Optimisation of neural network with simultaneous feature selection and network prunning using evolutionary algorithm

ABSTRACT

Most advances on the Evolutionary Algorithm optimisation of Neural Network are on recurrent neural network using the NEAT optimisation method. For feed forward network, most of the optimisation are merely on the Weights and the bias selection which is generally known as conventional Neuroevolution. In this research work, a simultaneous feature reduction, network pruning and weight/biases selection is presented using fitness function design which penalizes selection of large feature sets. The fitness function also considers feature and the neuron reduction in the hidden layer. The results were demonstrated using two sets of data sets which are the cancer datasets and Thyroid datasets. Results showed backpropagation gradient descent error weights/biased optimisations performed slightly better at classification of the two datasets with lower misclassification rate and error. However, features and hidden neurons were reduced with the simultaneous feature /neurons switching using Genetic Algorithm. The number of features were reduced from 21 to 4 (Thyroid dataset) and 9 to 3 (cancer dataset) with only 1 hidden neuron in the processing layer for both network structures for the respective datasets. This research work will present the chromosome representation and the fitness function design.