Simulation Output Knowledge Analysis Using Neural Network Approach : A Broadband Network Design Example

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Abstract

Simulation output knowledge analysis is one of problem-solving and/or knowledge acquisition process by investigating the system behavior under study through simulation. This paper describes an approach to simulation output knowledge analysis using fuzzy neural network model.

A fuzzy neural network model is designed with fuzzy sets and membership functions for variables of simulation model. The relationship between input parameters and output performances of simulation model is captured as system behavior knowledge in a fuzzy neural network model by training examples from simulation experiments. Backpropagation learning algorithm is used to encode the knowledge.

The knowledge is utilized to solve problem through simulation such as system performance prediction and goal-directed analysis. For explicit knowledge acquisition, production rules are extracted from the implicit neural network knowledge. These rules may assist in explaining the simulation results and providing knowledge base for an expert system.

This approach thus enables both symbolic and numeric reasoning to solve problem through simulation. We applied this approach to the design problem of broadband communication network.

key words : simulation output knowledge analysis, fuzzy neural network model, broadband communication network