Blue Book for Bulldozers

Predicting the sales price of used bulldozers

A Springboard Data Science Capstone submission by Greg McKenzie

Why bulldozers?

What stimulates the buying & selling of bulldozers?

Infrastructure development

#BuildBackBetter

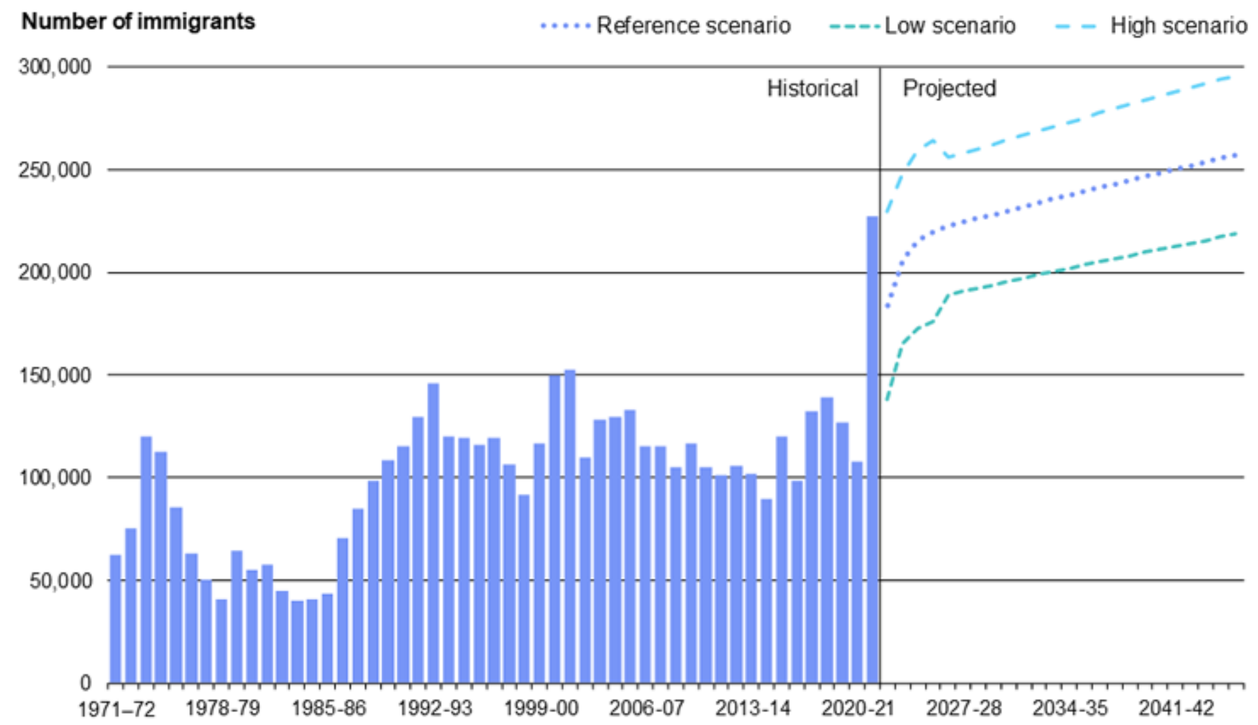
- $2.2 trillion investment

Why bulldozers?

What stimulates the buying & selling of bulldozers?

Urbanization

Chart 16: Immigration to Ontario, 1971 to 2046

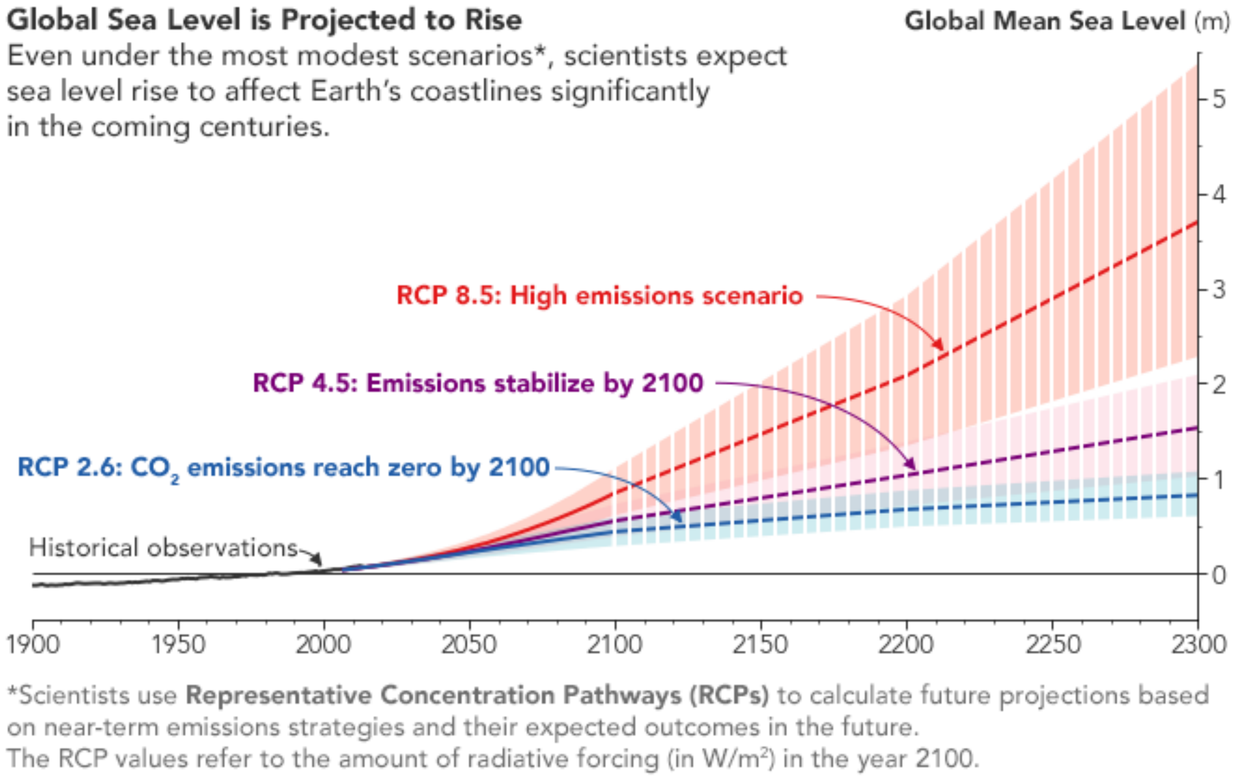


Sources: Statistics Canada for 1971–2022, and Ontario Ministry of Finance projections.

Why bulldozers?

What stimulates the buying & selling of bulldozers?

Natural Disasters



Who might care?

Where is a price prediction useful?

Insurance Companies

Who might care?

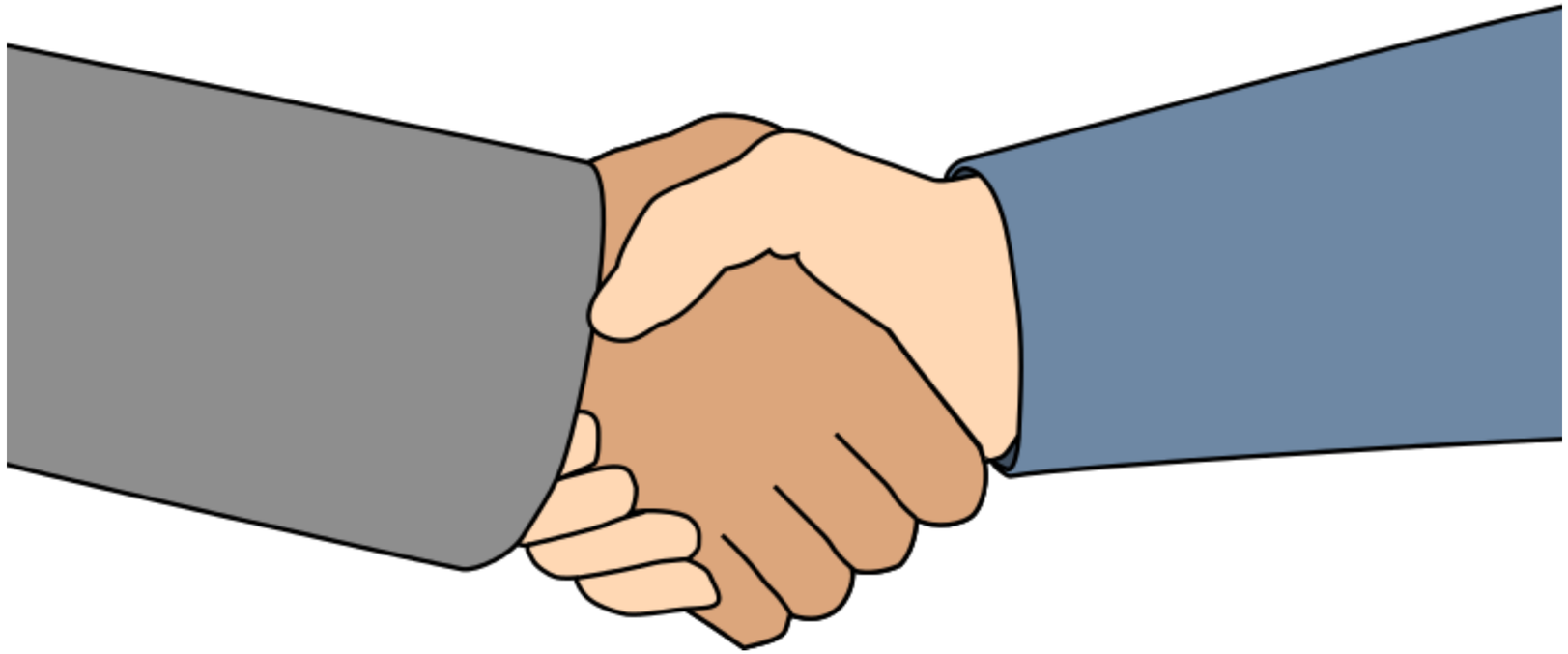
Where is a price prediction useful?

Auction Houses

Who might care?

Where is a price prediction useful?

Rental Agencies



Who might care?

Where is a price prediction useful?

Bulldozer Manufacturers

Data

53 features, 412,698 observations kaggle

- **saleprice (target)**: what the machine sold for at auction
- **SalesID**: the uniue identifier of the sale
- **MachineID**: the unique identifier of a machine. A machine can be sold multiple times
- **saledate**: the date of the sale
- **state**: US state in which the bulldozer was sold

  and 48 more…

Data

53 features, 412,698 observations kaggle

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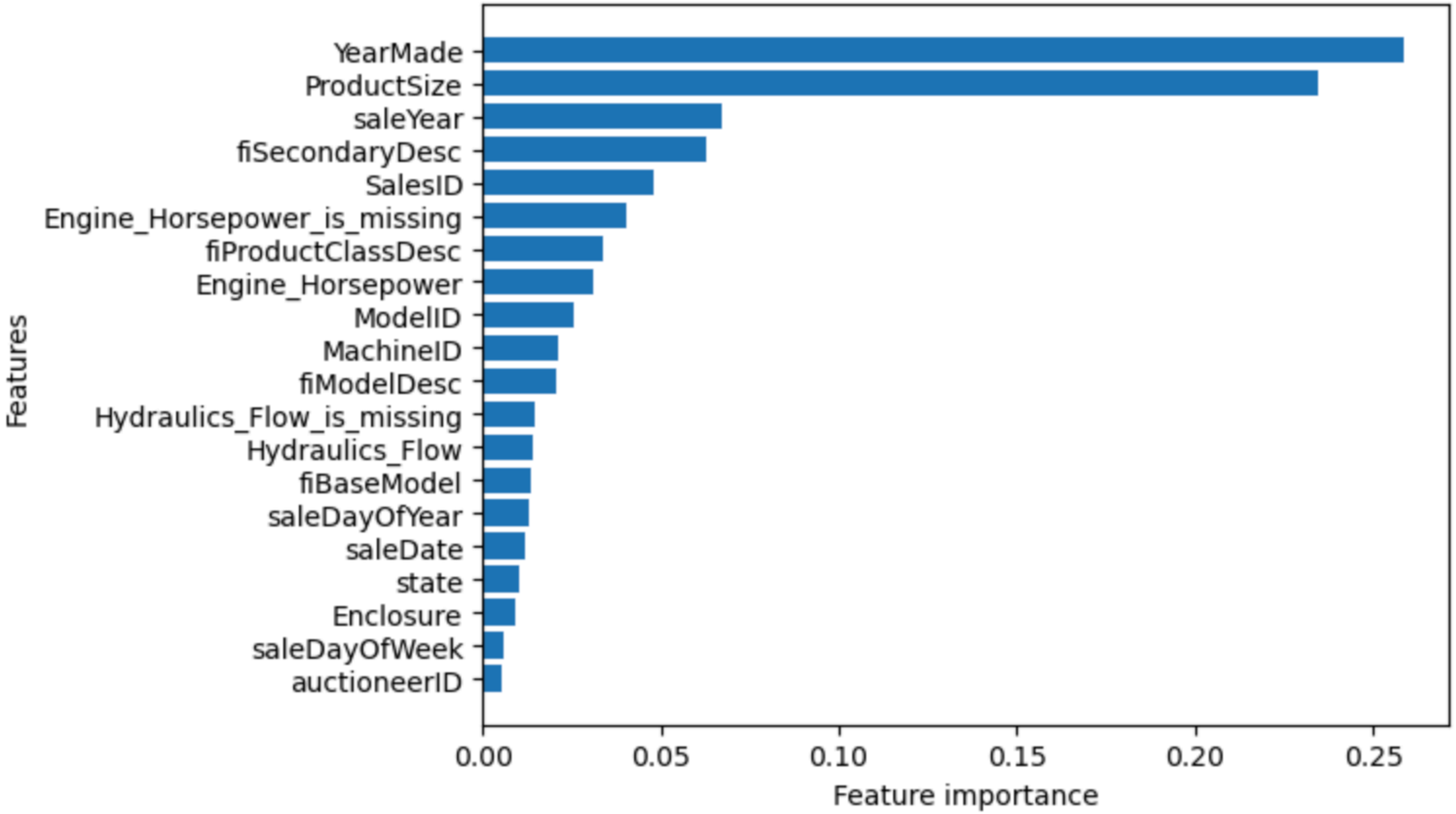
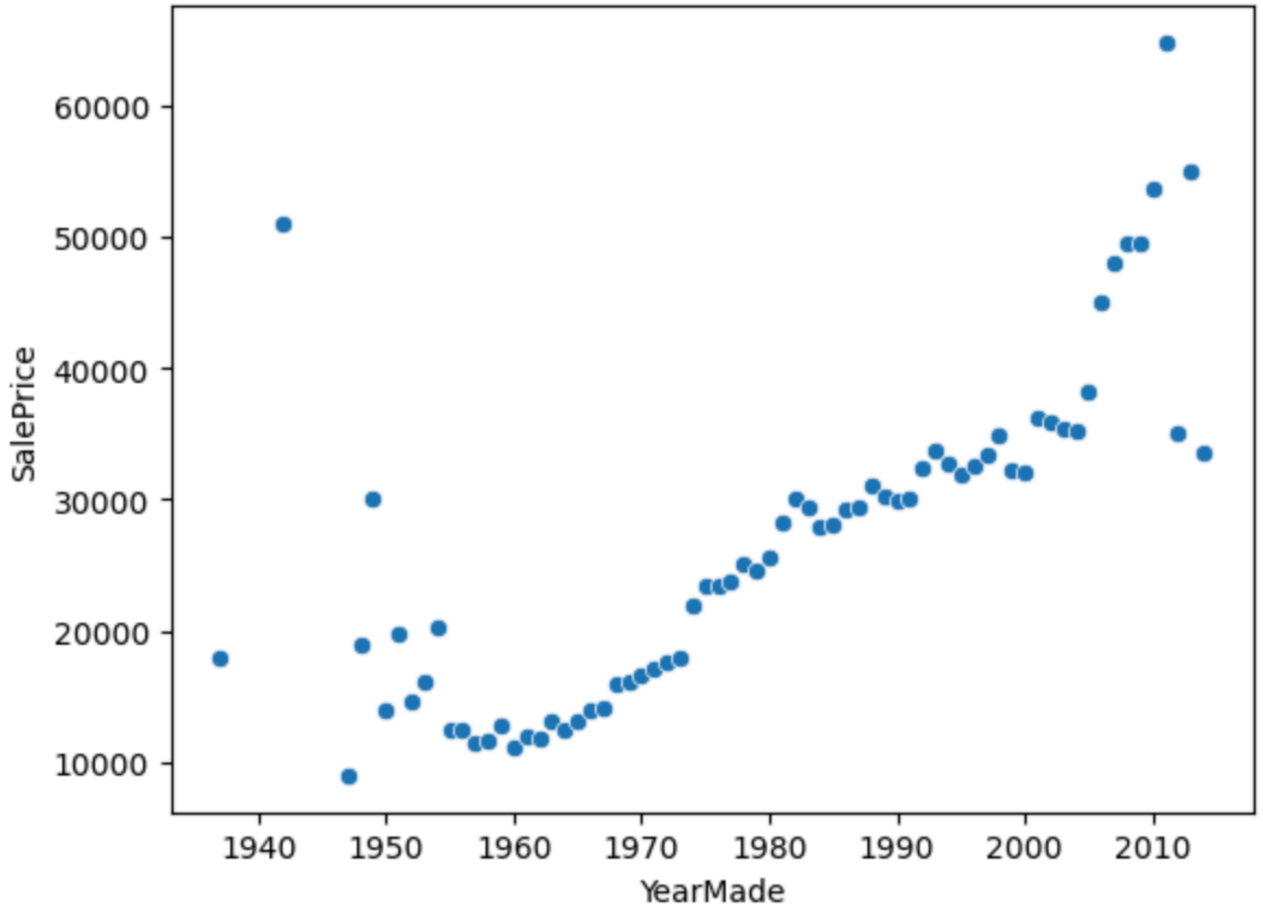
Data

Ranked feature importances



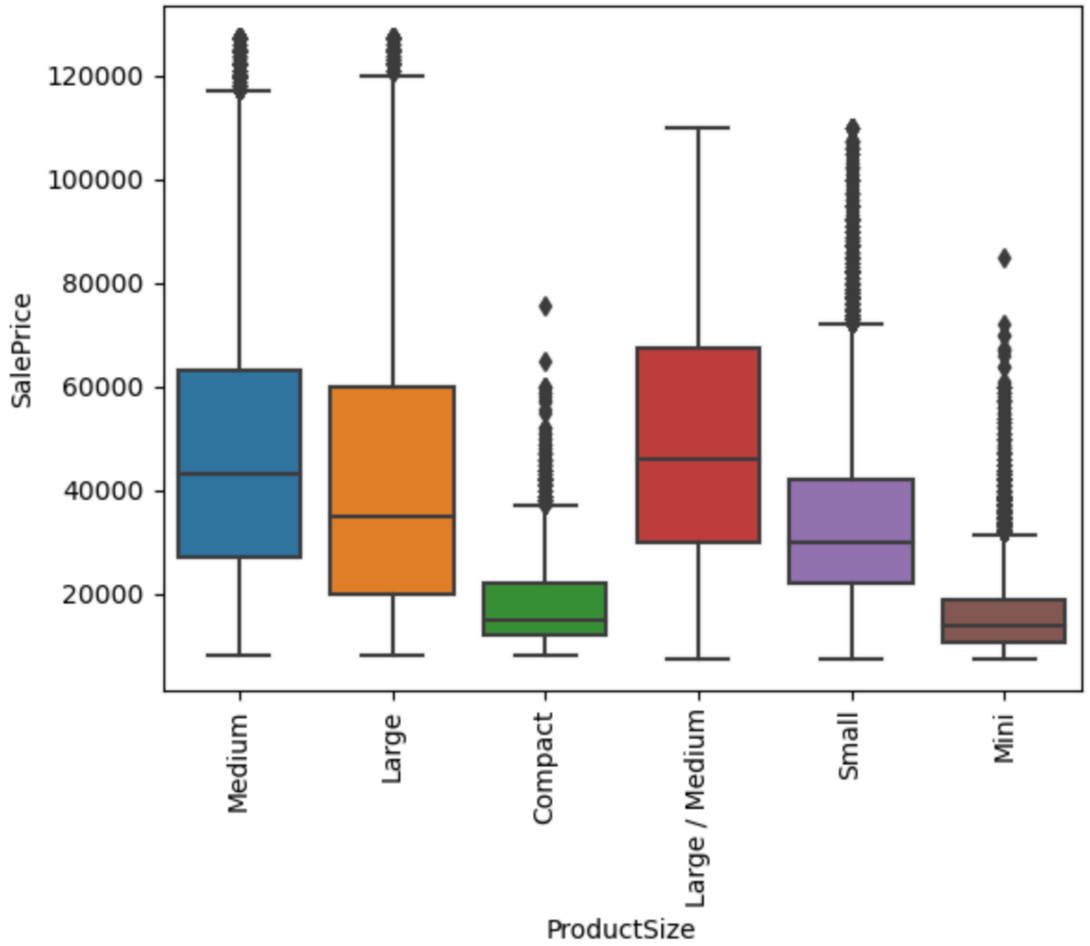
Data

Average sale price by year made



Data

Sale price by product size

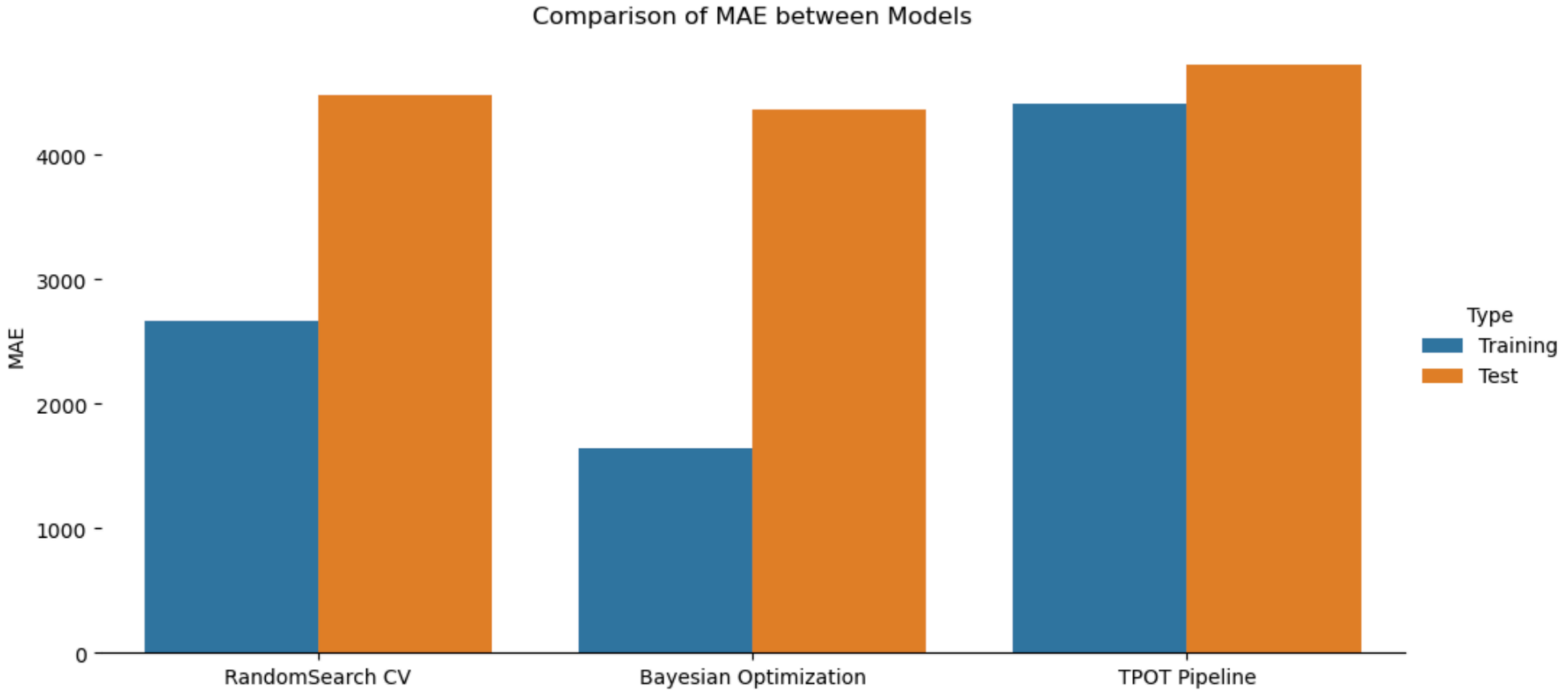


Modelling

Regression Algorithms used

- **RandomForestRegressor** with hyper parameters tuned via RandomSearchCV
- **RandomForestRegressor** with hyper parameters tuned via Bayesian Optimization
- **XGBRegressor** with hyper parameters tuned via TPOT

Modelling


Comparison of MAE between Models
MAE
4000
3000
2000
1000
0
RandomSearch CV
Bayesian Optimization
TPOT Pipeline
Type
Training
Test

Ideal Model

Scores & Precision

How well does our model predict against new, unseen data?

- **Mean Absolute Error**: $4,364.20
- **R2**: 0.91
- **Mean Squared Error**: 48,115,859.18

Ideas to Improve the Model in the Future

- As my training set only includes entries up to 2012, it would be nice to refresh this training data to reflect more current prices.
- Because I was tuning this through my personal laptop computer, prolonged hyperparamter tuning was difficult. To improve this model, I would rent virtual machine space to get a more exhaustive hyperparater tuning.
- Enriching this data with population growth metrics relative to the area in which the Bulldozer was sold my expose new patterns in sales prices