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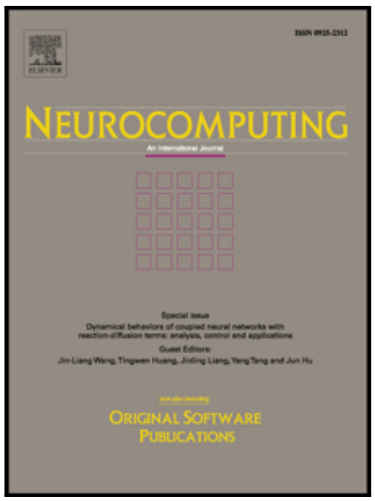

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A Niching Evolutionary Algorithm with Adaptive Negative Correlation Learning for Neural Network Ensemble

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Abstract

This paper proposes a niching evolutionary algorithm with adaptive negative correlation learning, denoted as NEA_ANCL, for training the neural network ensemble. In the proposed NEA_ANCL, an adaptive negative correlation learning, in which the penalty coefficient λ is set to dynamically change during training, has been developed. The adaptation strategy is based on a novel population diversity measure with the purpose of appropriately controlling the trade-off between the diversity and accuracy in the ensemble. Further, a modified dynamical fitness sharing method is applied to preserve the diversity of population during training. The proposed NEA_ANCL has been evaluated on a number of benchmark problems and compared with related ensemble learning algorithms. The results show that our method can be used to design a satisfactory NN ensemble and outperform related works.

Keywords: Neural network ensemble, evolutionary algorithm, negative correlation learning, adaptation strategy, diversity measure.

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