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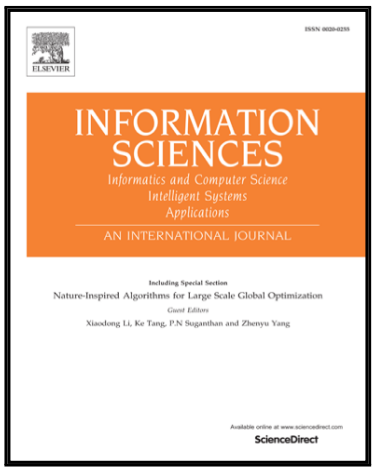

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An eigenvector based center selection for fast training scheme of RBFNN

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Abstract

The Radial Basis Function Neural Network (RBFNN) model is one of the most popular Feedforward Neural Network architectures. Calculating the proper RBF centers efficiently is one of the key problems in the configuration of an RBFNN model. In previous studies, clustering approaches, especially the k-means clustering, are most frequently employed to obtain the RBF centers. However, these approaches are usually time-consuming, particularly for the data sets with a relatively large scale. Meanwhile, some approaches have been proposed to save the training time by sacrificing the accuracy. This paper introduces an approach to quickly determine the RBF centers for an RBFNN model. An eigenvector based clustering method is employed to calculate the RBF centers in the input feature space. RBF centers for the RBFNN model thus can be determined very quickly by calculating the principal components of the data matrix instead of the iterative calculation process of k-means clustering. After that, the connecting weights of the network can be easily obtained via either pseudo-inverse solution or the gradient descent algorithm. To evaluate the proposed approach, the performance of RBFNNs trained via different training schemes is compared in the experiments. It shows that the proposed method greatly reduces the training time of an RBFNN while allowing the RBFNN to attain a comparable accuracy result.

Keywords: RBFNN, Eigenvectors, Center Selection

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