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Introducing an evolutionary method to create the bounds of artificial neural networks

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Abstract: Artificial neural networks are widely used in applications from various scientific fields and in a multitude of practical applications. In recent years, a multitude of scientific publications have been presented on the effective training of their parameters, but in many cases overfitting problems appear, where the artificial neural network shows poor results when used on data that was not present during training. This text proposes the incorporation of a three - stage evolutionary technique, which has its roots in the differential evolution technique, for the effective training of the parameters of artificial neural networks and the avoidance of the problem of overfitting. The new method effectively constructs the parameter value range of the artificial neural network, achieving both a reduction in training error and preventing the network from experiencing overfitting phenomena. This new technique was successfully applied to a wide range of problems from the relevant literature and the results were extremely promising.

Keywords: Neural networks; Evolutionary algorithms; Stochastic methods; Differential Evolution

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