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Adaptive machine learning algorithm employed statistical signal processing for classification of ECG signal and myoelectric signal. (English) Zbl 07273282
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Summary: In this research paper we present designing and evaluating the electrocardiography (ECG) and Myoelectric signal (EMG) pattern recognition methods based on the adaptive machine learning. For this theoretical model to describe how the Boundary Misclassification Risk (BMR) changes along parameters including, the adaptive learning times, the adaptive learning frequencies, the generalization ability of the predictive model, and the ratio of samples without supervised information during the adaptive learning were proposed. The models are built up based on the formulated adaptive learning process of the myoelectric signal recognition, and the classification from the measured electrocardiogram (ECG) pattern. The theoretical model can be regarded as the extensions of current statistical learning theory and domain adaption theory. In the experiment, the maximum error rate (MER), and the average error rate (AER) of the RCS is employed as the approximation of the BMR. During the experiment, MER and AER change tendency matches the theoretical BMR change tendency. For different learning time interval AER is presented, from the result tendency match with the experimental and theoretical evaluated value is confirmed. Hence, the proposed theoretical model can be used for ECG and EMG pattern matching.

MSC:
68T07 Artificial neural networks and deep learning
94A12 Signal theory (characterization, reconstruction, filtering, etc.)

Keywords:
machine learning techniques; statistical signal processing; classification; pattern recognition; feature extraction

Full Text: DOI

References:
[22] Toledo Perez, DC; Martinez Prado, MA; Gomez Loenzo, RA; Paredes Garcia, WI; Rodriguez Resendiz, J., A study of movement classification of the lower limb based on up to 4-EMG channels, Electronics, 8, 299, 1-11 (2019)

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