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Chapter 3

APPLYING FUZZINESS IN NEURAL SYMBOLIC-INTEGRATION

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This paper presents a new approach to upgrade the performance of logic programming in Hopfield network by applying fuzziness in the system. Fuzzy Hopfield neural network clustering technique is used as it can solve the combinatorial optimization problems that always occur in Hopfield network. Neural networks are networks of neurons as the information processing paradigm that is inspired by the way biological nervous system, such as brain, process information while logic describes relationship among propositions. Logic requires descriptive symbolic tools whereas for neural networks are non-symbolic form. By neural-logic integration, the advantages of both neural network and logic programming can be combined. This work is merely focusing on the ways to upgrade the performance of logic programming in Hopfield network. We carried out computer simulations to demonstrate the ability of fuzzy Hopfield neural network clustering technique in enhancing the performance of the system. By applying fuzzy Hopfield neural network clustering technique in the system, it does not only produce better quality solutions but it also can handle the network better even though the complexity increased. Besides that, the system also makes the solutions converge faster. Thus, the presence of this fuzzy Hopfield neural network clustering technique in the system will produce solutions with better quality.

Keywords: Fuzzy; Hopfield network; logic.

1. Introduction

This work is merely focusing on the ways to upgrade the performance of logic programming in doing Hopfield network. Fuzzy clustering technique is used as it can solve the combinatorial optimization problems that always occur in Hopfield network. Literature review is done in order to collect information on how to upgrade the performance of logic programming in Hopfield network. Survey on few methods such as fuzzy logic-based coefficient tuning, fuzzy Hopfield neural network clustering technique and type-2 fuzzy logic is done to determine which method is the best method to enhance the performance of the program. We integrated this method in logic programming to see whether the presence of this method improve the performance of the program. In order to improve the performance of the network, fuzzy Hopfield neural network clustering technique is chosen and being implemented in the program as it gives the best performance to the network and this technique produce solutions with better quality. This method is also easier to understand and more simple than others. The implementation is prepared and introduced in the program based on the theory. This method also can reduce parameter processing time. Computer simulations are carried out to verify the proposed theory.