Pruned Modified Fuzzy Hyperline Segment Neural Network and Its Application to Pattern Classification

Abstract

The Fuzzy hyperline segment neural network (FHLSNN) is a supervised classifier that forms n-dimensional hyperline segments (HLS) defined by two end points with a corresponding membership function for learning and testing. In this paper, the Pruned fuzzy hyperline segment neural network (PFHLSNN) and Pruned modified fuzzy hyperline segment neural network (PMFHLSNN) are proposed. The pruning method is based on a confidence factor calculated for each hyperline segment in the prediction phase after learning. The new definition of confidence factor is proposed. In PFHLSNN, the hyperline segments with low confidence factor are pruned using user defined threshold to reduce the network complexity. In order to improve the classification performance of PFHLSNN, the modification is proposed in its testing phase and the network is referred as PMFHLSNN. In this modification, the Euclidean distance is computed between the applied input pattern and the centroid of the patterns falling on the hyperline segment to decide the class of pattern. Finally, the HLS with smallest distance is selected as winner and the pattern is so classified that it belongs to the class associated with that HLS. The performance of PFHLSNN and PMFHLSNN is evaluated using benchmark problems and real world handwritten character recognition data set. The results are analyzed, discussed and compared with the FHLSNN. Thus, the proposed approach improved the classification accuracy without affecting the incremental learning of FHLSNN and reduces the
network complexity by pruning the hyperline segments of low confidence factor.

References

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Index Terms

Computer Science  Artificial Intelligences

Keywords

Fuzzy hyperline segment neural network  Pruning  Centroid  Euclidean Distance  computation  classification.