想象左右手运动的脑电特征提取

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摘　要：

针对脑机接口中脑电信号特征提取的传统方法特征数量多、计算量大及分类正确率低等不足，本文提出了一种基于时域、频域、空域结合的方法用于提取大脑在想象左右手运动时所产生的事件相关去同步(ERD)和事件相关同步(ERS)信号。文中分别用独立分量分析(Independent Component Analysis, ICA)和小波变换提取原始脑电信号的空域特征及时频域特征，并用BP(Back Propagation)神经网络对提取的特征进行分类。分类实验结果表明，运用本文提出的方法提取的想象左右手运动脑电的特征，有效克服了传统的仅基于时频域特征提取方法在描述脑电信号本质特征方面的不足，具有较好的分类正确率。

关键词：脑电特征；独立分量分析；小波变换；神经网络；空域特征

Feature Extraction of EEG for Imagery Left-right Hands Movement

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Abstract:

With the aim to solve the problems in brain-computer interfaces such as huge amounts of features, heavy computation and low classification accuracy in the traditional methods for the feature extraction of electroencephalography(EEG), a new method based on time domain, frequency domain and space domain was proposed , which could extract event related desynchronization and event related synchronization(ERD/ERS) signals during imagining left and right hands movement. In this paper, Independent Component Analysis(ICA) and wavelet transform was used to extract the temporal, spectral and spacial features from the original EEG signals, and then the extracted features were classified by the BP(Back Propagation) neural network. The classification results showed that the features of EEG, which were extracted during imagining left and right hands movement, could effectively overcome the drawbacks of the traditional method based solely on time-frequency domain when describing the characteristic of the brain electrical signals. And the proposed method displayed better classification performance.

Keywords: EEG features; ICA; wavelet transform; neural network; space domin features

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