Proceeding of The 6th International Colloquium on Signal Processing & Its Applications 2010, pages 82-85

Brain machine interface for physically retarded people using colour visual tasks

Abstract

A Brain Machine Interface is a communication system which connects the human brain activity to an external device bypassing the peripheral nervous system and muscular system. It provides a communication channel for the people who are suffering with neuromuscular disorders such as amyotrophic lateral sclerosis, brain stem stroke, quadriplegics and spinal cord injury. In this paper, a simple BMI system based on EEG signal emanated while visualizing of different colours has been proposed. The proposed BMI uses the color visual tasks and aims to provide a communication through brain activated control signal for a system from which the required task operation can be performed to accomplish the needs of the physically retarded community. The ability of an individual to control his EEG through the colour visualization enables him to control devices. The EEG signal is recorded from 10 voluntary healthy subjects using the noninvasive scalp electrodes placed over the frontal, parietal, motor cortex, temporal and occipital areas. The obtained EEG signals were segmented and then processed using an elliptic filter. Using spectral analysis, the alpha, beta and gamma band frequency spectrum features are obtained for each EEG signals. The extracted features are then associated to different control signals and a neural network model using back propagation algorithm has been developed. The proposed method can be used to translate the colour visualization signals into control signals and used to control the movement of a mobile robot. The performance of the proposed algorithm has an average classification accuracy of 95.2%.

Keywords — Brain machine interface, colour visual tasks, neural network