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一种新型的混沌BP混合学习算法

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摘要: 将一种新的快速BP(FBP)算法和混沌优化相结合, 提出了混沌BP算法(CBP算法). FBP算法吸收了误差函数的非线性信息, 大大加快了BP算法的收敛速度, 但它仍然采用梯度下降法, 不可避免地存在局部极小的缺陷. 混沌动力学具有遍历性、随机性的特点. 能在一定范围内按其自身规律不重复地遍历所有状态, 将混沌优化搜索引入FBP算法中, 形成一种新型的混沌BP算法. 它既能较快地局部收敛, 又能全局收敛, 避免了陷入局部极小的可能性. CBP算法为多层前馈网络的全局性收敛学习提供了一种有效的方法.

关键字: 前馈神经网络; 混沌优化; BP算法; 全局收敛

A new chaos BP hybrid learning algorithm

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Abstract: Owing to slow convergence speed and local minimum for SBP algorithm, a hybrid chaos-BP algorithm is proposed by means of new fast BP algorithm and chaos optimization together. In new BP algorithm, nonlinear function information of neural network output error is adopted, so it has faster partial convergence speed than that of general BP algorithm, but gradient descend method is used in FBP, which brings about local minimum problem. Due to no repetition and random of chaos dynamics, chaos searching is imported to FBP and new chaos BP algorithm is constructed, it has fast partial convergence speed and global convergence, no local minimum.

CBP algorithm is applied to XOR problem and non-line function approximation. Simulation results show that performances of the CBP algorithm exceed that of the SBP and FBP in the reduction of total number of iteration and learning time. CBP algorithm is very effective to approach global convergence learning for multiplayer feed forward neural networks.

Key words: feed-forward neural networks; chaos optimization; BP algorithm; global convergence

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