# Machine Learning Applications On Neuroimaging For Diagnois and prognosis of epilepsy

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Abstract- Machine learning is playing an increasingly important role in medical image analysis, spawning new advances in the clinical application of neuroimaging. Epileptic seizures occur due to disorder in brain functionality which can affect patient's health. Prediction of epileptic seizures before the beginning of the onset is quite useful for preventing the seizure by medication. Machine learning techniques and computational methods are used for predicting epileptic seizures from Electroencephalograms (EEG) signals. However, preprocessing of EEG signals for noise removal and features extraction are two major issues that have an adverse effect on both anticipation time and true positive prediction rate. Therefore, we propose a model that provides reliable methods of both preprocessing and feature extraction.

The disease in which patients suffer seizures caused by a brain functionality disorder is called epilepsy [1]. While more than fifty million people around the world are diagnosed with epilepsy [2], in the United States, about three million patients have been affected by epilepsy. Epilepsy is the third most common brain disorder [3]. Meanwhile, there are several possible causes of epilepsy, one of which is a molecular mutation, which results in irregular neuronal behavior or migration of neurons. Although the main cause of epilepsy remains unknown, early diagnosis can be useful for treating epilepsy. Epilepsy patients can be treated with drugs or surgical procedures . However, these methods are not fully effective. Unfortunately, seizures that cannot be completely treated medically limit the active life of the patient. In these cases, patients cannot independently work and do some activity. This leads to social isolation of individuals and economic difficulties. Early prediction of epileptic seizures ensures enough time before it actually occurs; it is very useful because the attack can be avoided by the drug. Epileptic seizures have four different states: the preictal state, which is a state that appears before the seizure begins, the ictal state that begins with the onset of the seizure and ends with an attack, the postictal state that starts after ictal state, and interictal state that starts after the postictal state of 1st seizure and ends before the start of preictal state of consecutive seizure. Figure 1 shows different input states of three different channels. In addition, seizures can be predicted by detecting the beginning of the preictal state