

Engine fault diagnosis using probabilistic neural network

ABSTRACT

Engine failure is one of the major factors caused vehicle breakdown. In the current practice, the engine faults are diagnosed manually by mechanics and the accuracy is highly relied on their experience. Therefore, this study would like to explore the feasibility of implementing auto fault diagnosis using Probabilistic Neural Network (PNN). A benchmarked engine fault model is developed and simulated in Matlab. The proposed algorithm is designed to detect 9 common engine faults based on the information extracted from exhaust gas, such as hydrocarbon (HC), carbon monoxide (CO), oxides of nitrogen (NO_x), carbon dioxide (CO₂) and dioxygen (O₂). The proposed PNN is trained using the collected engine fault data from experiment and the probability density of PNN is determined based on the Parzen window estimation method. Bayes decision rule is implemented for classifying the types of the engine faults. The simulated results show that the proposed algorithm has faster diagnosis speed, higher accuracy and consistent. The algorithm takes 0.038 s in diagnosing the fault and the average accuracy is 98.3 %.