

Recent Developments in Multilayer Perceptron Neural Networks

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Abstract

Several neural network architectures have been developed over the past several years. One of the most popular and most powerful architectures is the multilayer perceptron. This architecture will be described in detail and recent advances in training of the multilayer perceptron will be presented.

Multilayer perceptrons are trained using various techniques. For years the most used training method was back propagation and various derivatives of this to incorporate gradient information. Recent developments have used output weight optimization-hidden weight optimization (OWO-HWO) and full conjugate gradient methods. OWO-HWO is a very powerful technique in terms of accuracy and rapid convergence. OWO-HWO has been used with a unique “network growing” technique to ensure that the mean square error is monotonically non-increasing as the network size increases (i.e., the number of hidden layer nodes increases). Additional performance improvements can be obtained using “separating mean” processing where the common means of inputs and outputs are removed prior to training the network. This avoids problems associated with many large data values and allows the network to train on the variations in the signals.