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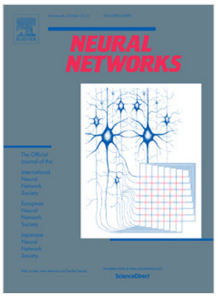

Fuzzy c–means-based architecture reduction of a probabilistic neural network

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Fuzzy C–Means-Based Architecture Reduction of a Probabilistic Neural Network

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Abstract

The efficiency of the probabilistic neural network (PNN) is very sensitive to the cardinality of a considered input data set. It results from the design of the network's pattern layer. In this layer, the neurons perform an activation on all input records. This makes the PNN architecture complex, especially for big data classification tasks. In this paper, a new algorithm for the structure reduction of the PNN is put forward. The solution relies on performing a fuzzy c–means data clustering and selecting PNN's pattern neurons on the basis of the obtained centroids. Then, to activate the pattern neurons, the algorithm chooses input vectors for which the highest values of the membership coefficients are determined. The proposed approach is applied to the classification tasks of repository data sets. PNN is trained by three different classification procedures: conjugate gradients, reinforcement learning and the plugin method. Two types of kernel estimators are used to activate the neurons of the network. A 10–fold cross validation errors for the original and the reduced PNNs are compared. Received results confirm the validity of the introduced algorithm.

Keywords: probabilistic neural network, fuzzy c–means, architecture reduction, classification

1. Introduction

It is known that the complexity of the PNN's architecture proposed by Specht (1990) is high. This complexity is an effect of using all of the input

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