Hand movements classification for myoelectric control system using adaptive resonance theory

ABSTRACT

This research proposes an exploratory study of a simple, accurate, and computationally efficient movement classification technique for prosthetic hand application. Surface myoelectric signals were acquired from the four muscles, namely, flexor carpi ulnaris, extensor carpi radialis, biceps brachii, and triceps brachii, of four normal-limb subjects. The signals were segmented, and the features were extracted with a new combined time-domain feature extraction method. Fuzzy C-means clustering method and scatter plot were used to evaluate the performance of the proposed multi-feature versus Hudginsô multi-feature. The movements were classified with a hybrid Adaptive Resonance Theory-based neural network. Comparative results indicate that the proposed hybrid classifier not only has good classification accuracy (89.09 %) but also a significantly improved computation time.

Keyword: Adaptive resonance theory; EMG; Neural network; Pattern recognition; Prosthetic hand