

LITERATURE SURVEY

Team ID : PNT2022TMID43198

Machine Learning based Vehicle Performance Analyzer

| S.NO | PAPER | AUTHOR | YEAR | METHOD AND ALGORITHM | ACCURACY/ PRECISION |
|------|--|---|------|--|---------------------|
| 1 | The European Commission forecasts increase in transportation over the next 20 years. This will lead to a capacity crunch as the infrastructure development will not match the increase in traffic. | R. Prytz, S. Nowaczyk, S. Byttner, "Towards Relation Discovery for Diagnostics" in KDD4Service Proceedings of the First International Workshop on Data Mining for Service and Maintenance, San Diego California | 2011 | The usage statistics database, named the Logged Vehicle Data database (LVD), is limited to aggregated data. The data is aggregated on-board every Volvo vehicle and is either transmitted wirelessly through a telematics gateway or downloaded at a workshop. The update frequency is at best once per month but normally every three and six months. The frequency is unknown a priori even though vehicles regularly visit workshops for maintenance. | 50% |
| 2 | Predicting maintenance needs in vehicles | T.Rögnvaldsson, S. Byttner, R. Prytz, S. Nowaczyk, "Wisdom of Crowds for Self-organized Intelligent Monitoring of Vehicle Fleets", submitted to | 2014 | On-board solutions have unrestricted, real-time, access to the data streams. This enables fast detection as the detection algorithms are located close to the data source. On-board solutions typically have limited computational and storage capacity since the hardware needs to be of automotive grade, e.g. water, shock and EMC | 70% |

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| | | IEEE Transactions on Knowledge and Data Engineering(TKDE), | | resistant. and inexpensive as well. Generally automotive electronics usually lingers two or three generations behind the consumer market. | |
| 3 | Learning from historical data | R. Prytz, S. Nowaczyk, T. Rögnvaldsson, S. Byttner, "Analysis of Truck Compressor Failures Based on Logged Vehicle Data", In Proceedings of the 9th International Conference on Data Mining (DMIN'13), Las Vegas, NV,USA. | 2013 | Pre-processing of data: The LVD and VSR databases contain many of the general problems of real-world databases as well as more specific problems related to how data is entered and structured in these databases. Typical problems are missing values and duplicate entries and more specific problems related to these sources are varying parameter sets among vehicles and uncertain repair dates. Furthermore, the LVD database only consists of aggregated data, which smoothens the trends in the data. | The overall accuracy is good as the influence of the poorly predicted minority class is small. A dataset with a imbalance of 1:100 typically yields an accuracy of 95-100% of the majority class and 0-10% in the minority class. The overall accuracy is around 99%. |
| 4 | Paper I Paper II Paper III | R. Prytz, S. Nowaczyk, T. Rögnvaldsson, S. Byttner, "Predicting the Need for Vehicle Compressor Repairs Using Maintenance Records and Logged Vehicle Data" submitted | 2019 | Paper IV introduces the presented off-board method that uses supervised machine learning to find patterns of wear. The method is evaluated on the air compressor of a Volvo FH13 vehicles. The method evaluates a vehicle just prior to an already scheduled workshop visit. The vehicle is flagged as Faulty in case the vehicle's air compressor is predicted to fail before the | The optimum case is when the classifier is tuned to the sensitivity of 0.4 resulting in 0.9 specificity. This means that 40% of the failing air compressors were correctly |

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| | | to Engineering Applications of Artificial Intelligence. | | next planned workshop visit. This results in an extra air compressor check-up at the upcoming workshop visit. | predicted and 10% of the normal readouts where wrongly classified as failing. |