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Abstract
In this paper, the neural network, the back propagation algorithm and steepest descent method are combined to develop the leakage diagnosis of vacuum pressure of the gasoline engine. The datum of air flow, throttle position, intake manifold pressure and injection time are collected under the normal and leakage conditions. The testing samples are divided into the normal condition, the leakage of crank ventilation and that of fuel pressure regulator. The results indicate that the diagnostic system constructed by the neural network can exactly identify the leakage caused by crank ventilation or fuel pressure regulator. Furthermore, the leakage degree diagnosis systems for crank ventilation and fuel pressure regulator are presented.

Secondly, neural networks system is utilized to estimate the normal and leakage conditions of engine, manifold pressure, air mass flow rate into manifold and air mass flow rate into cylinder under the different conditions. The intake manifold temperature, intake manifold pressure, throttle position, engine speed and datum of air flow frequency are collected as dynamic data and use for neural networks tuning. The overall estimation error ratios are less than 1%. In this research, the engine diagnosis system and dynamic data estimator are proposed, and the application of engine leakage diagnosis and dynamic data estimator are also demonstrated.
Advisory Committee Chen,Pei-Chung - advisor

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