

Title: Explainable AI for Epileptic Seizure Prediction: A SHAP and LIME Approach

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Abstract: Epilepsy is a neurological chaos typified by frequent, spontaneous seizures. Early recognition of epilepsy by utilising AI techniques to scan EEG signals can enhance the prevention and management of it. This study aims to improve the classification of epileptic seizures by using the preprocessed version of the Epileptic Seizure (ERS) dataset. The preprocessed dataset is subjected to multiple stages in order to improve its quality and achieve balanced class representation. Data cleaning, outlier management, merging, and oversampling are those. After that, an 80:20 split of the dataset is made into subsets for testing and training. Next, training, testing, and evaluation are performed on the models of Gradient Boosting Classifier (GBC), Decision Tree Classifier (DTC), Random Forest Classifier (RFC), CatBoost Classifier (CBC), and ExtraTree Classifier (ETC). The ExtraTree Classifier is remarkably accurate, with a 99.51% accuracy rate, which is the highest accuracy. Finally, explainable artificial intelligence (SHAP and LIME) is used to clarify the ExtraTree Classifier's decision-making procedure. By providing a visual representation of significant variables and their influence on the model's predictions, this interpretability tool improves comprehension of the classification results.

Keywords: XAI, Extra Tree, Epileptic Seizure, LIME, SHAP

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