Structure optimization of neural network for dynamic system modeling using multi-objective genetic algorithm

Abstract :

The problem of constructing an adequate and parsimonious neural network topology for modeling non-linear dynamic system is studied and investigated. Neural networks have been shown to perform function approximation and represent dynamic systems. The network structures are usually guessed or selected in accordance with the designer's prior knowledge. However, the multiplicity of the model parameters makes it troublesome to get an optimum structure. In this paper, an alternative algorithm based on a multi-objective optimization algorithm is proposed. The developed neural network model should fulfil two criteria or objectives namely good predictive accuracy and minimum model structure. The result shows that the proposed algorithm is able to identify simulated examples correctly, and identifies the adequate model for real process data based on a set of solutions called the Pareto optimal set, from which the best network can be selected.