Epileptic Seizure Prediction with Ensemble Learning Classifiers

In this analysis, the presence of Epileptic Seizure is predicted by employing Support Vector Machine (SVM), Gaussian Naïve Bayes & Decision Tree (DT); Ensemble combination rules i.e., Majority Voting & Weighted Average Voting and Ensemble classifiers i.e., Bagging, Adaptive Boosting, Gradient Boosting XGBoost.

Parameters such as Accuracy, Precision, Recall and F1-score were estimated to analyze the performance and a comparative study of these classifiers was carried out.

Epileptic Seizure Recognition Data Set

Data Source: https://archive.ics.uci.edu/ml/datasets/Epileptic+Seizure+Recognition#

Attribute Information:

The original dataset from the reference consists of 5 different folders, each with 100 files, with each file representing a single subject/person. Each file is a recording of brain activity for 23.6 seconds. The corresponding time-series is sampled into 4097 data points. Each data point is the value of the EEG recording at a different point in time. So, we have total 500 individuals with each has 4097 data points for 23.5 seconds.

They divided and shuffled every 4097 data points into 23 chunks, each chunk contains 178 data points for 1 second, and each data point is the value of the EEG recording at a different point in time. So now the dataset has 23 x 500 = 11500 pieces of information(row), each information contains 178 data points for 1 second(column), the last column represents the label y {1,2,3,4,5}.

The response variable is y in column 179, the Explanatory variables X1, X2, ..., X178, y contains the category of the 178-dimensional input vector. Specifically, y in {1, 2, 3, 4, 5}:

5 - eyes open, means when they were recording the EEG signal of the brain the patient had their eyes open.

4 - eyes closed, means when they were recording the EEG signal the patient had their eyes closed.

3 – Yes, they identify where the region of the tumor was in the brain and recording the EEG activity from the healthy brain area.

2 - They recorder the EEG from the area where the tumor was located.

1 - Recording of seizure activity.

All subjects falling in classes 2, 3, 4, and 5 are subjects who did not have epileptic seizure. Only subjects in class 1 have epileptic seizure.