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Numerical solution of Lane-Emden type equations using multilayer perceptron neural network method. (English) [Zbl 1428.65065]

Summary: In this paper, we discuss the multi-layer perceptron artificial neural network technique for the solution of homogeneous and non-homogeneous Lane-Emden type differential equations. Our aim is to produce an optimal solution of Lane-Emden equations with less computation using multi-layer perceptron artificial neural network technique, comparatively other numerical techniques. Several test examples have been considered to determine the robustness of the given method. The results obtained prove that the given technique has the capability to develop into an effective approach for solving Lane-Emden type problems with less computation time and memory space.

MSC:
65N20 Numerical methods for ill-posed problems for boundary value problems involving PDEs
92B20 Neural networks for/in biological studies, artificial life and related topics
68T05 Learning and adaptive systems in artificial intelligence
65N15 Error bounds for boundary value problems involving PDEs
65K10 Numerical optimization and variational techniques
65L70 Error bounds for numerical methods for ordinary differential equations
35C05 Solutions to PDEs in closed form

Keywords:
multilayer perceptron artificial neural network; singular initial value problem; Lane-Emden equation; error back propagation; quasi Newton method

Full Text: DOI

References:


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