The Application of Machine Learning Algorithms on EEG Data to Predict and Detect Epileptic Seizures

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Epilepsy is a chronic brain disorder affecting 1% of the population worldwide. Its primary symptoms, seizures, occur without warning and can often be dangerous. Epilepsy is diagnosed with the use of the electroencephalogram (EEG), measuring the bursts of electrical activity associated with seizures. The objective of this study is to apply machine learning algorithms to predict seizures before they occur and diagnose epilepsy using EEG data. Preprocessing was done using bandpass filters and discrete wavelet transform for feature extraction of energy and entropy of the data on selective electrodes. The K Nearest Neighbors classification algorithm was utilized to differentiate between preictal, ictal, and interictal segments of the data. It was able to detect seizures with a 99% accuracy, 93% sensitivity, and 95% specificity and predict seizures 3 minutes before they occured with a 96% accuracy, 90% sensitivity, and 91% specificity. With the application of the algorithm in medical wearable devices, seizure onset can be predicted, improving quality of life for epileptic patients.

Awards Won:
Third Award of $1,000
Samvid Education Foundation: Agni Second Place Award of $500