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Contents

Improving Epileptic Seizure Detection with Deep Learning: A Highly Efficient Approach

Sunil Kumar Choudhary and Tushar Kanti Bera

Abstract Epilepsy is described by the World Health Organization (WHO) as a reasonably common neurological brain disorder worldwide. Early seizure prediction significantly impacts how epileptic individuals live their lives. The automated neurological system influences raw EEG data as input, which reduces the computation required for the categorization procedure. To identify epilepsy episodes, which are crucial for patient diagnosis and improve classification accuracy and prediction time, deep learning models are suggested. The advantages of bidirectional long-short-term memory (Bi-LSTM) and recurrent neural networks (RNN) are utilized in this model to predict the development of epileptic seizures earlier than in the reference model. This system is suitable for real-time use thanks to the introduction of a channel reduction algorithm that selects the most relevant EEG channels. However, the deep learning classifier outperformed the other tested classifier and had incredible accuracy in most pairings. To assure robustness, a robust test technique is used.

Keywords Raw EEG data · Epilepsy · Seizure detection · Classification · Deep learning algorithm (DLA)

Nomenclature

WHO	World Health Organization
DLA	Deep learning algorithm
LSTM	Long short-term memory
SVM	Space vector machine
DCAE	Deep convolution autoencoder
ANN	Artificial neural network

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