Chapter 13
Optimizing Learning Weights of Back Propagation Using Flower Pollination Algorithm for Diabetes and Thyroid Data Classification

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ABSTRACT

A number of ANN methods are used, but BP is the most commonly used algorithms to train ANNs by using the gradient descent method. Two main problems which exist in BP are slow convergence and local minima. To overcome these existing problems, global search techniques are used. This research work proposed new hybrid flower pollination based back propagation HFPBP with a modified activation function and FPBP algorithm with log-sigmoid activation function. The proposed HFPBP and FPBP algorithm search within the search space first and finds the best sub-search space. The exploration method followed in the proposed HFPBP and FPBP allows it to converge to a global optimum solution with more

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efficiency than the standard BPNN. The results obtained from proposed algorithms are evaluated and compared on three benchmark classification datasets, Thyroid, diabetes, and glass with standard BPNN, ABCNN, and ABC-BP algorithms. The simulation results obtained from the algorithms show that the proposed algorithm performance is better in terms of lowest MSE (0.0005) and high accuracy (99.97%).

1. INTRODUCTION

A back-propagation (BP) neural network can resolve complex arbitrary nonlinear planning problems; therefore, it can be applied to a varied problem. However, as the model magnitude rises, the time becomes increased to train BP neural. Additionally, the classification exactness shrinkages as well. A parallel design proposed to enhance the classification exactness and runtime efficiency of the BP neural network algorithm. The HFPBP and FPBP algorithms used to optimize the BP neural network's original weights and thresholds and improve the exactness of the classification procedure. This research proposed a novel hybrid flower pollination based back propagation (HFPBP) algorithm with altered activation function and flower pollination back propagation (FPBP) algorithm with log-sigmoid activation function. The proposed HFPBP and FPBP algorithm firstly find the best search space. The investigated technique allows the convergence of global optimum resolution with more efficacy than the conventional BPNN algorithm. The proposed algorithm assessed and equated on three benchmark classification datasets, thyroid, diabetes, and glass, with conventional and proposed which is clearly shows that the proposed model performance is better than conventional with respect to low MSE (0.0005) and high accuracy (99.97%) .There are a lot of successes which are achieved by artificial neural network in various field that are such as health sciences engineering and the one field cognitive science which is unable to unnoticed due to admirable capability in intellectual complex nonlinear plotting bond and generate trainer mock-ups (Alsmadi, Omar, & Noah, 2009) .Gradient descent based back propagation algorithm are used to training of ANNs. Unfortunately, training of ANNs leading some drawbacks such as local minimum value, lower accuracy and time-consuming convergence speed Aydin (2014). To reduce these problems, the naturally enthused algorithms which are representing met heuristic algorithms are consumed to training ANNs. In illustration of research, different researchers used 2nd order stochastic learning method for the aim of training Artificial neural network mock-ups (Basheer et al., 2000). Another algorithm called Krill Herd which is also practiced for the training of ANNs (Bi et al., 2005). Bat-inspired algorithm is also used by some other researchers to adapt optimizing ANNs mock-up (Castellani & Rowlands, 2009). They used to adapt editions of bat algorithm for increasing the performance of Artificial Neural Networks. And all the given adapted structures of bat-algorithm guides to enhance performance of convergence. Metaheuristic algorithms are grouped into two techniques one is single and the other is population-based. The training of an artificial neural network which is based on a single based metaheuristic technique, it is started on one resolution, integrates with its locality to discover most excellent answer (Celik, Koylu, & Karaboga, 2016). The algorithm which is based on the Population open number of resolutions as well as produce a sequence of answers; it is not ending till it meet the condition. The algorithm based on Population