

**KCG COLLEGE OF TECHNOLOGY**

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**Machine learning based Vehicle Performance Analyzer**

**Literature Survey.**

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**1. Vehicle Acceleration Prediction Based on Machine Learning Models and Driving Behavior Analysis.**

**Author:** Yajie Zou; Lusa Ding; Hao Zhang ; Ting Zhu; Lingtao Wu

**Published Month and Year:** May 2022 **.**

**Project Description:**

Advanced Driving Assistance Systems (ADAS) improve traffic safety.

In this study, a vehicle acceleration prediction model based on machine learning methods and driving behaviour analysis is proposed. First, the driving behaviour data are pre-processed, and the relative distance, relative speed, and acceleration of the subject vehicle are selected as feature variables to describe the driving behaviour.

Then, a finite Mixture of Hidden Markov Model (MHMM) is used to divide the driving behaviour semantics. The model can divide heterogeneous data into different behavioural semantic fragments within different time lengths.

the similarity of different behavioural semantic fragments is evaluated using the Kolmogorov–Smirnov test.

In total, 10 homogenous drivers are classified as the first group, and the remaining 20 drivers are classified as the second group. Long Short-Term Memory (LSTM) and Gate Recurrent Unit (GRU) are used to predict the vehicle acceleration for both groups. The prediction results show that the proposed method in this study can significantly improve the prediction accuracy of vehicle acceleration

**GAPS**

However, few prediction models consider the characteristics of individual drivers, which may overlook the potential heterogeneity of driving behaviour

Behaviour alone is considered as a potential performance changer in this while there are atmospheric and situational instances which leads to performance dips and highs in vehicles.

**2.** **Car-Performance-Prediction**

**Authors:** Sudeepa Kolli ; Lohith Viswa .

**Published Month and Year:** July 2020.

**Project Details:**

Car Performance Prediction is a project thatfocuses on improving the present data analysis methods of car performance and service updates.

The performance analysis of the car based on the engine type, no of engine cylinders, fuel type and horsepower etc.

These are the factors on which the health of the car can be predicted. It is an on-going process of obtaining, researching, analysing and recording the health based on the above three factors.

The performance objectives like mileage, dependability, flexibility and cost can be grouped together to play a vital role in prediction engine and engine management system.

**GAPS:**

TheModel only accounts for car and it new on road performance

Old cars and models should be incorporated.

Heavy vehicle modules and load carried should be considered to know the performance of worn out shock absorber and tyres.

Finding a proper balance with heavy and light vehicles is necessary.

**3. Performance of Motor Vehicle based on Driving and vehicle Data using Machine learning.**

**Author:** Punith Kumar Nagaraje Gowda.

**Published Month and Year:** December 2019.

**Project Details:**

Themodel developed yields promising results in predicting fuel efficiency with XGBoost model outperforming others by predicting better

Model data is not limited to only one singular class despite the model was taken for a small car.

Can generalised for any data or any vehicle with driving data and vehicle characteristics.

**GAPS:**

The resultant model is highly tuned for only monitoring fuel efficiency and is fixed only for on-road situations.

The XGBoost model performance is low only when there is low efficiency even though it is better it still needs work

Given that data was collected only for a small car and different vehicles and their conditions can vary with different terrains need to be taken in to account

Other features like oil changing rate and engine health needs to factored in for efficient fuel analysis.

**4. Machine learning based real-time vehicle data analysis for safe driving modelling**

**Authors:** Pamal Yadav ; Sangsu Jung ; Dhananjay Singh.

**Published Month and Year:** April 2019.

**Project details:**

This paper identifies a necessity to evaluate the Meta features of vehicles which could be helpful in improving the vehicle driver's skill to prevent accidents and also evaluate the change in the quality of cars over passing time.

This paper does an analysis of the vehicle data using supervised learning based linear regression model that is used as an estimator for Driver's Safety Metrics and Economic Driving Metrics.

the metrics that we have devised have potential application in automotive technology analysis for developing an advanced intelligent vehicle.

presented a system for performing the real-time experiment based on the Onboard-Diagnosis version II (OBD-II) scanner data.

**GAPS:**

The model focuses on driver safety and the resultant effects of it on the vehicle

The model should account for all the damage done to the vehicle due to reckless driving and constant acceleration.

Offroad situations should also be monitored for heavy vehicles.

**5. Machine methods for vehicle predictive maintenance using off-board and on-board data.**

**Authors:** Rune Prytz.

**Published Month & Year:** September 2014.

**Project/paper description**:

Paper I provides first steps towards unsupervised method for discovering useful relations between measured signals in volvo truck during normal operations.

Paper II applies COSMO algorithm in real time setting. Detects failures related to cooling fan and heat load of engine.

System and traction control and are thus under supervision of an on-board diagnostic algorithm.

Paper III introduced off-board data sources LVD and VSR and presents early results of air compressor failure.

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

**GAPS**

One out of the four faults was clearly found while the others werer mixed up.

Three occurrences of deviations were impossible to link to any repair and they were left unexplained.

Much of the downtime is spent waiting at the workshop while the actual wrench time is much less.

The paper concludes that using these offboard data sources is viable as input data for predicting vehicle maintenance, albeit it will require a lot more work.