Capstone Project 2 (Springboard)

PREDICTING HOUSE PRICE

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Who is the audience?

- Banks and Financial Investors
- Real estate company and marketplace

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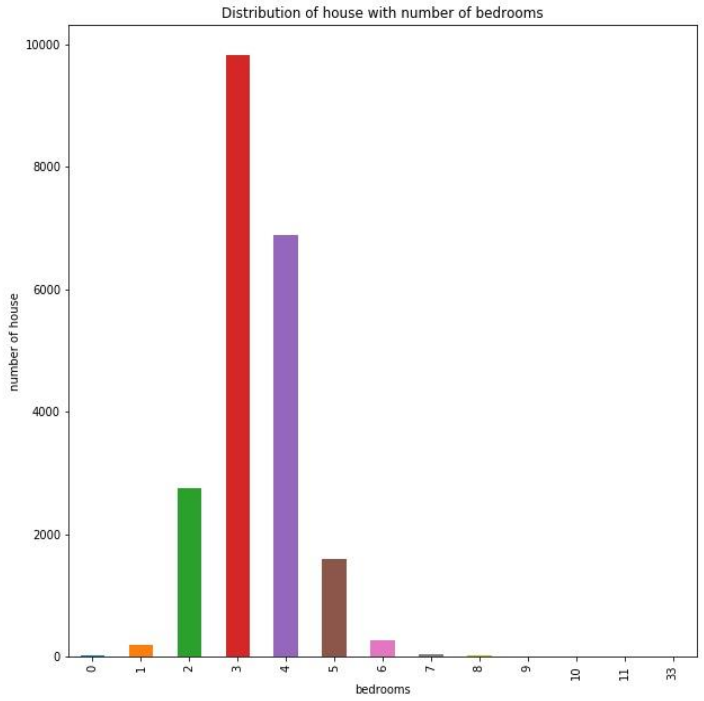
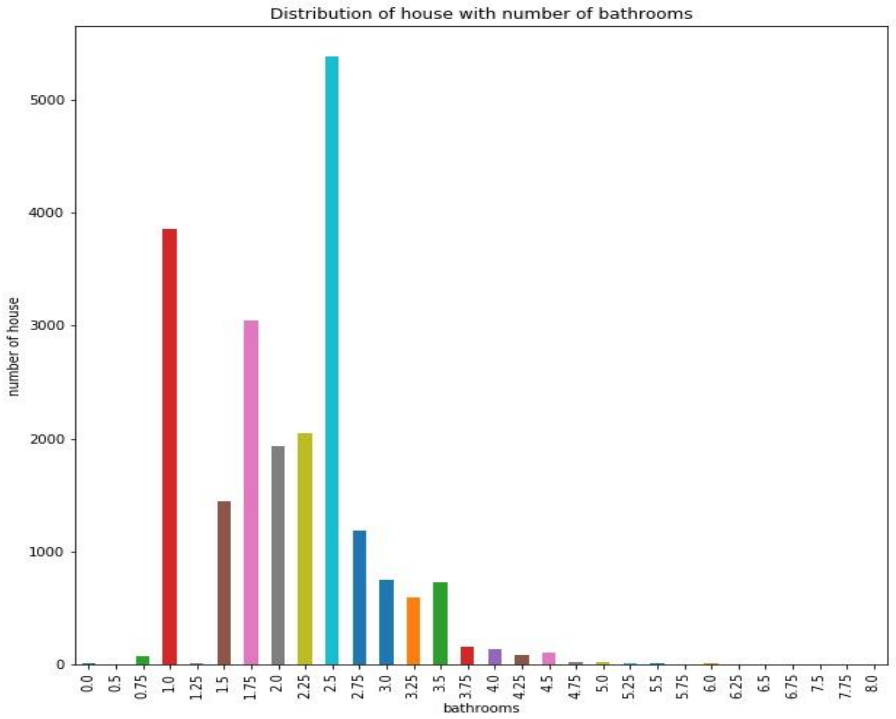
Data

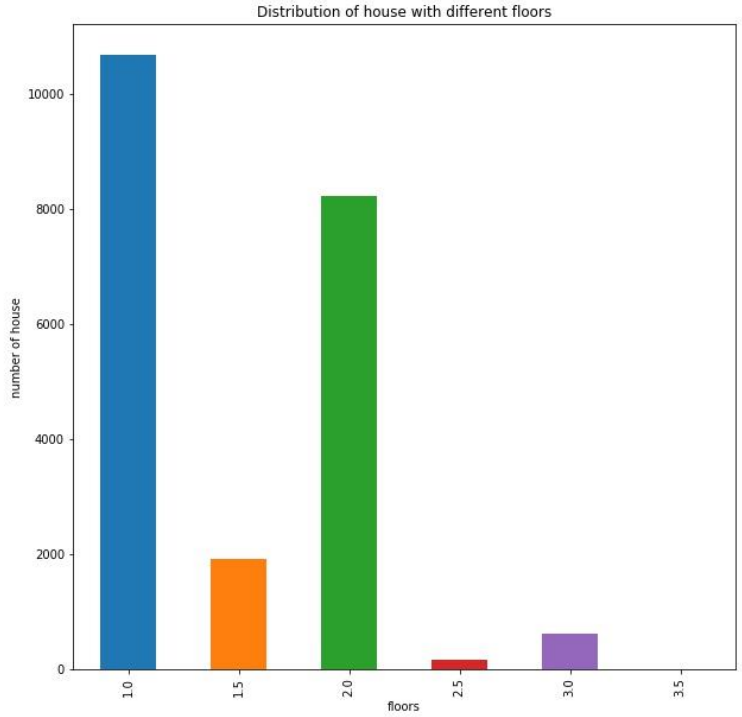
- Kings County, Seattle, Washington
- House sold between May 2014 and May 2015
- 21613 observations and 19 features
- No missing data
- There were some outliers

Exploratory Data Analysis

These bar plot will show us what kind of house were most sold in Kings county, Washington.







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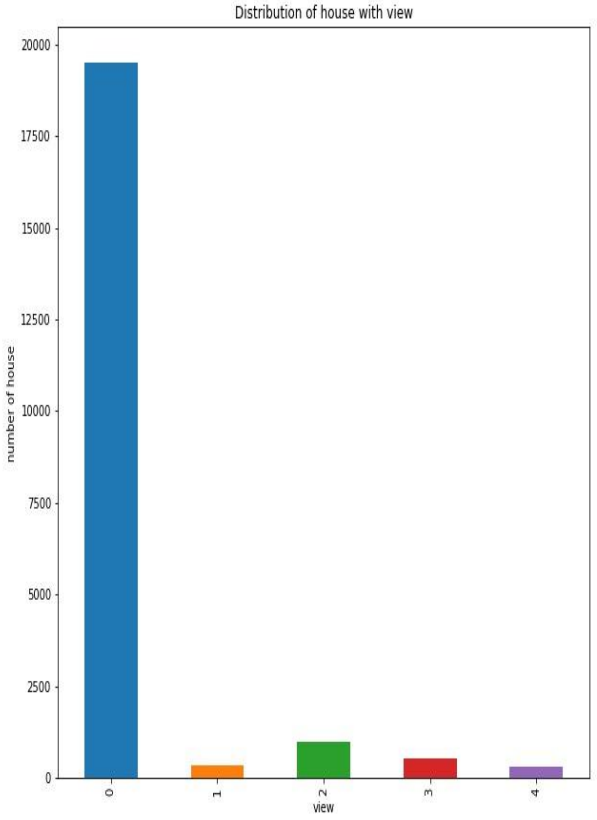
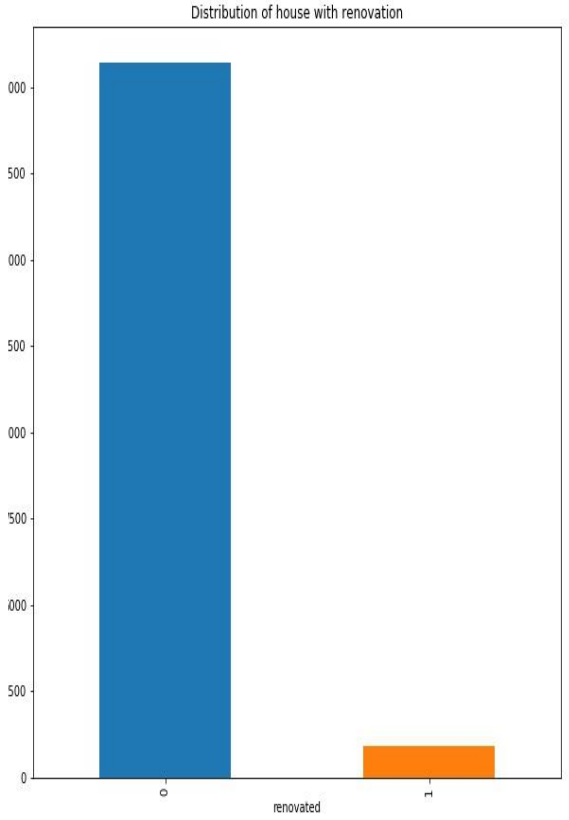
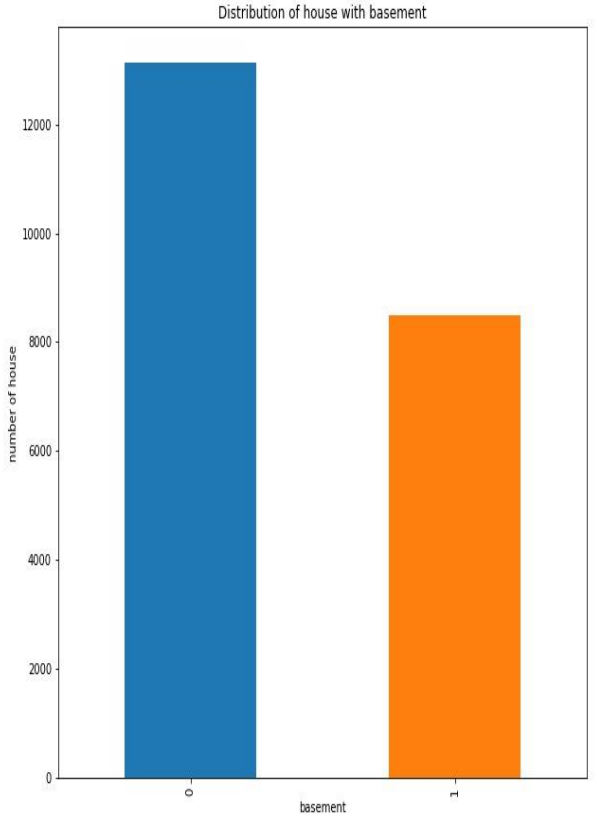
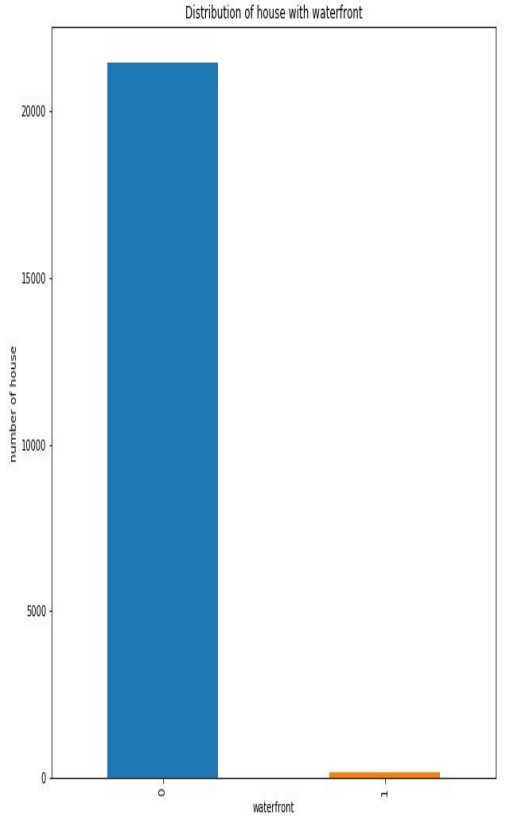
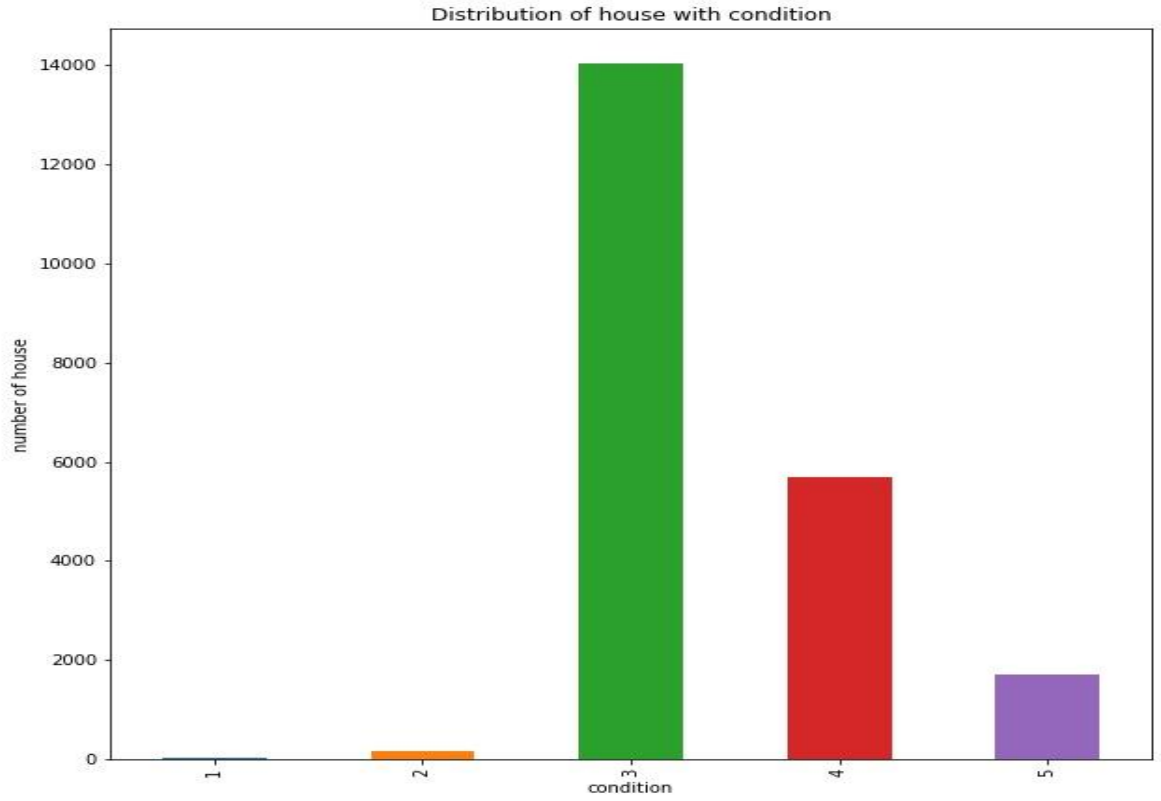


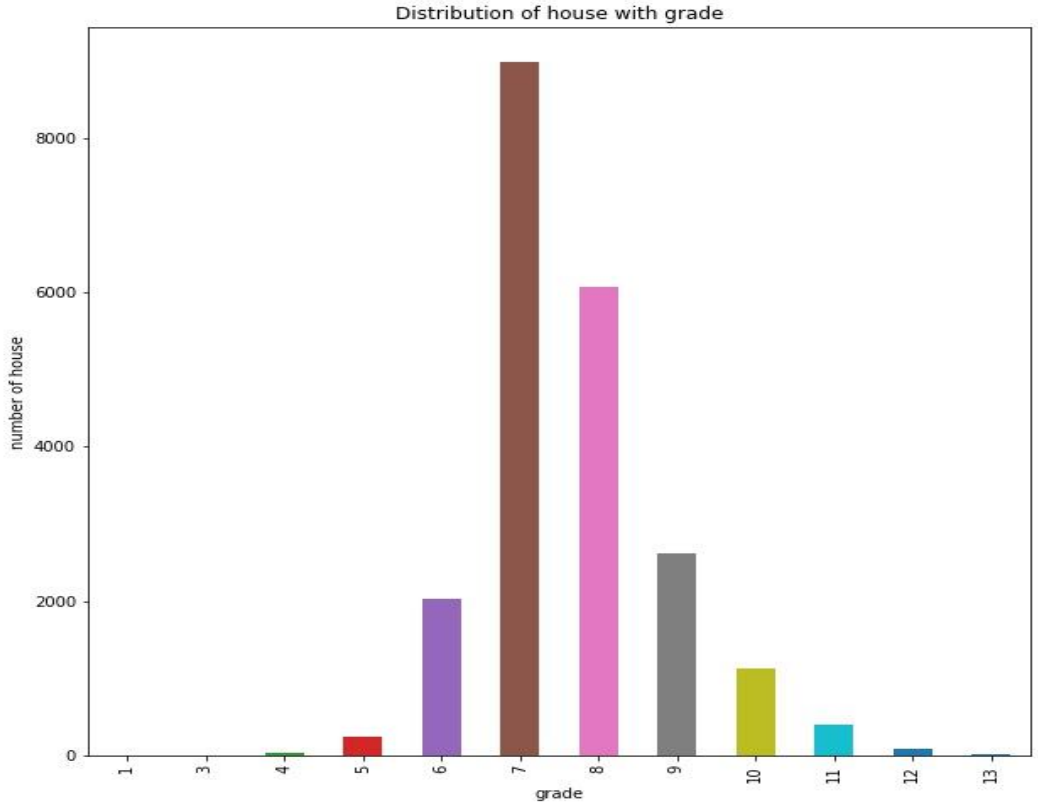




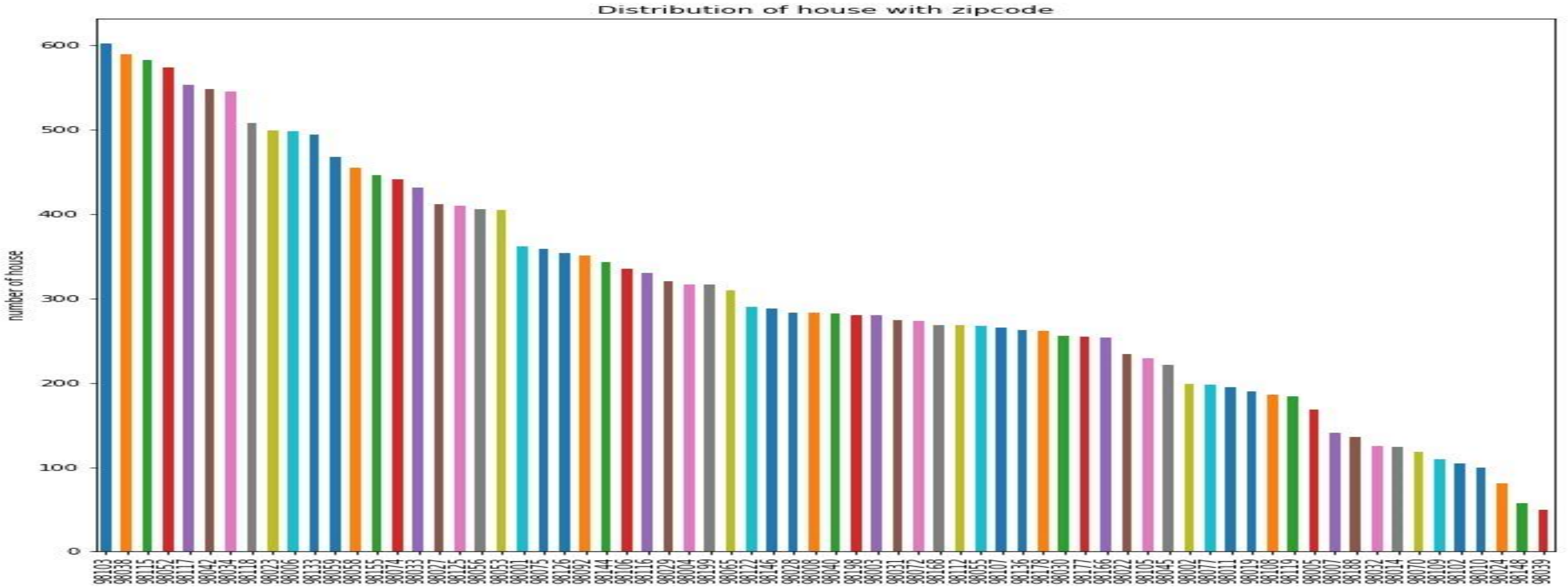


EDA continued..



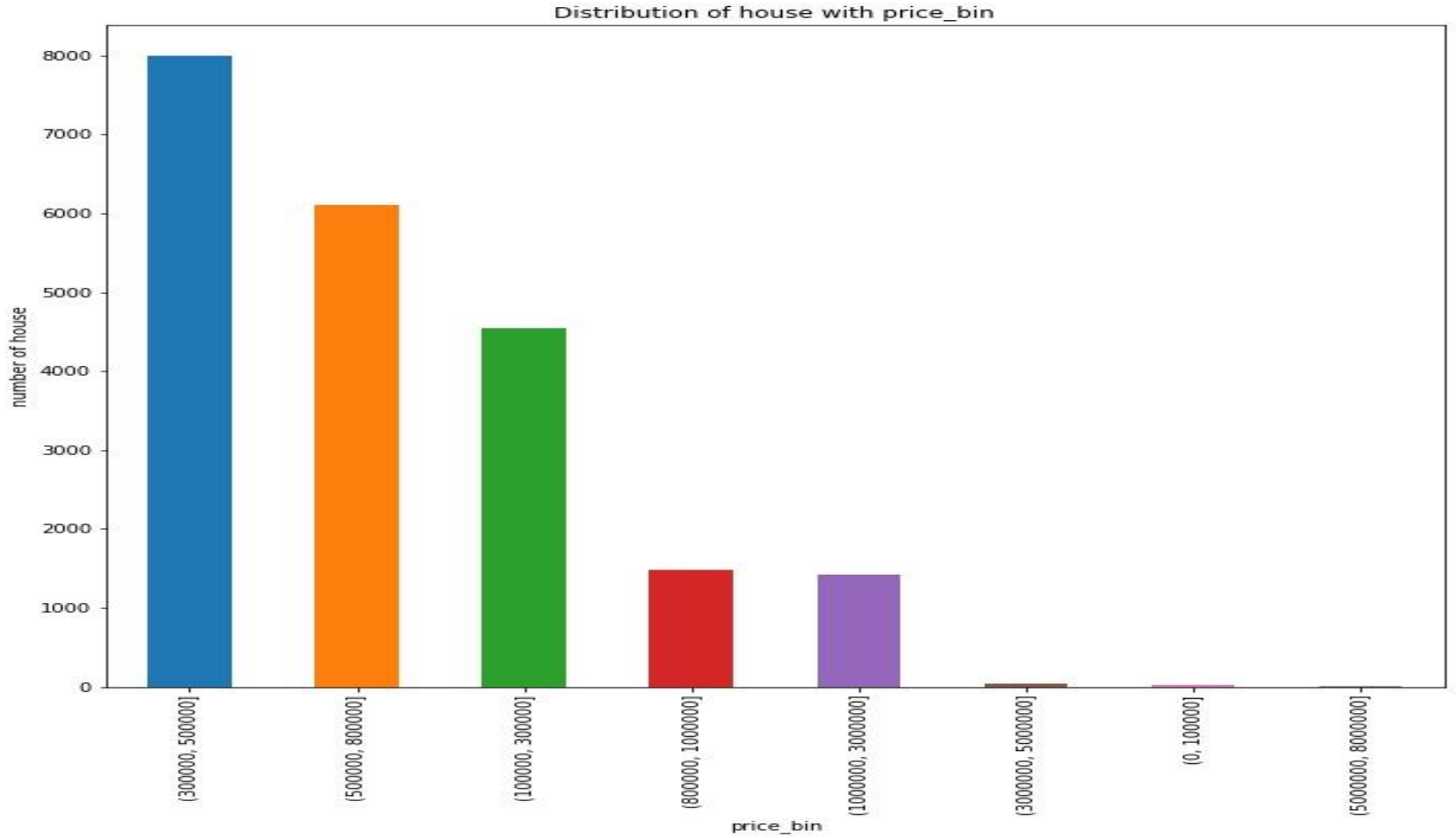


EDA continued…



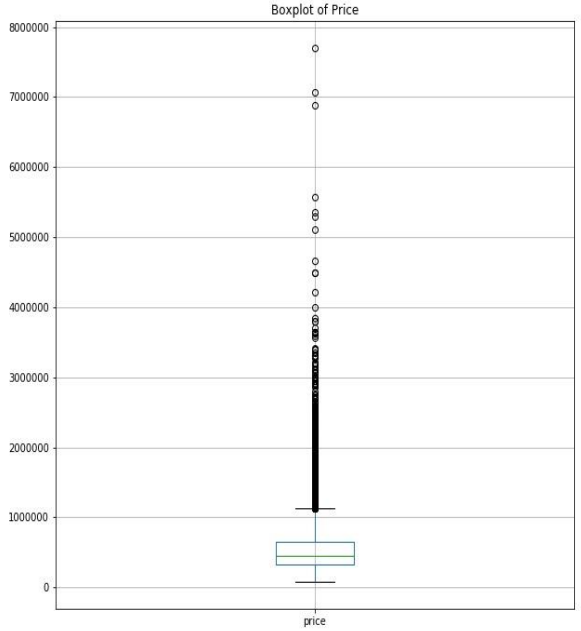
EDA continued…

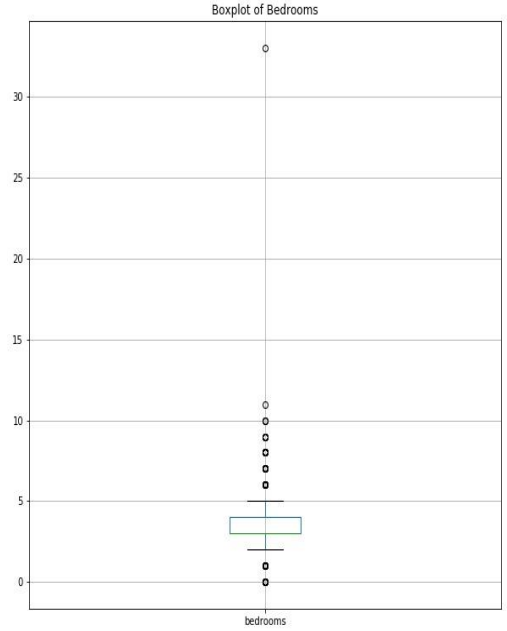
Most of the houses sold are in price-range of 300,000 to 500,000 followed by 800,000.

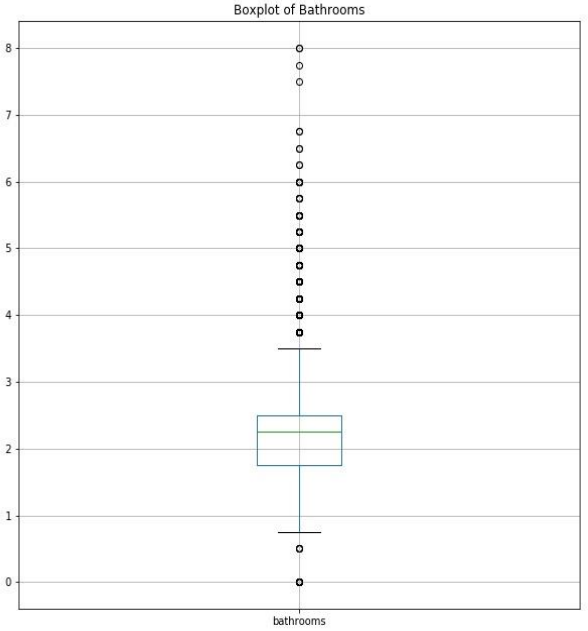


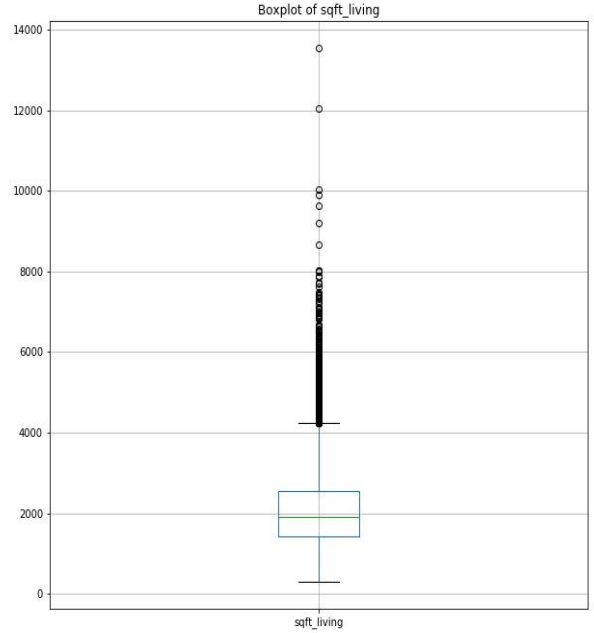
Data Wrangling or Cleaning.

- Data must be cleaned and prepared for Machine Learning Model.
- There were outliers in the dataset, which was dropped or removed.



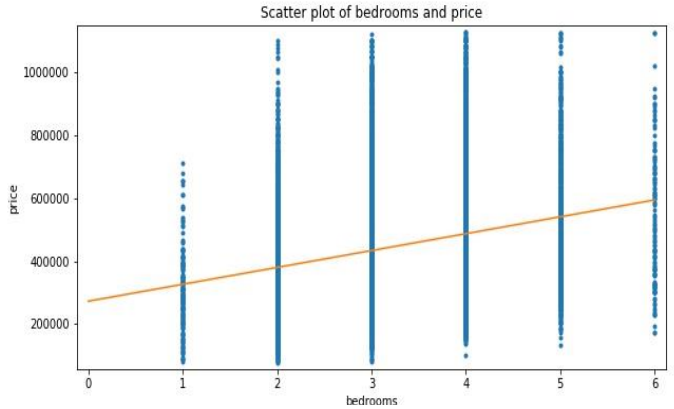


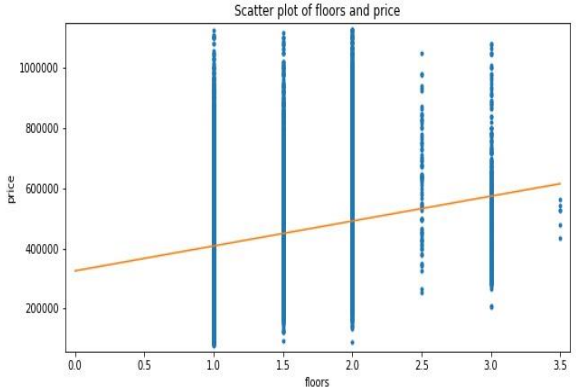


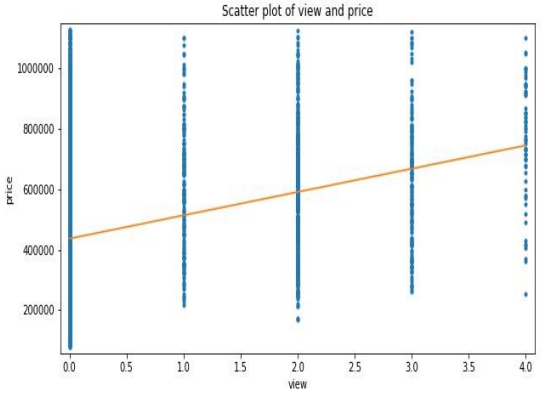


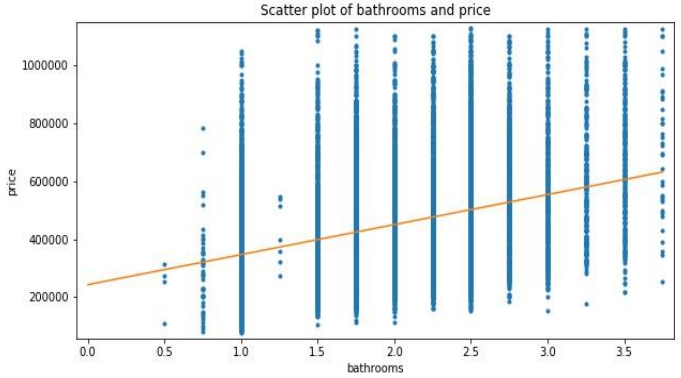
Finding Correlation with Price.

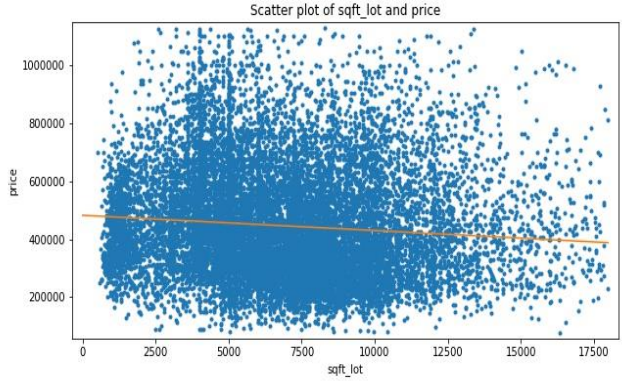
- I used scatter plot to check the correlation of different variables against the price of the house.

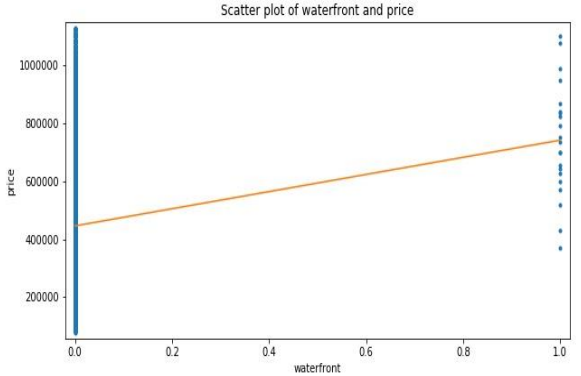


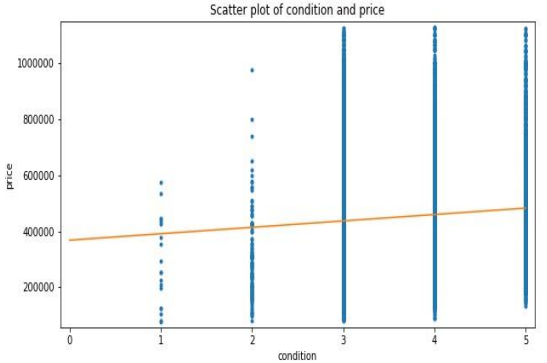








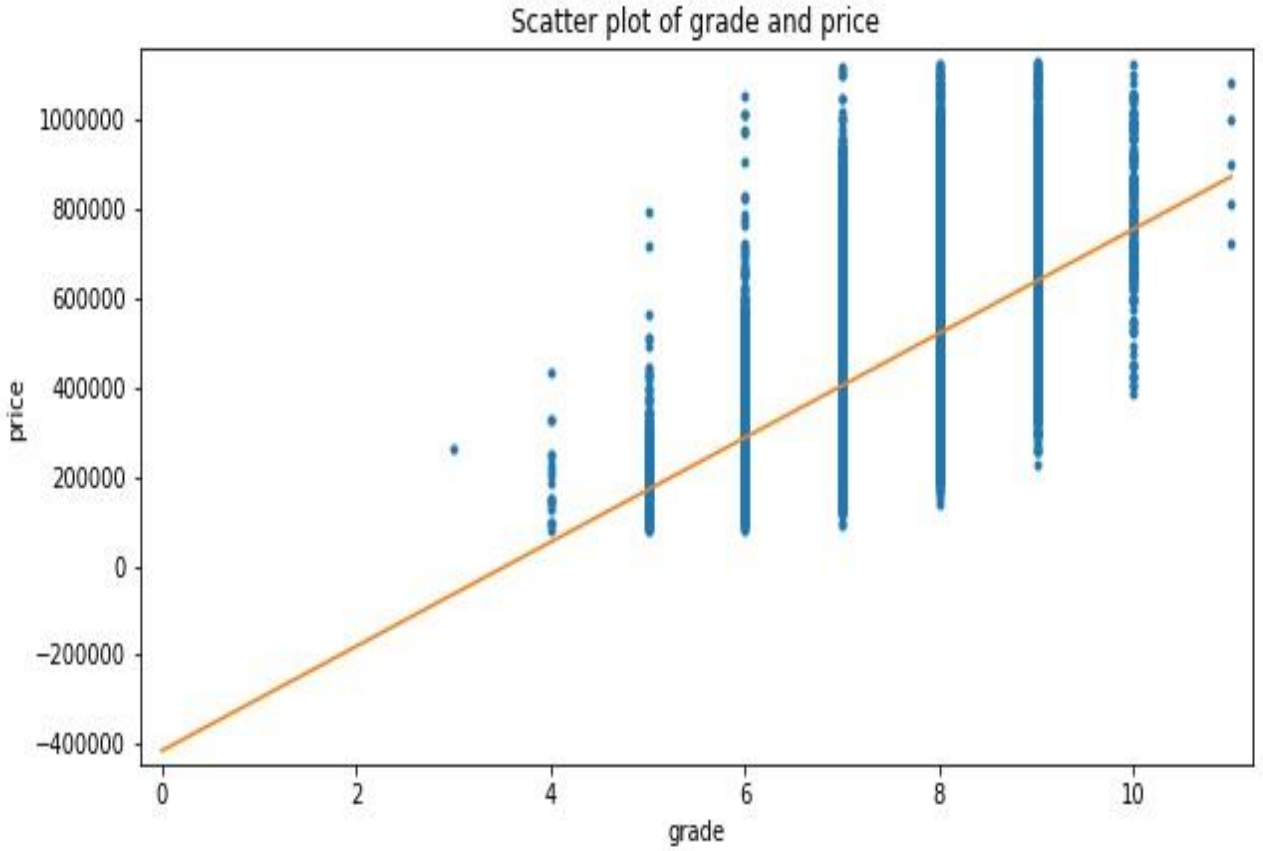




Finding correlation with price.

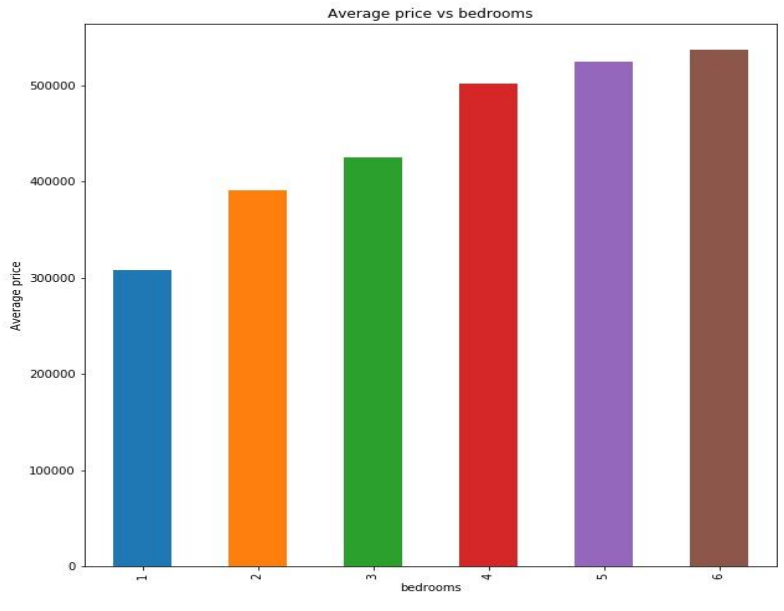
I calculated the correlation coefficient for all the variables to find the best predictors of the house price.

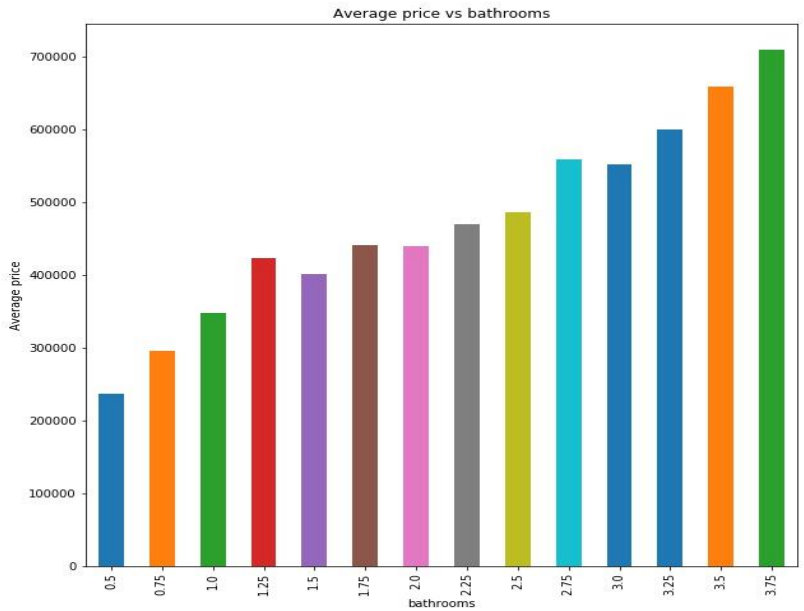
Features	CORRCOEFF	
sqft_lot15	-0.107535	Weak negative
sqft_lot	-0.089069	Weak negative
waterfront	0.055702	Very Weak positive
condition	0.078840	Very Weak positive
view	0.218874	Weak positive
bedrooms	0.235083	Weak positive
floors	0.238493	Weak positive
sqft_basement	0.239227	Weak positive
bathrooms	0.360725	Strong positive
sqft_above	0.403418	Strong positive
sqft_living15	0.439548	Strong positive
sqft_living	0.524052	Strong positive
grade	0.546210	Strong positive

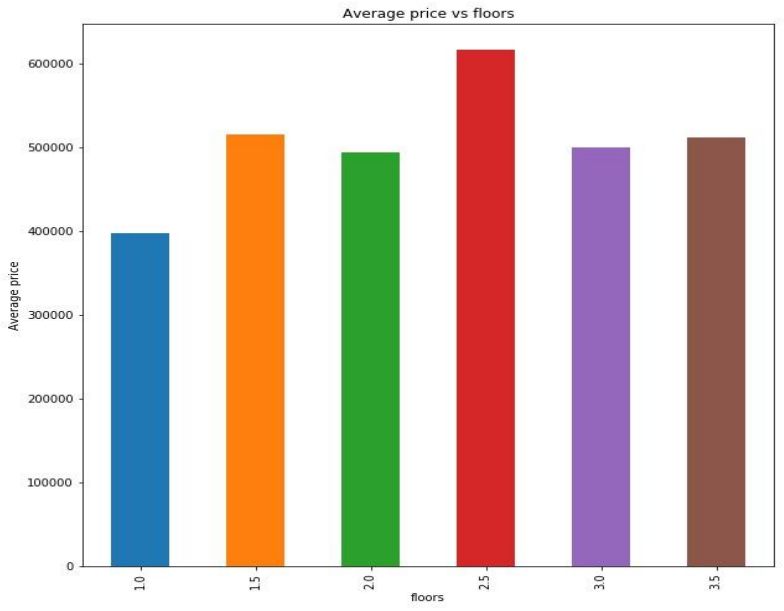


Data Story

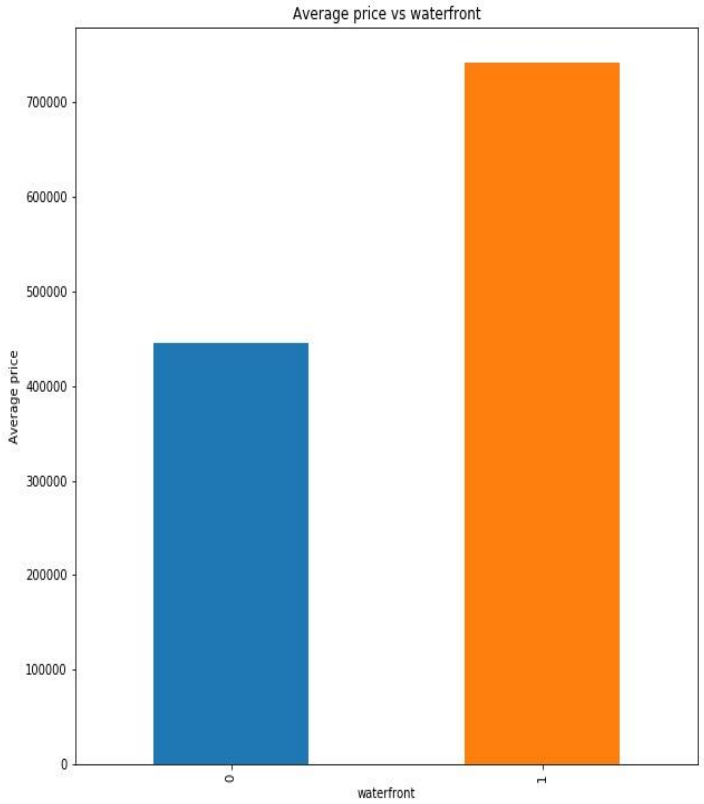
These bar plot can shows us how the average price of the house is affected by some predictor variables.

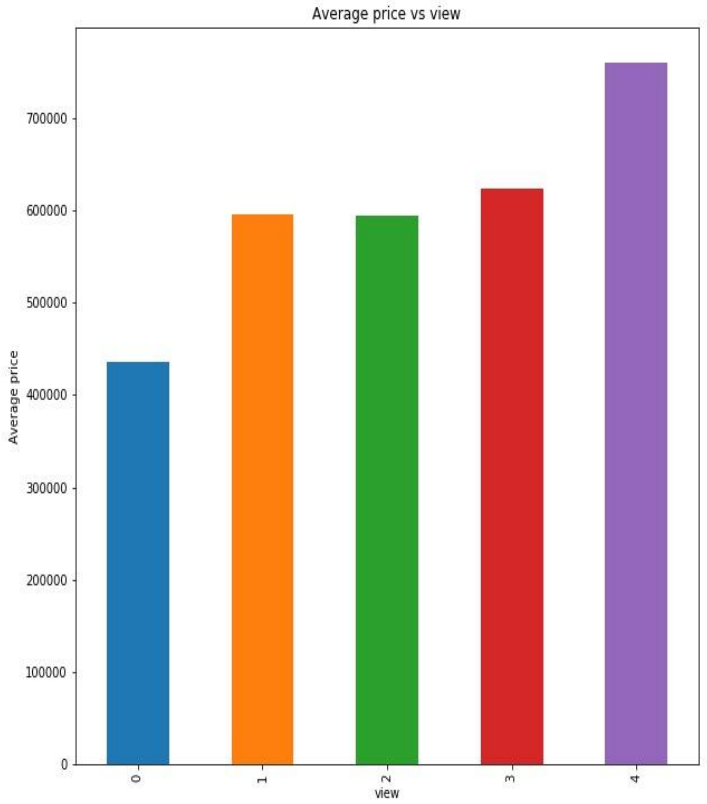


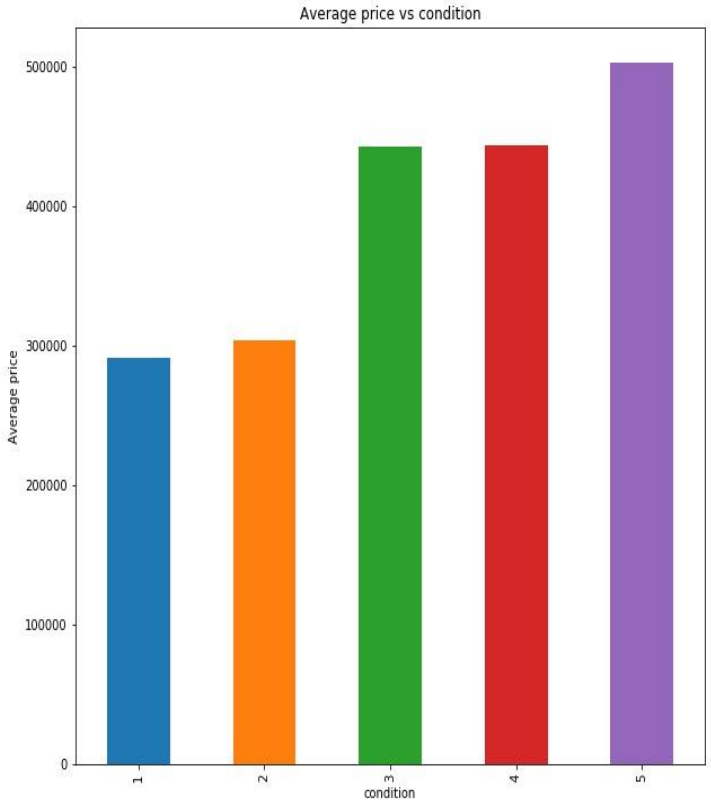




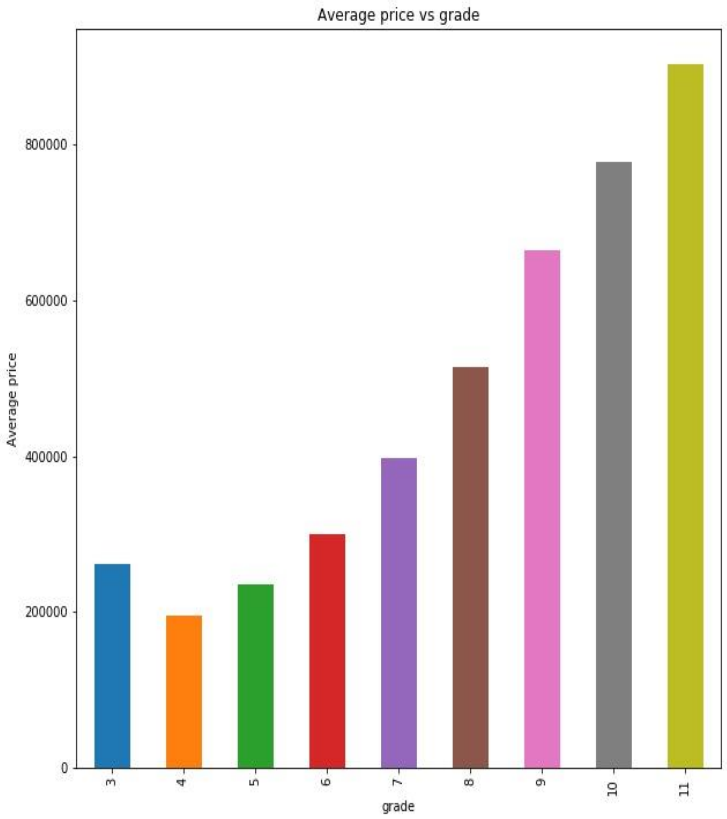
Data Story Cont…

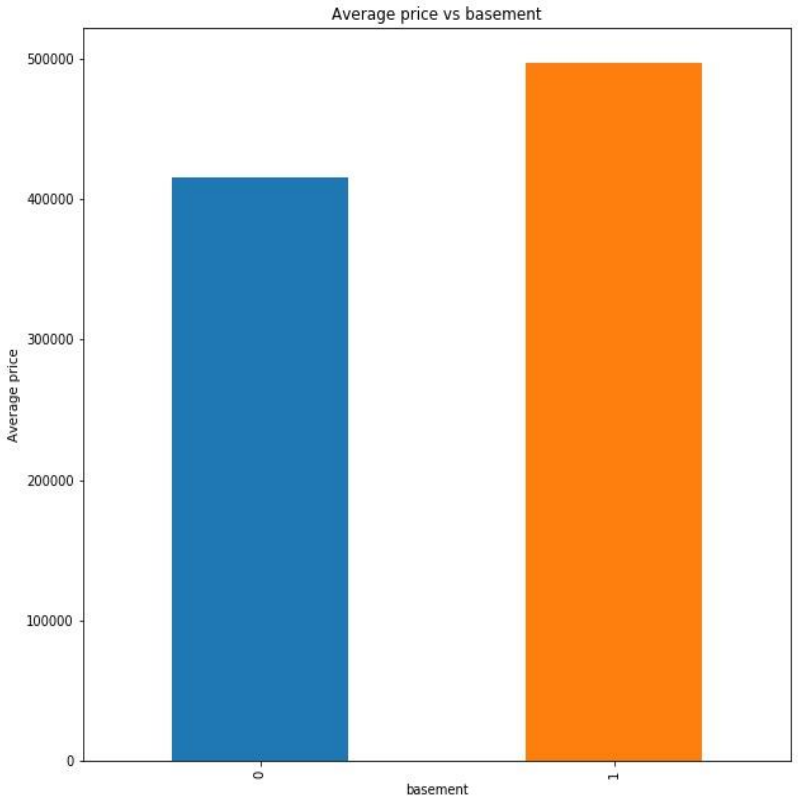


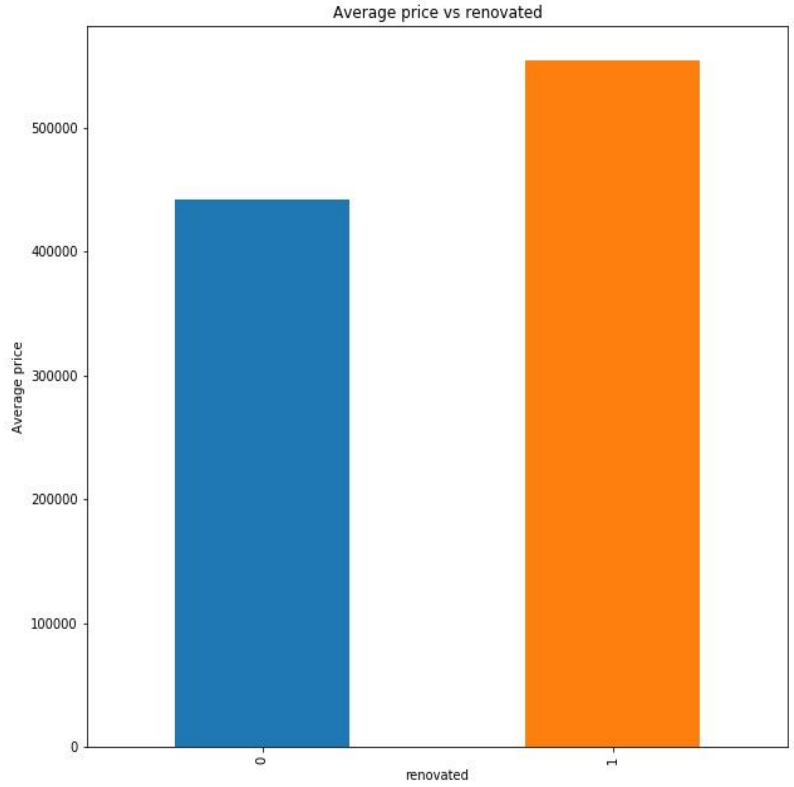




Data Story…


Average price vs grade
Average price
800000
600000
400000
200000
0
3
4
5
6
7
8
9
10
11
grade


Average price vs basement
Average price
500000
400000
300000
200000
100000
0
0
1
basement


Average price vs renovated
Average price
500000
400000
300000
200000
100000
0
0
1
renovated

Inferential Statistics

- #H0: There is no significant correlation between number of bedroom and price.
- #Ha: There is a correlation between number of bedrooms and price.
- The p-value is less than level of significance 0.05, so we reject the null hypothesis. There is a correlation between number of bedrooms and price.
- I performed the hypothesis testing to check if the correlation between price and other features happened by chance.

Machine Learning

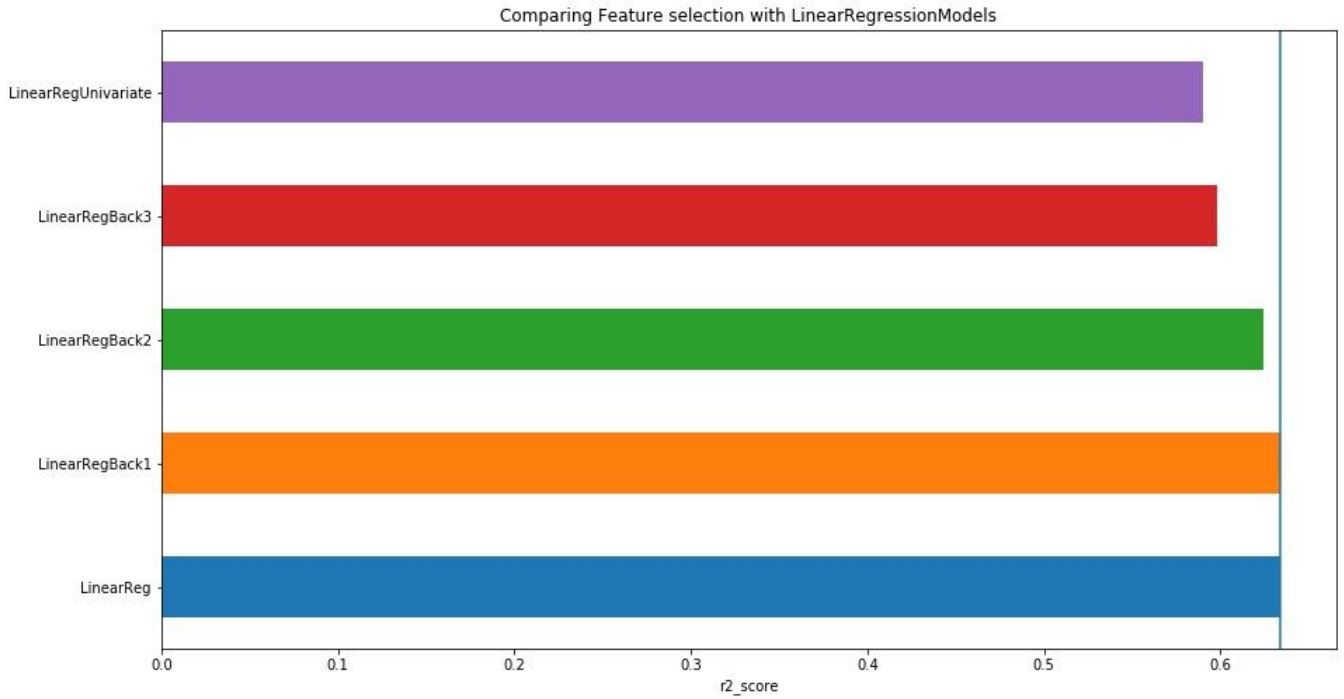
- Linear Regression
- Decision Tree Regressor
- Gradient Boosting Regressor
- Random Forest Regressor

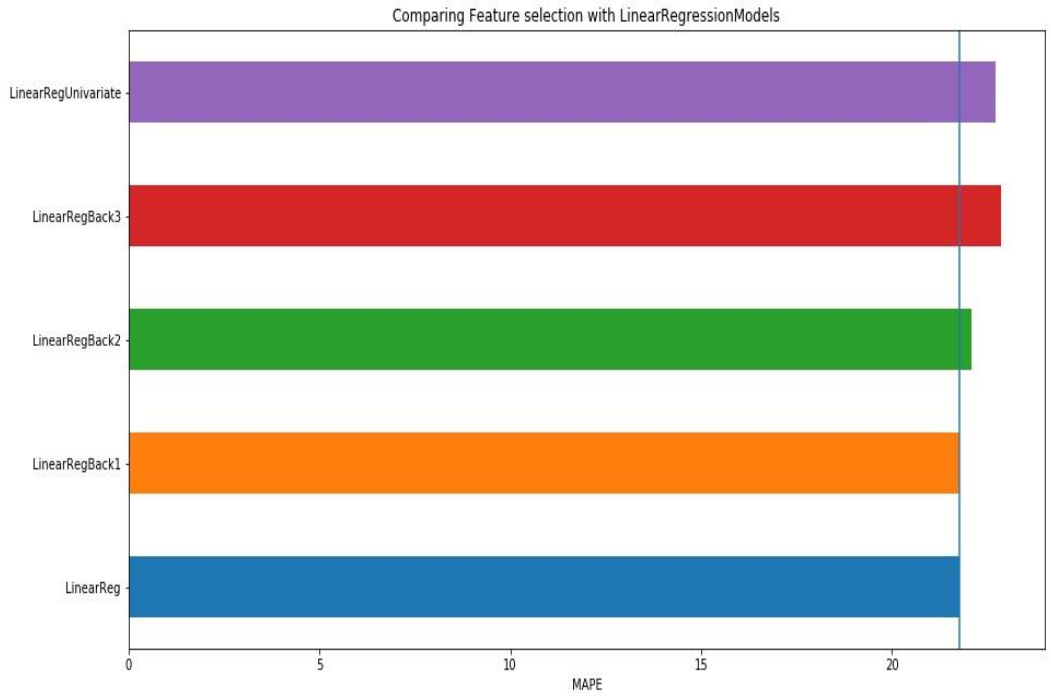
Metrics

- Mean Squared Error (MSE)
- Root Mean Squared Error (RMSE)
- R2_Score
- Mean Absolute Error (MAE)
- Mean Absolute Percent Error (MAPE)

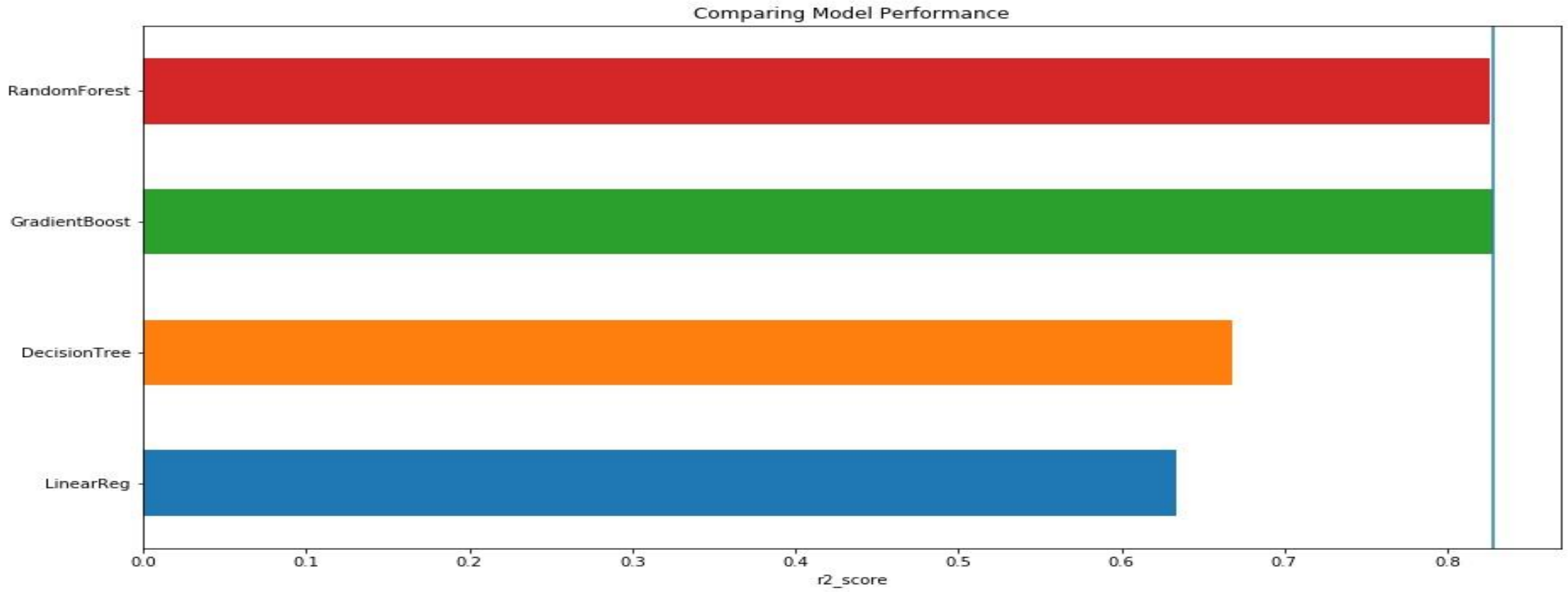
Using Feature Selection and Compare Model's performance.

- Backward Elimination
- Univariate Elimination

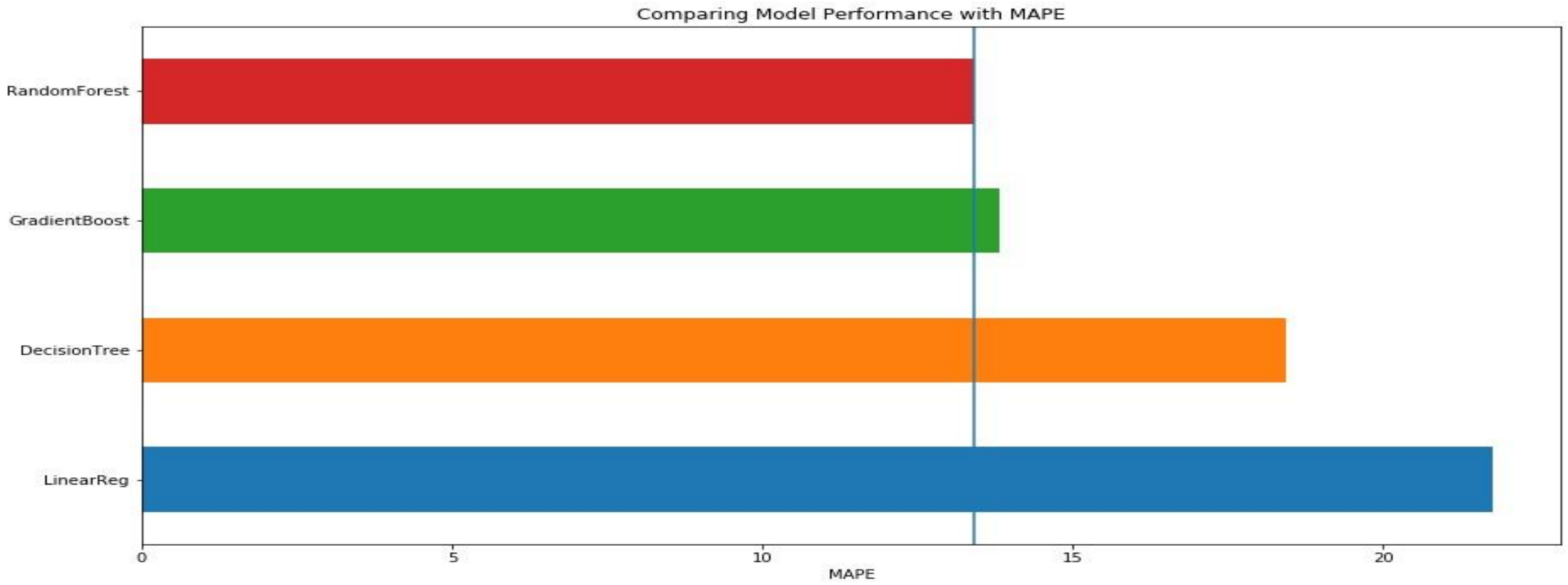




Compare Different Regressor Models

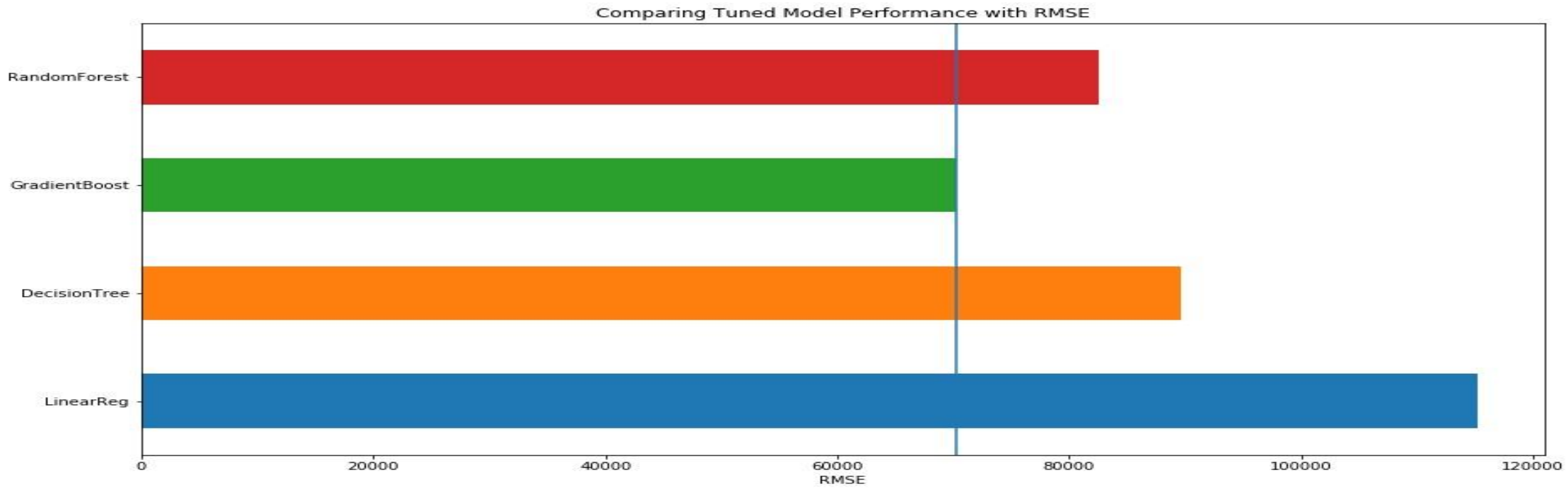


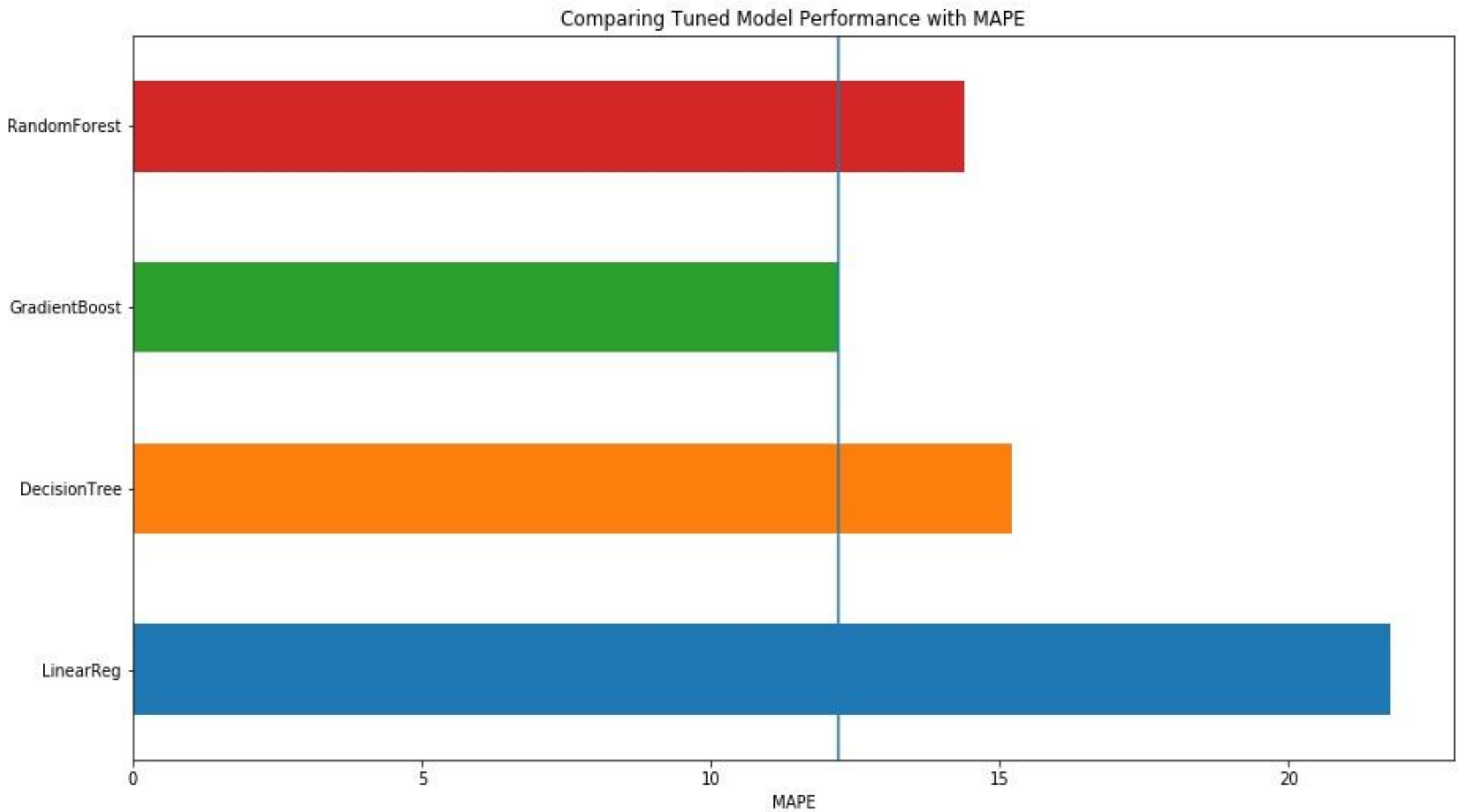
Comparing different Regressor Models

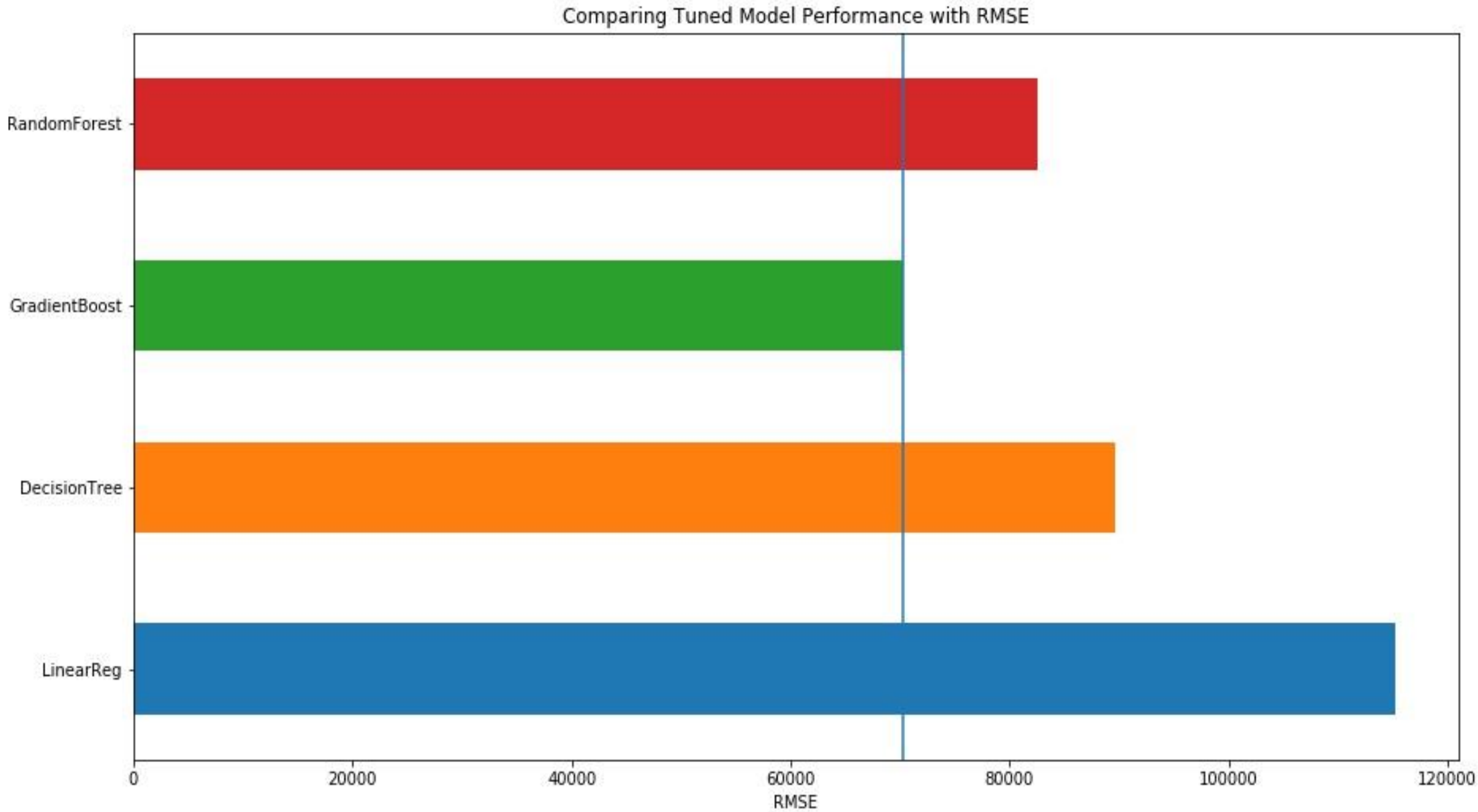


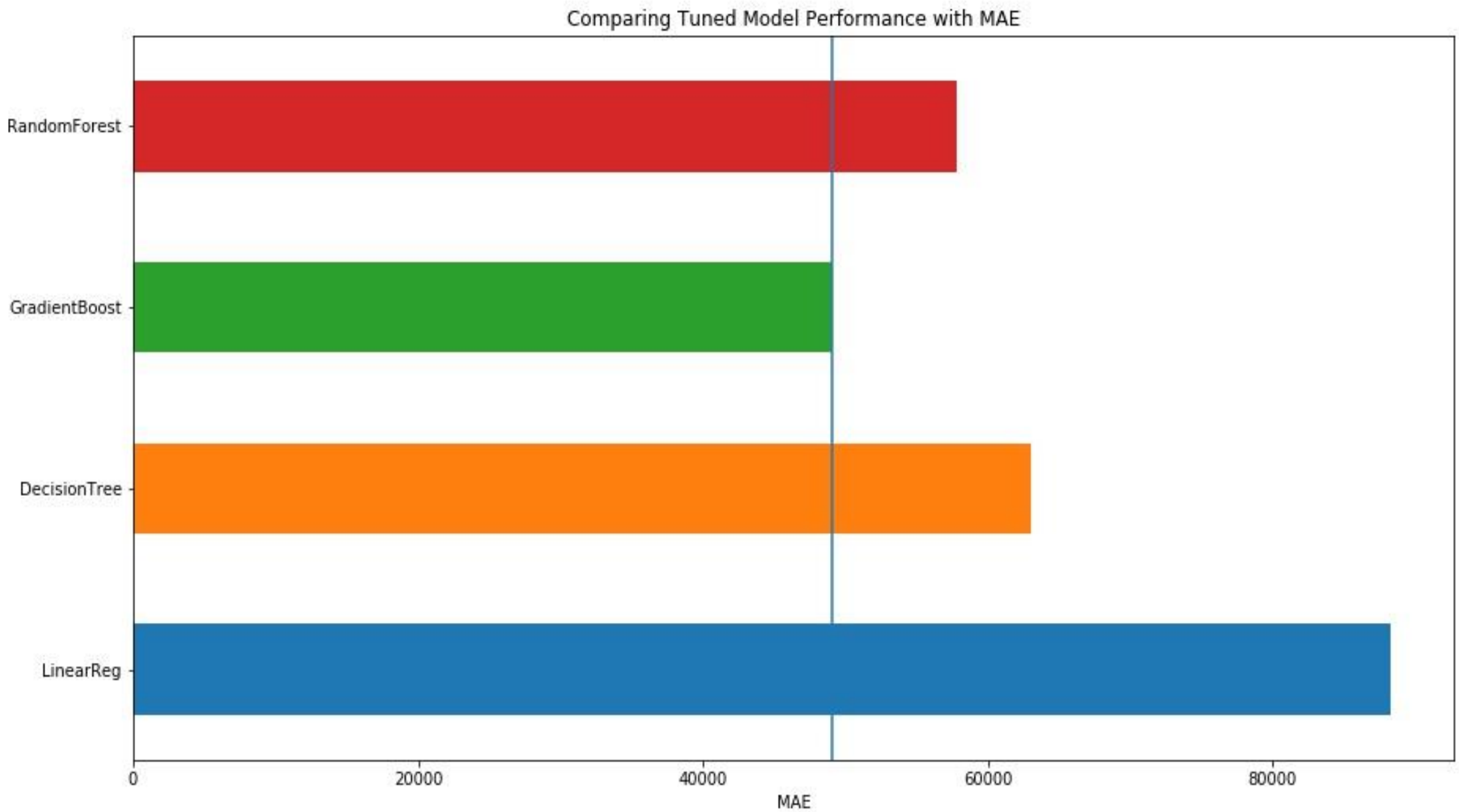
Hyper-parameter Tuning and Comparing Tuned Model's Performance

- GridSearchCV
- RandomizedSearchCV




Comparing Tuned Model Performance with MAPE
RandomForest
GradientBoost
DecisionTree
LinearReg
0
5
10
15
20
MAPE


Comparing Tuned Model Performance with RMSE
RandomForest
GradientBoost
DecisionTree
LinearReg
0
20000
40000
60000
80000
100000
120000
RMSE


Comparing Tuned Model Performance with MAE
RandomForest
GradientBoost
DecisionTree
LinearReg
0
20000
40000
60000
80000
MAE

Conclusion

- The Gradient Boosting Regressor Model is better than random guess, and it is a better performing model compared to other 3 models.
- In future, we can build other models and compare the performance with this model.
- Using this model we can predict the house price.
- This information can be used as a good estimate.