EVALUATION OF DIFFERENT PEAK MODELS OF EYE BLINK EEG FOR SIGNAL PEAK DETECTION USING ARTIFICIAL NEURAL NETWORK

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Abstract: There is a growing interest of research being conducted on detecting eye blink to assist physically impaired people for verbal communication and controlling devices using electroencephalogram (EEG) signal. One particular eye blink can be determined from use of peak points. Therefore, the purpose of peak detection algorithm is to distinguish an actual peak location from a list of peak candidates. The need of a good peak model is important in ensuring a satisfy classification performance. In general, there are various peak models available in literature, which have been tested in several peak detection algorithms. In this study, performance evaluation of the existing peak models is conducted based on Artificial Neural Network (ANN) with particle swarm optimization (PSO) as learning algorithm. This study evaluates the performance of eye blink EEG signal peak detection algorithm for four different peak models which are Dumpala's, Acir's, Liu's, and Dingle's peak models. To generalize the performance evaluation, two case studies of eye blink EEG signal are considered, which are single and double eye blink signals. It has been observed that the best test performance, in average, is 91.94% and 87.47% for single and double eye blink signals, respectively. These results indicate that the Acir's peak model offers high accuracy of peak detection for the two eye blink EEG signals as compared to other peak models. The result of statistical analysis also indicates that the Acir's peak model is better than Dingle's and Dumpala's peak models.

Key words: *electroencephalogram (EEG), eye blink, peak detection algorithm, artificial neural network (ANN) classifier, particle swarm optimization (PSO), biomedical and clinical applications*

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