

# Identification of Vehicle Warranty Data and Anomaly Detection by Means of Machine Learning Methods

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Nowadays, the use of machine learning methods instead of manual methods on the data is increasing. This increase also improve the applied methods. In addition the frequency of the use of machine learning methods in the field of the industry has improved. These methods are also used on vehicle warranty data in predictive maintenance. The warranty data used in the industry is important for companies in terms of cost. A part in a vehicle may cause a fault and if the fault is a continuing error during the warranty period, this will increase the cost.

In this study, the warranty data used in the automotive industry have automatically labeled and the anomaly detection process has performed on the labeled case. We have used 32360 vehicle data together with warranty costs. In addition, gamma distribution and moving average methods are used for labeling. The labeling cases are given as Stable, Issue\_New, Issue\_Stable, Issue\_Decrease and Issue\_Increase. These cases show the behavior of the anomaly. For example, Stable; anomaly no as showed, Issue\_New; a new anomaly shows the status of. Stable and Issue\_New labels are determined using the gamma distributions. The other labels are determined by moving average. Machine learning algorithms are used for anomaly case detection on the labeled data. We are used two different algorithms. The first is a xgboost algorithm based on decision-tree and gradient-boosting. The second is a logistic regression algorithm based on regression. The accuracy is used as an evaluation criterion and results are compared. We have observed xgboost algorithm in the anomaly detection process performed better than logistic regression algorithm.

**Keywords:** Machine Learning, Anomaly Detection, Gamma Distribution, Warranty Classification, Predictive Maintenance