

THE STRUCTURE OPTIMIZED FUZZY CLUSTERING NEURAL NETWORK MODEL AND ITS APPLICATION

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ABSTRACT. *There have been a lot of achievements in the study of fuzzy clustering neural network. The clustering characteristic of the fuzzy neural network has been improved greatly. But the study of the fuzzy clustering neural network is still in the initial stage, and there are still lots of open problems. The structure optimization of the fuzzy clustering neural network is one of the key issues that needs to be solved. In this paper, we design a structure optimized fuzzy clustering neural network model based on the grid and density and apply it in the clustering of the social development level. By doing this, we can solve the uncertain problems of the class number and can accelerate the speed of the clustering.*

Keywords: Clustering analysis, Neural network, Grid and density, Economic development level

1. **Introduction.** Identification and classification are the basic human activities. To well understand the world, people need to identify the differences and recognize the similarities among things. People can form the supposition and build the conception by classification, and they also need to use the classification to find and summarize rules. So the classification research has very important significance. Clustering analysis is a subject that uses the mathematics method to study the classification problem. The traditional clustering analysis is sort of hard partition. This method partition the objects into certain class strictly, so the class circumscription is clear in the way. While the fact is that most of the classification problems have the fuzzies and each object has no strict boundary. So we need to use a new method—the fuzzy clustering analysis, to solve this kind of the clustering problem. The fuzzy clustering analysis has been widely used in many fields, such as pattern reorganization, data analysis, image processing, computer vision, and fuzzy control.

In the early 1980s, the neural network raised the research climax with its characteristics of distributed store, parallel and cooperating processing, high nonlinear, self-study and self-organizing etc, and then became the hot topic of the information science, and mathematical science. Accordingly people began to use the neural network to solve the problem of the fuzzy clustering, and then put forward the fuzzy clustering method based on the neural network. That is fuzzy clustering neural network.

The neural network technique used in the clustering analysis began with the works of T. Kohonen [1] and the adaptive resonance theory of Grossberg [2]. Both the self-organizing neural network and the adaptive resonance neural network adopt Winner-Take-All as their learning method, but this way can only actualize the hard *c*-means algorithm. So many scholars began to search a general and effective fuzzy clustering neural network model