

## ABSTRACT

Epilepsy seizure detection by means of machine learning and deep learning models is the emerging research field. There are certain works that employ machine learning algorithm for seizure detection. Thus the first phase of this work concentrates on using the hyper parameter tuning to achieve better results. For enabling the best classifier, nine different classifiers have been experimented and compared with one another in terms of accuracy and other performance parameters. The classifiers experimented with are K-Nearest Neighbor, Decision Tree, Naïve Bayes, Random forest, Stochastic Gradient Descent, Gradient Boosting, XGBoost, Extra Tree Classifier, and Logistic regression.

The best performing machine learning classifier is identified and fine tune for increasing the performance. From the obtained results, it is noticed that the Extra Tree classifier performs better than the other models. The accuracy obtained with it is 96.5%. Modification in several features and Hyperparameter tuning is done to increase the classifier performance using a genetic algorithm approach. When experimented with the Extra tree classifier's max features property, the best accuracy obtained is 98%.

The performance of the model increases considerably when the genetic algorithm based AutoML approach is used for hyperparameter tuning. In addition to this a convolutional neural network model is also designed for seizure detection and the results are compared. The CNN model is found to perform better than the extra tree classifier and the result obtained is 99.6%, which is higher than the other state of art models.

Prediction of occurrence of a seizure would be of greater help to make necessary precaution for taking care of the patient. A Deep learning model, Recurrent Neural Network (RNN), is designed for predicting the upcoming values in the EEG values. A deep data analysis is made to find the parameter that

could best differentiate the normal values and seizure values. Next a recurrent neural network model is built for predicting the values earlier. Four different variants of recurrent neural networks are designed in terms of number of time stamps and the number of LSTM layers and the best model is identified. The best identified RNN model is used for predicting the values. The performance of the model is evaluated in terms of explained variance score and R2 score. The model founds to perform well number of elements in the test dataset is minimal and so this model can predict the seizure values only a few seconds earlier.