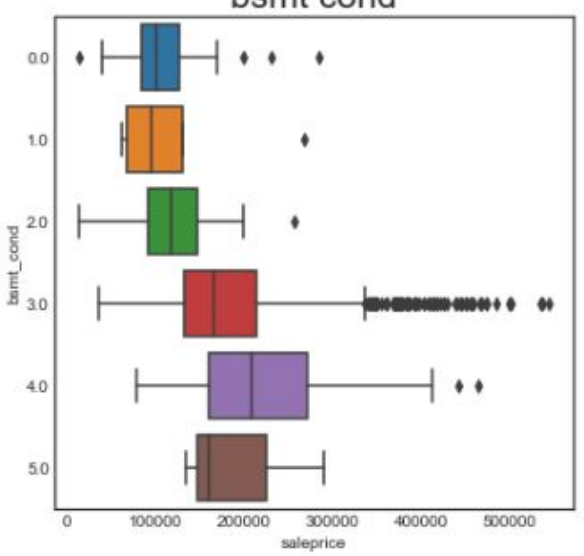


Feature Engineering

- These steps were implemented
  - Missing value Imputation
    - Mean for numerical variables, Mode for nominal and ordinal
  - One hot encoding for nominal variables
- Interaction terms were explored
  - However, viable pairs with high correlation to saleprice all contains variables which are already chosen in the previous steps.
  - No interaction terms were created to prevent collinearity

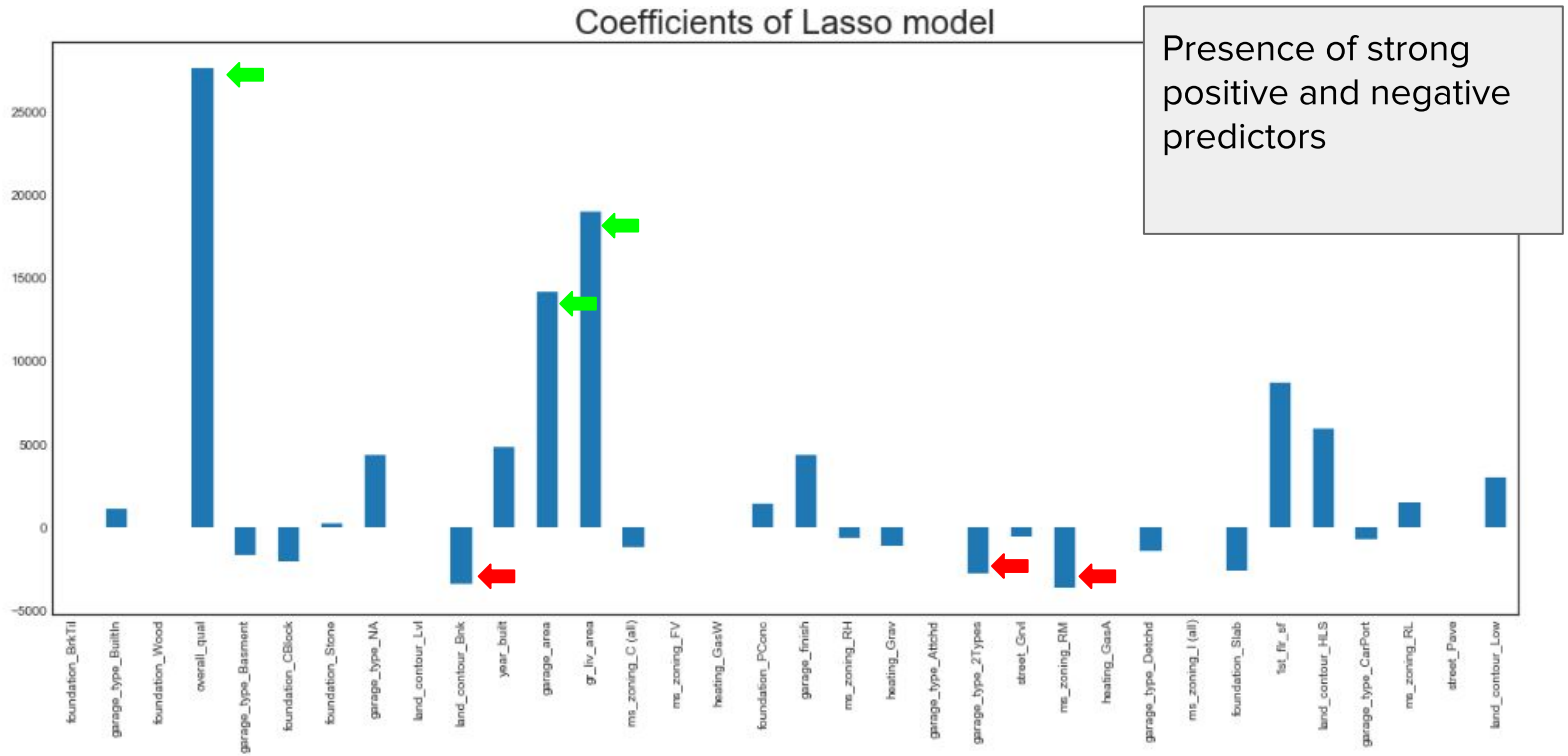
Modelling: Baseline

- Use mean of saleprice in training data as all predictions as baseline.
- Use of Root Mean Squared Error (RMSE) as metric as it is the one selected by the Kaggle Challenge
- RMSE: $79,435

Modelling: Baseline vs other models

Model	RMSE	No. of variables
Baseline	$79,435	NA
Lasso	$33,414	26
Ridge	$33,575	33
Elastic Net (Optimised using GridSearch)	$33,542	33

Best model: Lasso



Presence of strong positive and negative predictors

Top 3 positive predictors

1. Overall material and finish quality
2. Above grade (ground) living area in square feet
3. Size of garage in square feet

Top 3 negative predictors

1. Land Contour where there is a Quick and significant rise from street grade to building
2. There is more than one type of garage
3. Zoning classification of Residential Medium Density