

Fire Department Response Time Predictive Analysis

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Abstract

In emergency response, every second counts. This project aims to create a robust model able to predict the response times of fire departments in the Louisville Metro and surrounding areas using a dataset from Louisville Metro Open Data. The analysis uses decision tree regression to obtain a model with a relatively low root mean squared error. The results can be used to assess potential patterns and allow decision makers to re-evaluate how to approach emergency management. To combat potential overfitting or statistical issues, other models will be used in further analysis.

Introduction

In emergency response, each second carries significance. This project aims to better predict the response times of fire departments in the Louisville Metro and surrounding areas. Using predictive analysis, the model forecasts the estimated response times of agencies based on given variables. By better understanding what and how variables affect the response time we can make emergency management more efficient and in turn, increase safety and welfare in our community.

Materials and Methods

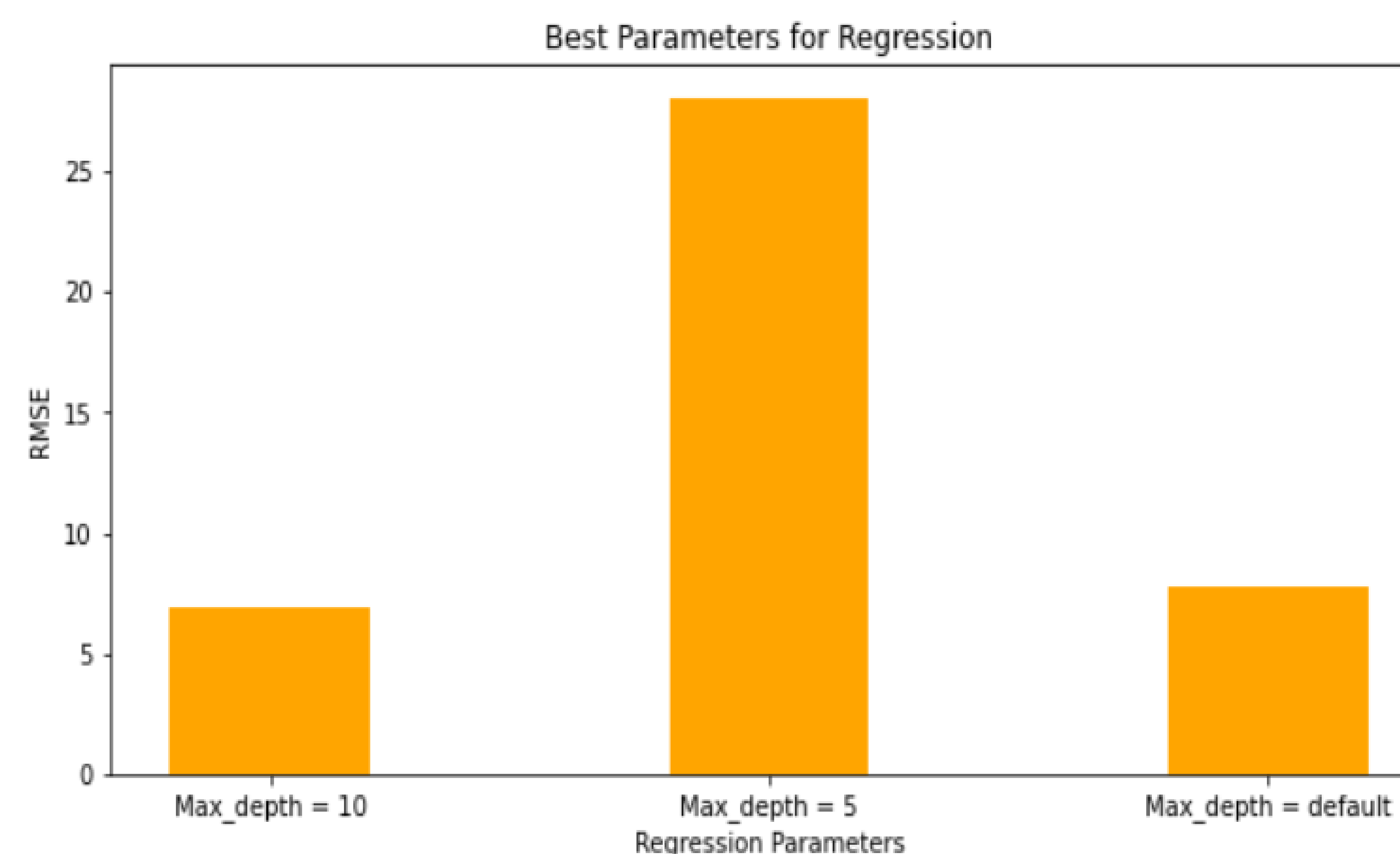
- Gathered Data using Louisville Metro Open Data.
- Cleaned data using Python to use in the model including the reorder of the priority column.
- Used Decision Tree Regression to formulate initial model for Response Time (seconds).

Objective

- Develop a Robust Model
- Analyze Agency-Specific Response Dynamics
- Establish Benchmark Standards and Improvement Targets
 - Enhance Emergency Management Decision-Making

Results

- MSE of ~7 seconds
- Priority Column re-ordering
- Potential overfitting issues



Conclusions/Future Works

- Decision Tree Regressor fits well
- Random Forest and XGBoost models next
- Incorporate zip codes and regions
- Expand to create models for police and ambulances
- Gives telecommunicators accurate estimations to give those in need

Contact

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References

- Louisville Metro Open Data
- Python and Libraries
- Microsoft Excel
- Github
- ChatGPT/stackoverflow