GA-BP神经网络在下肢运动步态识别中的应用研究

作　者：马玉良, 马云鹏, 张启中, 罗志增, 杨家强

单　位：杭州电子科技大学自动化学院

摘　要：

为了提高下肢表面肌电信号步态识别的准确性，提出了一种基于遗传算法（GA）优化的BP神经网络分类器设计方法。首先，对采集的下肢表面肌电信号进行小波滤波及特征值提取，其次，构造基于GA优化的BP神经网络分类器，然后，以提取的表面肌电信号特征作为输入对分类器进行训练，最后利用训练好的分类器进行测试。实验结果表明，基于GA优化的BP神经网络分类器能成功识别下肢正常行走的五个步态，平均识别率达到98%以上，效果明显优于BP神经网络分类器的识别效果。

关键词：肌电信号； 特征提取； BP神经网络； 遗传算法

Gait Phase Recognition of Lower Limb based on GA Optimized BP Neural Network

Author's Name:

Institution:

Abstract:

In order to improve the accuracy of the lower limb gait recognition using limb surface electromyography, a classification method of BP neural network optimized by genetic algorithms (GA) is put forward. Firstly do wavelet filtering and multi-channel SEMG eigenvalue extraction, Secondly construct the BP neural network classifier based on GA optimization, then to extract the surface EMG characteristics as input for the classifier training, and finally use the trained classifier to be tested. The experimental results show that the BP neural network classifier based on GA optimization can successfully identify five of normal walking gait of lower limb, the average recognition rate above 98%, better than the BP neural network classifier recognition effect.

Keywords: electromyography；eigenvalue extraction； BP neural network； genetic algorithms（GA）

查看pdf文件