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Fast Learning Algorithm for Fuzzy Inference Systems using Vector Quantization

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Abstract

Many studies on modeling of fuzzy inference systems have been made. Their aim is to construct automatically fuzzy systems from learning data based on steepest descent method [1]. Further, there is difficulty for learning with high dimensional spaces [2]. In order to overcome them, learning methods using VQ and SDM are proposed and they are superior in the number of rules to other methods, but they need a great deal of learning time [3]. The cause seems to be both local searches. On the other hand, it is known that learning method of RBF (Radial Basis Function) networks using Vector Quantization and Generalize Inverse Method is much fast compared to other learning methods.

In this paper, we propose a new learning method composed of iterating three stages. It starts by breaking the method into three stages: learning in the first stage, intermediate stage of adjusting the center and width parameters, and the next stage of updating the weight parameters using the generalized inverse method. As for final stage, three parameters are updated by learning based on SDM. In order to demonstrate the validity of the proposed method, numerical simulations for function approximation and pattern classification problems are performed.

References

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