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Real-Time Vehicle Engine Defect Prediction on Raw Vehicle Sensor and ECU Data

A Dissertation by

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ABSTRACT

The rising number of road traffic accidents resulting in injury or death of passengers has become a major concern. One of the potential causes of these accidents is mechanical failures in vehicles. In 2016, the number of deaths caused by road crashes reached 1.35 million, which is equivalent to 3700 deaths per day. To address this issue, it is crucial to proactively identify vehicle engine defects before they lead to accidents. The current method of identifying defects after they occur is not effective, as it might be too late to prevent the accident.

The proposed solution to reduce the risk of road traffic accidents caused by mechanical failures in vehicles is to implement an automatic defect detection system. The system will use data analysis to predict defects before they occur, allowing users to minimize 70% of the risk and save time and cost. By identifying issues early, users could prevent dangerous situations and reduce the likelihood of road accidents caused by common vehicle defects.

A defect is an uncommon, infrequent occurrence. So, a classifier or a machine learning model that can tell the difference between normal and irregular behavior is learned by using the OBD II device by collecting information from the computer system of a vehicle. The proposed system will utilize advanced data analysis and machine learning techniques, such as deep learning, to process and analyze the data, and identify patterns and anomalies that may indicate a potential engine defect thereby improving road safety and saving lives. In this case according to the current model the system was able to obtain an accuracy rate of 0.96.

Key Words - Machine Learning, One class classifier, Time series prediction, OBD II, Defect Prediction, Data Science, Real-Time Data, Onboard Diagnosis, Vehicle ECU data.

Subject Descriptors:

- Vehicle engine sensor data →ECU output → Onboard diagnosis → OBD II data fetching → Realtime vehicle sensor
- OBD II output →OBD II device → Vehicle sensor data → Real-time data → Machine Learning Algorithms → Defect identification