Using MLP-GABP and SVM with Wavelet Packet Transform Based Feature Extraction for Fault Diagnosis of a Centrifugal Pump

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Abstract

In this paper, a hybrid training method for Multilayer Perceptron (MLP) is proposed based on combining Back Propagation (BP) and Genetic Algorithm (GA). The proposed scheme is compared with the Support Vector Machine approach to classify six fault conditions and the normal condition of a centrifugal pump. Two training algorithms were tested and compared. Features were extracted using Wavelet Packet Transform (WPT) with three levels decomposition, and two mother wavelets were used to investigate their effectiveness on feature extraction. Furthermore, GA is also used to optimize the number of hidden layers and neurons of MLP. The results obtained, show improved performance on the feature extraction, GA based hidden layers and neurons selection, training algorithm, and classification performance using the proposed scheme.

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