ABSTRACT

Epilepsy is a neurological disease characterised by recurrent seizures, making early diagnosis and intervention a major challenge, and electroencephalogram (EEG) signals play an important role in detecting epilepsy-related brain activity abnormalities. In this study, the authors introduce a novel approach to classify epileptic and normal signals using convolutional neural networks (CNNs) in 1D signal processing.

The project started with the collection and pre-processing of EEG data from epilepsy patients and normal subjects. Signal pre-processing includes noise reduction, feature extraction and data augmentation to improve model reliability and generalisability. The key innovation lies in converting 1D EEG signals into a format suitable for CNNs and effectively utilising the power of deep learning for time series analysis.

Next, a CNN architecture is created that is optimised for 1D signal data and trained on the pre-processed EEG dataset. The model is tuned through an iterative hyperparameter tuning and cross-validation process to achieve the highest classification accuracy. Parameters such as sensitivity, specificity and F1 score were used to evaluate the performance of the model in distinguishing epileptic and normal signals.

The final result obtained in this final project is an accuracy rate of 97.50%, this result is obtained using adam optimiser with filter parameters = 20 and kernel = 8.

keywords: *Convolutional Neural Network, EEG, Epilepsi*