基于**CI-HMM**的运动想象脑电信号分类

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摘　要：

针对隐马尔科夫模型在运动想象脑电信号分类应用中，其独立性假设与脑电信号间相关性的不一致问题，提出一种基于Choquet 模糊积分隐马尔科夫模型的脑电信号分类方法。该模型应用模糊积分的单调性取代了概率测度的可加性，放宽了隐马尔科夫模型的独立性假设。利用重叠滑动窗对脑电信号分段，然后对每段数据提取绝对均值、波长和小波包相对能量特征，构成特征序列用于CI-HMM的训练和分类。选取2008年BCI竞赛Datasets 1的两类运动想象数据进行分类，实验结果表明，该方法有效提高了隐马尔科夫模型方法对运动想象脑电信号分类的性能。

关键词：脑电信号；运动想象；模糊积分；隐马尔科夫模型

Motor Imagery EEG Classification Based on CI-HMM

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Abstract:

In the applications of hidden Markov model (HMM) in motor imagery electroencephalogram (EEG) classification, the independence assumption of HMM is inconsistent with the inherent correlation of EEG signals. In order to resolve the problem, an EEG classification method based on Choquet fuzzy integral HMM (CI-HMM) is proposed. The independence assumption of HMM is relaxed by substituting the monotonicity of fuzzy integrals for the additivity of probability measures. Each signal was segmented using overlapping sliding window. Then from each segment, the absolute mean, wavelength and wavelet packet based relative energy features were extracted to constitute observation sequence for the CI-HMM training and classification. The BCI Competition 2008 Datasets 1 with two classes of motor imagery were selected for classification experiments. The experimental results show that this method can effectively improve the performance of the HMM method used in motor imagery EEG classification.

Keywords: EEG; Motor Imagery; Fuzzy Integral; Hidden Markov Model

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