**Machine Learning Models (3 labels)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Models | Validation  Accuracy | Testing  Accuracy | (Test) Recall | (Test) F1 score | (Test) Macro F1 score |
| 1. | Decision Tree | 0.85 | 0.86 | 0.86 | 0.86 | 0.8620 |
| 2. | RF | 0.91 | 0.91 | 0.91 | 0.91 |  |
| 3. | LightGBM | 0.9010 | 0.9141 | 0.91 | 0.91 | 0.9148 |
| 4. | KNN | 0.8932 | 0.91 | 0.9078 | 0.9076 | 0.9078 |
| 5. | SVM | 0.9154 | 0.9193 | 0.9193 | 0.92 | 0.9196 |
| 6. | Cat Boast | 0.9193 | 0.9336 | 0.9340 | 0.93 | 0.9343 |
| 7. | XGBoost | 0.90 | 0.92 | 0.92 | 0.92 | 0.9209 |
| 8. | GBM | 0.92 | 0.9414 | 0.9420 | 0.9418 | 0.9418 |
| 9. | AdaBoost | 0.8906 | 0.8880 | 0.8880 | 0.8884 | 0.8894 |
| 10. | LR(Multinomial) | 0.9023 | 0.9076 | 0.9076 | 0.9076 | 0.9084 |
| 11. | HistGradientBoostingClassifier | 0.8919 | 0.9219 | 0.9219 | 0.9219 | 0.9226 |
| 12. | Extra Trees Classifier | 0.9206 | 0.93 | 0.9297 | 0.9302 | 0.9302 |

**Machine Learning Models (5 labels)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Models | Validation  Accuracy | Testing  Accuracy | (Test) Recall | (Test) F1 score | (Test) Macro F1 score |
| 1. | Decision Tree | 0.73 | 0.72 | 0.72 | 0.72 | 0.722313 |
| 2. | RF\_70\_15\_15 | 0.76 | 0.73 | 0.73 | 0.73 | 0.724848 |
| 3 | LightGBM | 0.8242 | 0.8138 | 0.8118 | 0.8129 | 0.8129 |
| 4 | KNN | 0.82 | 0.8047 | 0.80 | 0.80 | 0.8025 |
| 5 | SVM | 0.750325 | 0.79 | 0.7865 | 0.7846 | 0.7844 |
| 6 | Cat Boost | 0.8268 | 0.8294 | 0.8270 | 0.83 | 0.8282 |
| 7 | XGBoast | 0.82 | 0.84 | 0.84 | 0.84 | 0.84 |
| 8 | GBM | 0.8698 | 0.8555 | 0.8536 | 0.85 | 0.8543 |
| 9 | AdaBoost | 0.7409 | 0.75 | 0.75 | 0.7511 | 0.7511 |
| 10 | LR(Multinomial) | 0.7969 | 0.7878 | 0.7878 | 0.7882 | 0.7851 |
| 11 | HistGradientBoostingClassifier | 0.82 | 0.8308 | 0.8281 | 0.8290 | 0.8268 |
| 12 | Extra Trees Classifier | 0.8568 | 0.85 | 0.8422 | 0.8447 | 0.8428 |

**Deep Learning Networks Models (3 Labels)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Models | Validation  Accuracy | Testing  Accuracy | (Test) Recall | (Test) F1 score | (Test) Macro f1 score |
| 1 | Base CNN | 0.8841 | 0.8919 | 0.8922 | 0.89 | 0.8925 |
| 2 | Sequential CNN | 0.8997 | 0.9010 | 0.9016 | 0.9016 | 0.9025 |
| 3 | Multi-layer Perceptron | 0.9115 | 0.9219 | 0.9219 | 0.9227 | 0.9230 |
| 4 | Transformer | 0.9323 | 0.9232 | 0.92 | 0.92 | 0.9220 |
| 5 | RNN | 0.8724 | 0.89 | 0.89 | 0.89 | 0.8883 |
| 6 | DeepGBM | 0.8802 | 0.9089 | 0.9089 | 0.9088 | 0.9097 |
| 7 | ResNet | 0.9049 | 0.9115 | 0.9115 | 0.9118 | 0.9122 |
| 8 | DenseNet | 0.9102 | 0.9141 | 0.9141 | 0.9144 | 0.9151 |
| 9 | Improved MLP | 0.9062 | 0.9219 | 0.9221 | 0.9222 | 0.9224 |
| 10 | SAINT | 0.9297 | 0.9349 | 0.9355 | 0.9349 | 0.9355 |
| 11 | FT-Transformer | 0.9154 | 0.9284 | 0.9287 | 0.9286 | 0.9292 |
| 12 | NODE | 0.9102 | 0.9167 | 0.9165 | 0.9171 | 0.9178 |

**Deep Learning Networks Models (5 Labels)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Models | Validation  Accuracy | Testing  Accuracy | (Test) Recall | (Test) F1 score | (Test) Macro f1 score |
| 1 | Base CNN | 0.8385 | 0.8242 | 0.8196 | 0.8245 | 0.8221 |
| 2 | Sequential CNN | 0.84 | 0.8125 | 0.81 | 0.81 | 0.8108 |
| 3 | Multi-layer Perceptron | 0.8516 | 0.83 | 0.83 | 0.8262 | 0.8262 |
| 4 | Transformer | 0.8828 | 0.86 | 0.86 | 0.86 | 0.8575 |
| 5 | RNN | 0.8099 | 0.7891 | 0.79 | 0.79 | 0.7850 |
| 6 | DeepGBM | 0.8099 | 0.8177 | 0.8177 | 0.8183 | 0.8158 |
| 7 | ResNet | 0.8438 | 0.8138 | 0.8138 | 0.8130 | 0.8106 |
| 8 | DenseNet | 0.8307 | 0.8112 | 0.8112 | 0.8116 | 0.8098 |
| 9 | Improved MLP | 0.8490 | 0.8203 | 0.8203 | 0.8207 | 0.8191 |
| 10 | SAINT | 0.8828 | 0.8503 | 0.8492 | 0.8515 | 0.8501 |
| 11 | FT-Transformer | 0.8594 | 0.8490 | 0.8453 | 0.8485 | 0.8467 |
| 12 | NODE | 0.8555 | 0.8216 | 0.8190 | 0.8216 | 0.8195 |

SAINT = Self-Attention and Intersample Attention Transformer.