# 遗传算法构建的神经网络及在机械工程中的应用

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摘要　在分析遗传法和神经网络优点的基础上，采用遗传进化的方式自动获得神网络的结构、权值和阈值. 提出了构建神经网络模型参数的遗传算法分区编码方案，构建了适应度函数并依据个体适应度值的大小动态调整隐层节点及连接权个数的方法，给出了整体算法过程. 采用该方法构建的神经网络计算两自由度的机械手参数，并通过实例仿真与常规凭经验构建网络结构及采用BP学习算法相比较，采用遗传算法构建的神经网络具有仿真精度高、占用资源少、计算效率高等优点.

关键词　遗传算法　神经网络　机械实例　BP算法　自适应参数调整
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# Neural networks based on the genetic algorithm and its application in mechanical engineering

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**Abstract**

Authors take advantage of the genetic algorithm (GA) to automatically obtain structures, weights and bias of neural networks (NN). A classified coding scheme is presented to get modeling parameters of an NN. Then a practical fitness function along with a new method that can automatically adjust the number of hidden nodes and connection weights according to the individual fitness values is described in detail. The proposed method is applied to calculate the parameters of a manipulator with a freedom of degree 2. Simulation result is compared with data obtained from practical experience and the back propagation(BP) learning algorithm. Comparison study indicates that the proposed method has many advantages such as higher simulation accuracy, less resource utilization and higher computational efficiency. <BR>

**Key words**　Genetic algorithm　neural network　machinery example　back propagation algorithm　self-adaptive parameter adjustment

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