ASSIGNMENT-6

CLASSIFICATION

HEERTHI RAJA H

1. SVM Kernel Classification:-

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.NO** | **METRIC** | **HYPER PARAMETER** | **GAMMA** | **KERNEL** | **VALUE** | | |
| **1.** | **F1 score** | **C= 10** | **Auto** | **Rbf** | | **0.9171** | |
| **2.** | **Accuracy** | **C= 10** | **Auto** | **Rbf** | **0.9166** | |
| **3.** | **Balanced Accuracy** | **C= 10** | **Auto** | **Rbf** | **0.9132** | | |
| **4.** | **Top k accuracy** | **C= 10** | **Auto** | **Rbf** | **1.0** | | |
| **5.** | **Average precision** | **C= 10** | **Auto** | **Rbf** | **0.8098** | | |
| **6.** | **Neg brier score** | **C= 10** | **Auto** | **Rbf** | **0.0833** | | |
| **7.** | **Neg log loss** | **C= 10** | **Auto** | **Rbf** | **2.8782** | | |
| **8.** | **Precision score** | **C= 10** | **Auto** | **Rbf** | **0.9181** | | |
| **9.** | **Recall score** | **C= 10** | **Auto** | **Rbf** | **0.9024** | | |
| **10.** | **Jaccard score** | **C= 10** | **Auto** | **Rbf** | **0.8795** | | |

**SVM kernel classification best score: (Precision score, c=10, auto, rbf)= 0.9181**

**2. Decision Tree Classification:-**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.NO | METRIC | CRITERION | MAX FEATURES | SPLITTER | VALUE |
| 1. | F1 score | Gini | Log 2 | Random | **0.8839** |
| 2. | **Accuracy** | Gini | Log 2 | Random | 0.8833 |
| 3. | **Balanced Accuracy** | Gini | Log 2 | Random | 0.8761 |
| 4. | **Top k accuracy** | Gini | Log 2 | Random | 1.0 |
| 5. | **Average precision** | Gini | Log 2 | Random | 0.7448 |
| 6. | **Neg brier score** | Gini | Log 2 | Random | 0.1166 |
| 7. | **Neg log loss** | Gini | Log 2 | Random | 4.0295 |
| 8. | **Precision score** | Gini | Log 2 | Random | 0.8851 |
| 9. | **Recall score** | Gini | Log 2 | Random | 0.8536 |
| 10. | **Jaccard score** | Gini | Log 2 | Random | 0.8352 |
| 11. | **Roc\_auc\_score** |  |  |  | 0.8761 |

**Best score Decision Tree: (Top k accuracy, gini, log2, Random)= 1.0**

1. **Random Forest Classification:-**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.NO | Metric | CRITERION | MAX FEATURES | N ESTIMATES | VALUE |
| 1. | F1 score | Gini | Auto | 100 | 0.9171 |
| 2. | **Accuracy** | Gini | Auto | 100 | 0.9166 |
| 3. | **Balanced Accuracy** | Gini | Auto | 100 | 0.9132 |
| 4. | **Top k accuracy** | Gini | Auto | 100 | 1.0 |
| 5. | **Average precision** | Gini | Auto | 100 | 0.8098 |
| 6. | **Neg brier score** | Gini | Auto | 100 | 0.0833 |
| 7. | **Neg log loss** | Gini | Auto | 100 | 2.8782 |
| 8. | **Precision score** | Gini | Auto | 100 | 0.9181 |
| 9. | **Recall score** | Gini | Auto | 100 | 0.9024 |
| 10. | **Jaccard score** | Gini | Auto | 100 | 0.8795 |
| 11. | **Roc\_auc\_score** |  |  |  | 0.9648 |

**Random forest best score: (Roc auc score)= 0.9648**

1. **Logistic Regression Classification:-**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.NO** | **METRIC** | **PENALTY** | **SOLVER** | **VALUE** |
| **1.** | **F1 score** | **L2** | **Newton- cg** | **0.8906** |
| **2.** | **Accuracy** | **L2** | **Newton- cg** | **0.8916** |
| **3.** | **Balanced Accuracy** | **L2** | **Newton- cg** | **0.8707** |
| **4.** | **Top k accuracy** | **L2** | **Newton- cg** | **1.0** |
| **5.** | **Average precision** | **L2** | **Newton- cg** | **0.7656** |
| **6.** | **Neg brier score** | **L2** | **Newton- cg** | **0.1083** |
| **7.** | **Neg log loss** | **L2** | **Newton- cg** | **3.7417** |
| **8.** | **Precision score** | **L2** | **Newton- cg** | **0.8908** |
| **9.** | **Recall score** | **L2** | **Newton- cg** | **0.8048** |
| **10.** | **Jaccard score** | **L2** | **Newton- cg** | **0.8505** |
| 11. | **Roc\_auc\_score** |  |  | **0.9481** |

**Logistic regression best score: ( Roc auc score)= 0.9481**

1. **K- Nearest Neighbor Classification:-**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **METRIC** | **VALUE** |
| **1.** | **F1 score** | **0.7407** |
| **2.** | **Accuracy** | **0.8256** |
| **3.** | **Balanced Accuracy** | **0.8025** |
| **4.** | **Top k accuracy** | **1.0** |
| **5.** | **Average precision** | **0.6404** |
| **6.** | **Neg brier score** | **0.1751** |
| **7.** | **Neg log loss** | **6.0443** |
| **8.** | **Precision score** | **0.7511** |
| **9.** | **Recall score** | **0.7317** |
| **10.** | **Jaccard score** | **0.5882** |

**K nearest neigbor best score: (Top K accuracy)= 1.0**

1. **Naive Bayes Classification:-**

**GaussianNB**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **METRIC** | **VALUE** |
| **1.** | **F1 score** | **0.8354** |
| **2.** | **Accuracy** | **0.8916** |
| **3.** | **Balanced Accuracy** | **0.8707** |
| **4.** | **Top k accuracy** | **1.0** |
| **5.** | **Average precision** | **0.7656** |
| **6.** | **Neg brier score** | **0.1083** |
| **7.** | **Neg log loss** | **3.7417** |
| **8.** | **Precision score** | **0.8684** |
| **9.** | **Recall score** | **0.8048** |
| **10.** | **Jaccard score** | **0.7173** |
|  | **Roc\_auc\_score** |  |

**MultinomialNB**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **METRIC** | **VALUE** |
| **1.** | **F1 score** | **0.3999** |
| **2.** | **Accuracy** | **0.6751** |
| **3.** | **Balanced Accuracy** | **0.5889** |
| **4.** | **Top k accuracy** | **1.0** |
| **5.** | **Average precision** | **0.4059** |
| **6.** | **Neg brier score** | **0.3251** |
| **7.** | **Neg log loss** | **11.225** |
| **8.** | **Precision score** | **0.5416** |
| **9.** | **Recall score** | **0.3707** |
| **10.** | **Jaccard score** | **0.2501** |

**BernoulliNB**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **METRIC** | **VALUE** |
| **1.** | **F1 score** | **0.0** |
| **2.** | **Accuracy** | **0.6583** |
| **3.** | **Balanced Accuracy** | **0.5** |
| **4.** | **Top k accuracy** | **1.0** |
| **5.** | **Average precision** | **0.3416** |
| **6.** | **Neg brier score** | **0.3416** |
| **7.** | **Neg log loss** | **11.808** |
| **8.** | **Precision score** | **0.0** |
| **9.** | **Recall score** | **0.0** |
| **10.** | **Jaccard score** | **0.0** |

**ComplementNB**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **METRIC** | **VALUE** |
| **1.** | **F1 score** | **0.4242** |
| **2.** | **Accuracy** | **0.5251** |
| **3.** | **Balanced Accuracy** | **0.5219** |
| **4.** | **Top k accuracy** | **1.0** |
| **5.** | **Average precision** | **0.3521** |
| **6.** | **Neg brier score** | **0.4751** |
| **7.** | **Neg log loss** | **16.406** |
| **8.** | **Precision score** | **0.3620** |
| **9.** | **Recall score** | **0.5121** |
| **10.** | **Jaccard score** | **0.2692** |

**CategoricalNB**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **METRIC** | **VALUE** |
| **1.** | **F1 score** | **0.8421** |
| **2.** | **Accuracy** | **0.9** |
| **3.** | **Balanced Accuracy** | **0.871** |
| **4.** | **Top k accuracy** | **1.0** |
| **5.** | **Average precision** | **0.7885** |
| **6.** | **Neg brier score** | **0.1** |
| **7.** | **Neg log loss** | **3.4538** |
| **8.** | **Precision score** | **0.9142** |
| **9.** | **Recall score** | **0.7804** |
| **10.** | **Jaccard score** | **0.7272** |

**Naves Bayes best score:**

**Accuracy - 0.9**

**Top k accuracy - 1.0**

**Precision score – 0.9142**

The Final Machine Learning best model of Regression:

**The best model :-**

**Random Forest Classification -> Roc aur score -> 0.9648**

**Thank You!**