**Compare results plot of different classifiers that Decision Tree, LDA, Naive Bayes, Linear SVN, Fine KNN, SVM Kernel and Optimizable Neural Network accuracy percent validation graph**

**Performance metrics of different classifiers that Decision Tree, LDA, Naive Bayes, Linear SVM, Fine KNN, SVM Kernel and Optimizable Neural Network.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model Type** | **Accuracy %** | **Error Rate %** | **Macro Precision %** | **Macro Recall %** | **Macro F1 Score %** | **Training Time (sec)** |
| Tree | 64.12222222 | 35.87777778 | 64.20092339 | 64.12222222 | 64.07244482 | 84.9065491 |
| Discriminant | 56.76666667 | 43.23333333 | 56.79003646 | 56.76666667 | 56.72943475 | 20.3769099 |
| Naive Bayes | 55.61666667 | 44.38333333 | 61.08418698 | 55.61666667 | 49.37350745 | 130.677279 |
| SVM | 55.71111111 | 44.28888889 | 55.90577991 | 55.71111111 | 55.34311133 | 526.706255 |
| KNN | 72.48333333 | 27.51666667 | 72.48515463 | 72.48333333 | 72.48277611 | 124.983686 |
| Kernel | 62.80555556 | 37.19444444 | 62.86721158 | 62.80555556 | 62.76094581 | 88.962796 |
| Neural Network | 73.65555556 | 26.34444444 | 73.65935157 | 73.65555556 | 73.65449881 | 83109.9997 |

**Figure 6. (a, b, c, d, e, f, g)** shows classification confusion matrices. Every classifier—Decision Tree, LDA, Naive Bayes, Linear SVM, Fine KNN, SVM Kernel and Optimizable Neural Network—has a confusion matrix displayed here. When the classifiers were evaluated at the same extracted features at which they were trained, the diagonal area of the confusion matrices shows the best accuracy. Accuracy of classifiers was found to be given Optimizable Neural Network > KNN > Decision Tree > Kernal SVM > LDA > Linear SVM > Naive Bayes demonstrating Optimizable neural network with maximum accuracy and Naive Bayes with the lowest accuracy.

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| Figure 6. (a) Optimizable Neural Network Confusion Matrice | **Figure 6. (b)** KNN Confusion Matrice |

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| --- | --- |
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| Figure 6. (c) Decision Tree Confusion Matrice | **Figure 6. (d)** Kernel SVM Confusion Matrice |

|  |  |
| --- | --- |
|  |  |
| Figure 6. (e) Linear Discriminant Analyss (LDA) Confusion Matrice | **Figure 6. (f)** Linear SVM Confusion Matrice |

|  |
| --- |
|  |
| Figure .6 (g) Naive Bayes Confusion Matrice |

**3.3 Evaluation of classifiers using ROC Curve**

Figure 7. (a, b, c, d, e, f, g) shows ROC (Receiver Operating Characteristics for MRI classification). Every classifier (Decision Tree, LDA, Naive Bayes, Linear SVM, Fine KNN, SVM Kernel and Optimizable Neural Network) has its curves shown here. ROC Curve is found to be highest for Classifier where optimizable Neural Network > KNN > Decision Tree > Kernel SVM > LDA > Linear SVM > Naive Bayes illustrating optimizable Neural Network with highest TPR (True positive rate) and Naive Bayes with lowest accuracy TPR.

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| Figure .7 (a) Kernel SVM ROC Curve | **Figure .7 (b)** Linear SVM ROC Curve |

|  |  |
| --- | --- |
|  |  |
| Figure .7 (c) Decision Tree ROC Curve | **Figure .7 (d)** LDA ROC Curve |

|  |  |
| --- | --- |
|  |  |
| Figure .7 (e) Naive Bayes ROC Curve | **Figure .7 (f)** KNN ROC Curve |

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| Figure .7 (g) Optimizable Neural Network ROC Curve |