City of Detroit Police Department

Dispatch Time Analysis

Introduction and Preparation

The City of Detroit Police Department (DPD) wishes to determine which factors most impact the department’s dispatch time for 911 calls. Therefore, the Power BI Auto ML system analyzed 30-days of 911 calls to the department. The analysis found that a few factors had a significant impact on dispatch time.

The original data were cleaned to remove invalid values (e.g., negative dispatch times) and remove calls with missing information. Additionally, several numeric values were converted to text to ensure the machine learning system treats them as categorical values (e.g., zip code, district, and block ID). Additionally, two new data values were created to determine if the dispatch varies with time of day or week.

Initial analysis for correlation and variance determined that only three variables were suitable for including in the machine learning training: Officer Initiated (true or false), intake time (min), and the hour of the day (1 to 23).

Findings

The Power BI Auto ML system used the Pre-Fitted Soft Voting Regressor Ensemble method to train a model to predict the dispatch time. Using a training set of 56,808 rows and 25 iterations, the model achieved 19% accuracy. The most influential factors positively affecting dispatch time were if the call is not officer initiated, if the intake time is greater than 13.2 minutes, and if the hour of the call is 8 am, 3 am, 9 am, or 7 pm.

The accuracy of the model is low, meaning that it is likely to have poor predictive power. However, DPD can still use the relatively high predictive power of the intake time, time of day, and if the call is officer initiated to make operational modifications.

Refer to the attached training summary output from Power BI for more information.

How to Use the Model

1. Load a data set matching the format of the cleaned and processed 911\_Calls\_for\_servie\_(Last\_30\_Days).
2. Select the Detroit 911 Model 2
3. Select ‘Apply ML Model.’
4. Select the loaded data set.
5. Name the column where the predicted dispatch times will be placed.
6. Hit ‘Save and Apply’

Suggestions for Improvement

1. Run the model for additional time
2. Do an additional analysis of the predictors to remove additional outliers and determine if transformations may improve performance.
3. 