Analysis-adjustment-synthesis networks

葉怡成
Information Management
Computer Science and Informatics
icyeh@chu.edu.tw

Abstract

This paper presents a novel neural network architecture, Analysis-Adjustment- Synthesis Network (AASN), and tests its efficiency and accuracy in modeling nonlinear function and classification. The AASN is a composite of three sub-networks: analysis sub-network, adjustment sub-network and synthesis sub-network. The analysis sub-network is a one-layered network that spreads the input values into a layer of ‘spread input neurons’. This synthesis sub-network is a one-layered network that spreads the output values back into a layer of ‘spread output neurons’. The adjustment sub-network, between the analysis sub-network and the synthesis sub-network, is a standard multi-layered network that operates as the learning mechanism. After training the adjustment sub-network, in recalling phase, the synthesis sub-network receives the output values of spread output neurons, and synthesizes them into output values with a weighted-average computation. The weights in the weighted-average computation are deduced from the method of Lagrange multipliers. The approach is tested using four function mapping problems and one classification problem. The results show that combining analysis sub-network and the synthesis sub-network with a multi-layered network can significantly improve network’s efficiency and accuracy.

Keyword：spread neuron, function mapping, classification.