Abstract

Schizophrenia is a serious mental illness that affects 1% of the population worldwide. Our aim is to use convolutional neural networks (CNNs), classification methods, to predict whether or not an individual is diagnosed with schizophrenia. To accomplish this, we used an EEG dataset previously used to classify working memory performance on the Sternberg Working Memory Task (SWM). EEG is used to measure voltage changes in the brain, and the SWM is a well-known behavioral experiment that studies the 4 phases of the working memory: baseline, encoding, retention, and retrieval. Trials of anywhere from 4-8 letters are presented to the participant, in series, after which they are asked to respond whether or not a probed letter was contained in that trial set. We generated single-trial time-frequency spectrograms from the frontal and occipital channels of the EEG recording. We then created a CNN with 3 convolution and max pooling layers followed by dense activation layers for classification. This model was trained and tested using the spectrograms from the baseline phase of the SWM. CNNs are useful in this context because they take into account spatio-temporal information of the images. The model was able to predict schizophrenia with at least 73% accuracy based on the images generated from the baseline interval alone. This shows that CNNs, when used on EEG time-frequency data, have the potential to reliably classify clinical status.