**ML - HW 3 – NXN141730**

**Overall Comparison for 10 iterations:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dataset | # Instances | # Attributes | Percent Split | Decision Tree | SVM | Naïve Bayes | Logistic Regression | Neural Network |
| 1 - ILPD | 579 | 11 | 80/20 | 69.13793 | 70.77586 | 55.77586 | 0.1724138 | 71.2069 |
| 2 - Cleveland Heart Disease Processed | 303 | 14 | 80/20 | 56.55738 | 58.68852 | 54.2623 | 58.85246 | 54.42623 |
| 3 - Breast Cancer Diagnostic Wisconsin | 569 | 32 | 80/20 | 92.19298 | 97.01754 | 92.2807 | 2.894737 | 62.98246 |
| 4 - Wine | 178 | 14 | 80/20 | 92.5 | 96.38889 | 95.83333 | 0 | 33.333333 |
| 5 - Ionosphere | 351 | 35 | 80/20 | 89.5774 | 93.09859 | 90.56338 | 8.309859 | 37.32394 |

**Dataset 1**

**Classifier Accuracies:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # Sample | Decision Tree | SVM | Naïve Bayes | Logistic Regression | Neural Network |
| 1 | 70.68966 | 70.68966 | 54.31034 | 0 | 70.68966 |
| 2 | 73.27586 | 73.27586 | 60.34483 | 0 | 73.27586 |
| 3 | 66.37931 | 73.27586 | 48.27586 | 0 | 73.27586 |
| 4 | 75 | 75 | 52.58621 | 0 | 75 |
| 5 | 65.51724 | 73.27586 | 50.86207 | 0.862069 | 77.58621 |
| 6 | 69.82759 | 69.82759 | 60.34483 | 0 | 69.82759 |
| 7 | 60.34483 | 60.34483 | 56.89655 | 0 | 60.34483 |
| 8 | 76.72414 | 76.72414 | 56.89655 | 0 | 76.72414 |
| 9 | 68.10345 | 68.10345 | 58.62069 | 0.862069 | 68.10345 |
| 10 | 65.51724 | 67.24138 | 58.62069 | 0 | 67.24138 |

**Observation:**

Decision Tree, SVM and Neural Network had similar accuracies while perceptron performed very badly.

Best – Neural Network

**Dataset 2**

**Classifier Accuracies:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # Sample | Decision Tree | SVM | Naïve Bayes | Logistic Regression | Neural Network |
| 1 | 57.37705 | 60.65574 | 57.37705 | 57.37705 | 57.37705 |
| 2 | 60.65574 | 54.09836 | 45.90164 | 62.29508 | 55.7377 |
| 3 | 47.54098 | 50.81967 | 49.18033 | 59.01639 | 52.45902 |
| 4 | 57.37705 | 57.37705 | 54.09836 | 59.01639 | 52.45902 |
| 5 | 52.45902 | 55.7377 | 49.18033 | 55.7377 | 50.81967 |
| 6 | 68.85246 | 67.21311 | 68.85246 | 65.57377 | 62.29508 |
| 7 | 55.7377 | 60.65574 | 52.45902 | 52.45902 | 50.81967 |
| 8 | 52.45902 | 59.01639 | 50.81967 | 55.7377 | 49.18033 |
| 9 | 59.01639 | 63.93443 | 60.65574 | 67.21311 | 60.65574 |
| 10 | 54.09836 | 57.37705 | 54.09836 | 54.09836 | 52.45902 |

**Observation:**

All classifiers performed with very similar accuracies

Best – Logistic Regression

**Dataset 3**

**Classifier Accuracies:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # Sample | Decision Tree | SVM | Naïve Bayes | Logistic Regression | Neural Network |
| 1 | 91.22807 | 96.49123 | 93.85965 | 0 | 55.26316 |
| 2 | 93.85965 | 96.49123 | 91.22807 | 2.631579 | 64.03509 |
| 3 | 87.7193 | 96.49123 | 87.7193 | 1.754386 | 64.91228 |
| 4 | 92.98246 | 99.12281 | 91.22807 | 6.140351 | 64.91228 |
| 5 | 95.61404 | 97.36842 | 95.61404 | 2.631579 | 67.54386 |
| 6 | 91.22807 | 95.61404 | 92.98246 | 2.631579 | 67.54386 |
| 7 | 92.10526 | 96.49123 | 92.98246 | 4.385965 | 61.40351 |
| 8 | 91.22807 | 95.61404 | 92.10526 | 3.508772 | 62.2807 |
| 9 | 92.98246 | 99.12281 | 93.85965 | 4.385965 | 60.52632 |
| 10 | 92.98246 | 97.36842 | 91.22807 | 0.877193 | 61.40351 |

**Observation:**

Decision Tree, SVM and Naïve Bayes performed with similar accuracies with 90+ while Logistic Regression performed very poorly.

Best – SVM

**Dataset 4**

**Classifier Accuracies:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # Sample | Decision Tree | SVM | Naïve Bayes | Logistic Regression | Neural Network |
| 1 | 94.44444 | 94.44444 | 94.44444 | 0 | 38.88889 |
| 2 | 94.44444 | 100 | 97.22222 | 0 | 41.66667 |
| 3 | 83.33333 | 91.66667 | 91.66667 | 0 | 41.66667 |
| 4 | 91.66667 | 94.44444 | 94.44444 | 0 | 27.77778 |
| 5 | 88.88889 | 100 | 97.22222 | 0 | 30.55556 |
| 6 | 97.22222 | 100 | 97.22222 | 0 | 33.33333 |
| 7 | 94.44444 | 94.44444 | 97.22222 | 0 | 33.33333 |
| 8 | 86.11111 | 94.44444 | 94.44444 | 0 | 30.55556 |
| 9 | 94.44444 | 97.22222 | 94.44444 | 0 | 27.77778 |
| 10 | 100 | 97.22222 | 100 | 0 | 27.77778 |

**Observation:**

Decision Tree, SVM and Naïve Bayes performed with similar accuracies with 90+ while Logistic Regression performed very poorly.

Best – SVM

**Dataset 5**

**Classifier Accuracies:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # Sample | Decision Tree | SVM | Naïve Bayes | Logistic Regression | Neural Network |
| 1 | 95.77465 | 97.1831 | 92.95775 | 2.816901 | 30.98592 |
| 2 | 88.73239 | 88.73239 | 84.50704 | 7.042254 | 46.47887 |
| 3 | 85.91549 | 92.95775 | 95.77465 | 8.450704 | 32.39437 |
| 4 | 88.73239 | 88.73239 | 85.91549 | 9.859155 | 39.43662 |
| 5 | 94.3662 | 97.1831 | 95.77465 | 9.859155 | 42.25352 |
| 6 | 91.5493 | 92.95775 | 88.73239 | 7.042254 | 38.02817 |
| 7 | 91.5493 | 97.1831 | 95.77465 | 8.450704 | 35.21127 |
| 8 | 83.09859 | 92.95775 | 94.3662 | 9.859155 | 33.80282 |
| 9 | 87.32394 | 90.14085 | 80.28169 | 12.67606 | 36.61972 |
| 10 | 88.73239 | 92.95775 | 91.5493 | 7.042254 | 38.02817 |

**Observation:**

Decision Tree, SVM and Naïve Bayes performed with similar accuracies with 90+ while Logistic Regression performed very poorly.

Best – SVM