Abstract

Electroencephalogram (EEG) is one of the widely used non-invasive brain signal acquisition techniques that measure voltage fluctuations from neuron activities of the brain. EEG is typically used to diagnose and monitor disorders such as epilepsy, sleep disorders, and brain death and also to help advancement of various fields of science such as cognitive science, and psychology. Unfortunately, EEG signals usually suffer from a variety of artifacts like eye movements, chewing, muscle movements, and electrode pops, which disrupts the diagnosis and hinders precise representation of brain activities. This thesis evaluates three deep learning methods, and an ensemble method to detect the presence of the artifacts and to classify the kind of the artifact to help clinicians resolve problems regarding artifacts immediately during the signal collection process. Models were optimized to map the 1-second segments of raw EEG signals to detect 4 different kinds of artifacts. Among all the models, the best model is the ensemble model, which achieved 5-class classification accuracy of 67.59%, and a true positive rate of 80% with 25.82% false alarm for binary artifact classification with time-lapse. The model is lightweight and can be easily deployed in portable machines.