Performance Metrics

The Following table can be followed by error analysis for PSO feature extraction model. In this table contains mean absolute Error details are shows,

Table 8.1.1 Mean Absolute Error

Classification Algorithm	Mean Absolute Error
J.48	0.507
MLP	0.703
SVM	0.712
Random Forest	0.604
Bayesnet	0.572

Mean Absolute Error (MAE):

MAE measures the average magnitude of the errors in a set of predictions, without considering their direction. It's the average over the test sample of the absolute differences between prediction and actual observation where all individual differences have equal weight.

$$MAE = 1/n \sum |y_j - y^{\wedge}_j|$$

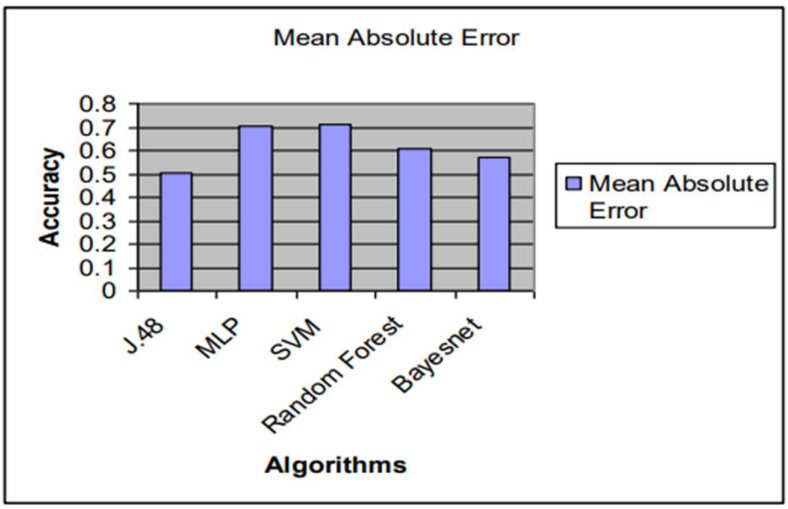

Fig 8.1.1 Mean Absolute Error Rate

The following table and figure describe a Root Mean Square Error (RMSE) analysis for PSO feature extraction model. In this table contains Root Mean Square Error details are shows,

Table 8.2.1 Root Mean Square Error

Classification Algorithm	Root Mean Square Error
J.48	0.487
MLP	0.403
SVM	0.425
Random Forest	0.467
Bayesnet	0.406

Root Mean Square Error (RMSE) is the standard deviation of the residuals (prediction errors). Residuals are a measure of how far liver dataset from the regression line data points.

RMSE is a measure of spread out these residuals is liver dataset.

$$RMSE = \sqrt{(f-o)^2}$$

f = forecasts (expected values or unknown results), o = observed values (known results).

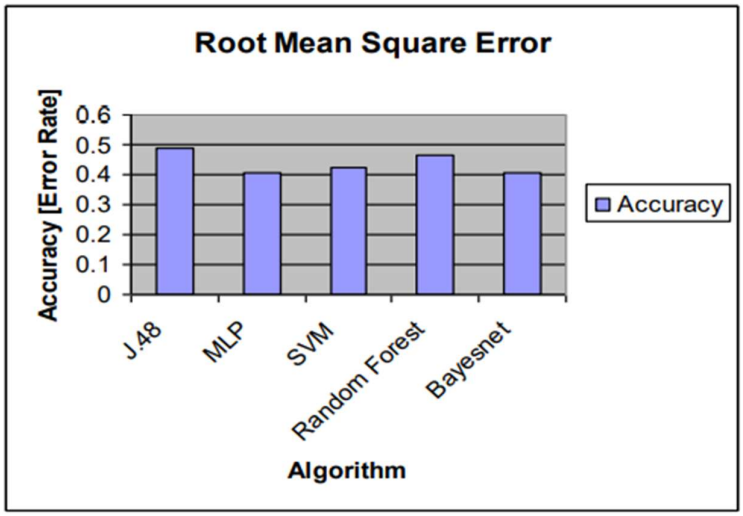

Fig 8.2.1 Root Mean Square Error

The following table and Figure describe a relative squared error analysis for PSO feature extraction model. In

this table contains relative squared error details are shows,

Table 8.3.1 Relative Squared Error

Classification Algorithm	Relative Squared Error
J.48	73.33

MLP	69.23
SVM	71.45
Random Forest	68.44
Bayesnet	74.25

The root relative squared error is relative to what it would have been if a simple liver disease predictor and just the average of the actual values. Thus, the relative squared error takes the total squared error and normalizes it by dividing by the total squared error of the simple predictor. By taking the square root of the relative squared error one reduces the error to the same dimensions as the quantity being predicted.

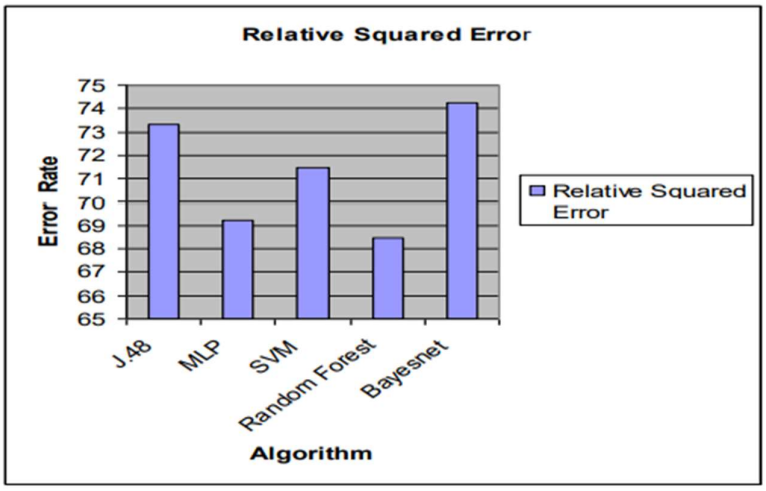

Fig 8.3.1 Relative Squared Error

Mathematically, the root relative squared error T_i of an individual program j is evaluated by the equation. Where $P_{(ij)}$ is the value predicted by the individual program i for sample case j (out of n sample cases); T_j is the target value for sample case j; and $\overline{T}$ is given by the formula:

RRSE = Tj= $1/n \sum_{j-1} T_j$

The following table describes an overall classification algorithm for accuracy values analysis. In this table contains

existing and proposed accuracy a values shows,

Accuracy = (TP + TN) / (TP + TN + FP + FN)

Classification Algorithm	Greedy Step Wise	PSO
J.48	68.77	95.04
MLP	68.26	77.54
SVM	71.35	73.44
Random Forest	70.32	80.22
Bayesnet	67.23	90.33

The following Figure describes an overall classification algorithm for accuracy values analysis. In this fig contains

existing and proposed accuracy a values shows,