Focal and non-focal epilepsy localization: a review

ABSTRACT

The focal and non-focal epilepsy is seen to be a chronic neurological brain disorder, which has affected ≈ 60 million people in the world. Hence, an early detection of the focal epileptic seizures can be carried out using the EEG signals, which act as a helpful tool for early diagnosis of epilepsy. Several EEG-based approaches have been proposed and developed to understand the underlying characteristics of the epileptic seizures. Despite the fact that the early results were positive, the proposed techniques cannot generate reproducible results and lack a statistical validation, which has led to doubts regarding the presence of the pre-ictal state. Various methodical and algorithmic studies have indicated that the transition to an ictal state is not a random process, and the build-up can lead to epileptic seizures. This study reviews many recently-proposed algorithms for detecting the focal epileptic seizures. Generally, the techniques developed for detecting the epileptic seizures were based on tensors, entropy, empirical mode decomposition, wavelet transform and dynamic analysis. The existing algorithms were compared and the need for implementing a practical and reliable new algorithm is highlighted. The research regarding the epileptic seizure detection research is more focused on the development of precise and non-invasive techniques for rapid and reliable diagnosis. Finally, the researchers noted that all the methods that were developed for epileptic seizure detection lacks standardization, which hinders the homogeneous comparison of the detector performance.