

Single Trial Motor Imagery Classification For A Four State Brain Machine Interface

Abstract

Motor imagery is the mental simulation of a motor act which can be used to design brain machine interfaces [BMI]. A BMI is a digital communication system, which connects the human brain directly to an external device bypassing the peripheral nervous system and muscular system. Thus a BMI opens up possibilities for a new communication channel for people with neuromuscular disorders. The ability of an individual to control his EEG through imaginary motor tasks enables him to control devices. This paper presents a novel method for single trial motor imagery classification for a four state BMI to control a powered wheelchair. Recurrent Neural classifiers are used for classification of EEG signals during motor imagery for forward, stop, left and right hand movements. EEG is recorded using noninvasive scalp electrodes placed over the motor cortex. The performance of the proposed algorithm has an average classification efficiency of 96.15%. The proposed method can be used to translate the motor imagery signals into control signal using a four state BMI to control the directional movement of a powered wheelchair.