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ALGORITHM FOR CLASSIFICATION OF EEG SIGNALS IN ASTRONAUTS

Abstract

An algorithm is presented for filtering and classification of electroencephalographic (EEG) signals, based on extended Kalman filters and dynamic neural networks. The EEG signal acquisition process is complicated since they have a lot of white noise and because the amplitude and frequency of the different rhythms are in a very small range. Astronauts when subjected to microgravity environments changes the physiology of the brain, it is important to analyze these changes because we can analyze: biomechanics, psychological issues, intracranial pressure and using a brain machine interface, among others. The filtering and sorting algorithm is designed based on extended Kalman filters and neural networks. These algorithms are used primarily because of its ease to remove white noise and detect small changes of the different types of rhythms present in EEG signals. For the classification of signals we use dynamic neural networks, unaware of how it will end EEG signal acquired have to estimate and observe the different rhythms, dynamic neural networks are suitable for this procedure. The neural network algorithm can be adapted to the extended Kalman filter and get one feedback system, the algorithm with 2 hidden layers is used to make more robust the Kalman filter. This algorithm has been able to effectively classify rhythm signals and which are the rates of interest for biomechanical analysis and brain machine interface. This algorithm is tested using a database, however we can use in astronauts in microgravity environments.