

## 基于多尺度Lempel-Ziv复杂度的运动想象脑电信号特征分析

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基金项目: 基于脑电和肌电的假手多自由度动作识别和控制方法研究、具有触觉临场感的肌电遥操作研究

摘要:

运动想象脑电信号特征提取是脑机接口研究领域的重要问题, 本文提出一种基于多尺度Lempel-Ziv复杂度的运动想象脑电信号特征提取算法。该算法是传统二值化Lempel-Ziv复杂度算法的改进, 它将脑电信号分成多个不同幅值范围的区域, 根据信号在各区域间的上升和下降趋势, 对脑电信号进行二值化处理得到Lempel-Ziv复杂度。本文将运动想象脑电信号分为4个区域, 提取各典型时段的Lempel-Ziv复杂度作为特征值, 最后利用支持向量机对脑电信号进行分类识别。实验结果表明, 以多尺度Lempel-Ziv复杂度为特征的分类方法, 对想象左右手运动脑电信号的平均分类识别率最高达87.87%, 优于传统二值化Lempel-Ziv复杂度算法

关键词: 脑电信号; 运动想象; 多尺度Lempel-Ziv复杂度

## EEG Feature Analysis of Motor Imagery Based on Lempel-Ziv Complexity at Multi-scale

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**Abstract:**

Electroencephalogram(EEG) feature extraction of motor imagery is an important issue in the field of brain-computer interfaces. In this paper, an algorithm of EEG feature extraction of motor imagery based on Lempel-Ziv complexity at multi-scale is put forward. This algorithm is the improvement compared to that of the traditional binary quantification Lempel-Ziv complexity, while it divides the EEG into several areas with different amplitude. The Lempel-Ziv complexity can be obtained from the binary quantification of EEG according to the rise and decline trends of it in different areas. This paper extracts Lempel-Ziv complexity from different typical time interval, separates EEG of motor imagery into four areas and finally uses the Support Vector Machine to classify. The experimental result shows that the average classification accuracy of EEG of two hands motor imagery can reach 87.87% to the highest owing to the classification method featured by Lempel-Ziv Complexity at Multi-scale, which excels the algorithm of traditional binary quantification Lempel-Ziv complexity.

**Keywords:** EEG; Motor Imagery; Lempel-Ziv Complexity at Multi-scale

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