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A STUDY ON THE S-EMG PATTERN RECOGNITION USING NEURAL NETWORK

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Abstract. *Surface electromyogram signals (abbr. s-EMG) are detected over the skin surface and are generated by the electrical activity of the muscle fibers during contraction. Moved muscle can be presumed by analyzing s-EMG. EMG is used to control artificial leg etc. s-EMG recognition of using the conventional neural network is a method which learns the relation between s-EMG patterns and is reproduced using a neural network. The feature extraction for neural network usually uses the FFT analysis of s-EMG signal. In this paper, the feature extraction uses the maximum value and the minimum value of s-EMG signal, and integrated EMG. In addition, we use fast ICA technique. We compared performance of the feature extraction in two experiments (wrist muscles and facial muscles).*
Keywords: Surface electromygram, FFT analysis, Fast ICA, Neural network, Feature extraction

1. **Introduction.** s-EMG, collected at the skin surface, has become an important tool in rehabilitation due to the ease with which it may be acquired. s-EMG provides information about the neuromuscular activity from which it originates, and this has been fundamental to its use in clinical diagnosis, and as a source of control for assistive devices and schemes of functional electrical stimulation. The signal is utterly complex however, as it is influenced by many factors due to the electrophysiology and the recording environment [2].

s-EMG are detected over the skin surface and are generated by the electrical activity of the muscle fibers during contraction [1]. Moved muscle can be presumed by analyzing s-EMG. Therefore, s-EMG is used to control artificial leg etc. s-EMG recognition of using the conventional neural network is a method which learns the relation between s-EMG patterns and is reproduced using a neural network. The feature extraction for neural network usually uses the Fast Fourie Transform (abbr. FFT) analysis of s-EMG.

In the quest to improve classification accuracy, one has the choice of improving the classifier or the means of the feature extraction of s-EMG. Although some classifiers demonstrate obvious advantages over others, it is the feature extraction of s-EMG that most dramatically affects the classification performance, and this is the focus here. In this paper, the feature extraction uses the maximum value and the minimum value of s-EMG signal and integrated EMG. We experimented in the new approach of "the mixed method of the maximum value and the minimum value of s-EMG signal and integrated EMG". In addition, we use fast ICA technique. We compared performance of the feature extraction in two experiments (wrist muscles and facial muscles). From these simulation results, we showed the process of s-EMG pattern recognition suitable for the muscular part.