Fuzzy based classification of EEG mental tasks for a brain machine interface

Patients with neurodegenerative diseases loose all motor movements including impairment of speech, leaving the patients totally locked-in. One possible option for rehabilitation of such patients is using a brain machine interfaces (BMI) which uses their active cognition capabilities to control external devices and their environment. BMIs are designed using the electrical activity of the brain detected by scalp EEG electrodes. Classification of EEG signals extracted during mental tasks is a technique for designing a BMI. In this paper five different mental tasks from five subjects were studied, for classification combinations of two tasks are studied for each subject. A fuzzy based classification method is proposed for classification of the EEG mental task signals. Power of the spectral band frequencies of the EEG are used as features for training and testing the fuzzy classifier. Classification accuracies ranged from 65% to 100% for different combinations of mental tasks. The results validate the performance of the proposed algorithm for mental task classification.