Brain Machine Interface: A Comparison Between Fuzzy And Neural Classifiers

Abstract

Patients with neurodegenerative disease loose all motor movements including impairment of speech, leaving the patients totally locked-in. One possible option for rehabilitation of such patients is through a brain machine interfaces (BMI) which uses their active cognition capabilities to control external devices and the 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. This paper compares the performances of two BMIs designed using neural and fuzzy classifiers. EEG signals collected from two subjects during five mental tasks are used to test the classifiers. Band power of the EEG signals is used as features for testing the classifiers. From the results it is observed that the neural classifiers outperformed the fuzzy classifiers marginally. The neural classifier showed an average classification efficiency of 86.15% for subject 1 and 84.09% for subject 2. On the other hand the fuzzy classifier showed an average classification efficiency of 84.5% for subject 1 and 83.0% for subject 2.