

Article

Neural DE: an evolutionary method based on Differential Evolution suitable for neural network training

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Abstract: Artificial neural networks have proven to be an important machine learning model that has been widely used in recent decades in a number of difficult problems of classification or data fitting from real - world areas. Due to their importance, a number of techniques have been developed that efficiently identify the parameter vector for these models. These techniques usually come from the field of optimization and, by minimizing the training error of artificial neural networks, estimate the vector of their parameters. However, many times these techniques either get trapped in local minima of the training error or lead to overfitting the artificial neural network, resulting in poor performance when applied to data that was not present during the training process. This paper presents an innovative training technique for artificial neural networks based on the Differential Evolution optimization method. This new technique creates an initial population of artificial neural networks that evolve and periodically applies a local optimization technique in order to accelerate the training of these networks. The application of the local minimization technique is done in such a way as to avoid the phenomenon of overfitting. This new method was successfully applied to a series of classification and data fitting problems and a comparative study was made with other training techniques from the relevant literature.

Keywords: Neural networks; Evolutionary methods; Differential Evolution; Machine learning

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