| Model | 400X Feature | Technique | Accuracy |
|--------------------------------------|--|---------------------------------|------------------|
| DL | Xception | LSTM | 0.92 |
| HF + ML | LBP + LPQ | Linear SVM | 0.8549 |
| DL | | ResNet 152 | 0.85172 |
| HF + ML | LBP + LPQ + GLCM | Linear SVM | 0.8335 |
| DL + ML (TL) | VGG 19 + RESNET 152 | SVM | 0.8305 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | SVM | 0.829 |
| HF + ML | LBP + LPQ | SVM | 0.829 |
| IF + ML | LBP + LPQ | Gradient Boosting | 0.8152 |
| HF + ML DL + ML | LBP + LPQ + GLCM VGG 19 | Gradient Boosting Random Forest | 0.8152 0.8122 |
| DL + ML | VGG 19 | Extremely Trees | 0.8122 |
| DL + ML | VGG 19 | SVM | 0.8106 |
| HF + ML | LBP + LPQ + GLCM | SVM | 0.8106 |
| HF + ML | LBP | SVM | 0.8076 |
| HF + ML | LBP | Linear SVM | 0.8061 |
| HF + ML | LBP + LPQ | Adaboost | 0.7984 |
| HF + ML | LBP + LPQ + GLCM | Adaboost | 0.7954 |
| DL + ML (TL) | VGG 19 + RESNET 152 | Adaboost | 0.7923 |
| DL + ML (TL) | VGG 19 + RESNET 152 | Gradient Boosting | 0.7877 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Adaboost | 0.7801 |
| HF + ML | LPQ | Gradient Boosting | 0.777 |
| HF + ML | LBP + LPQ + GLCM | Random Forest | 0.777 |
| HF + ML | LPQ | Adaboost | 0.7755 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Gradient Boosting | 0.774 |
| HF + ML | LPQ | Linear SVM | 0.774 |
| DL + ML | VGG 19 | SGD | 0.7725 |
| DL + ML | VGG 19 | Adaboost | 0.7725 |
| DL + ML | VGG 19 | Gradient Boosting | 0.7725 |
| DL + ML (TL) | VGG 19 + RESNET 152 | Random Forest | 0.7725 |
| OL + ML | VGG 19 | Linear SVM | 0.7709 |
| DL + ML (TL) | VGG 19 + RESNET 152 | Linear SVM | 0.7709 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Linear SVM | 0.7709 |
| HF + ML | LBP | Random Forest | 0.7709 |
| HF + ML | VGG 19 + RESNET 152 + IV3 | Extremely Trees Random Forest | 0.7664 |
| <mark>DL + ML (TL)</mark> HF + ML | LBP | Gradient Boosting | 0.7648 0.7618 |
| DL + ML (FT) | VGG 19 + RESNET 152 | SGD | 0.7618 |
| DL + ML (FI) | VGG 19 + RESNET 152 VGG 19 + RESNET 152 + IV3 | Extremely Trees | 0.7587 |
| HF + ML | LBP | Adaboost | 0.7587 |
| DL + ML (TL) | VGG 19 + RESNET 152 | Extremely Trees | 0.7572 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | SGD | 0.7572 |
| HF + ML | LBP + LPQ | Random Forest | 0.7557 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Linear SVM | 0.7541 |
| HF + ML | LBP + LPQ + GLCM | Extremely Trees | 0.7496 |
| DL + ML (FT) | VGG 19 + RESNET 152 | Linear SVM | 0.748 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Random Forest | 0.748 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Extremely Trees | 0.745 |
| DL + ML (FT) | VGG 19 | Random Forest | 0.7419 |
| DL + ML (FT) | VGG 19 + RESNET 152 | Gradient Boosting | 0.7404 |
| DL + ML (FT) | VGG 19 + RESNET 152 | Random Forest | 0.7404 |
| HF + ML | LPQ | Random Forest | 0.7389 |
| DL + ML | VGG 19 | KNN | 0.7374 |
| DL + ML (TL) | VGG 19 + RESNET 152 | KNN | 0.7374 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | KNN | 0.7374 |
| OL + ML (FT) | VGG 19 + RESNET 152 | Extremely Trees | 0.7374 |
| HF + ML | LBP + LPQ | KNN | 0.7358 |
| HF + ML | Haralick | SVM | 0.7328 |
| HF + ML | LPQ | KNN | 0.7282 |
| DL + ML (FT) | VGG 19 + RESNET 152 | Adaboost | 0.7251 |
| HF + ML | Haralick | Linear SVM | 0.7251 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Gradient Boosting | 0.7236 |
| HF + ML | LBP | Decision Tree | 0.7236 |
| HF + ML | LBP + LPQ | Extremely Trees | 0.7236 |
| DL + ML (FT) DL + ML (FT) | VGG 19 VGG 19 + RESNET 152 | SVM | 0.7221 0.7221 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Adaboost | 0.7221 |
| DL + ML (FT) | VGG 19 + RESNET 132 + IV3 | Extremely Trees | 0.7221 |
| DL + ML (FT) | VGG 19 | Linear SVM | 0.7200 |
| DL + ML (TL) | VGG 19 + RESNET 152 | SGD | 0.716 |
| DL + ML (FT) | RESNET 152 | Linear SVM | 0.7129 |
| HF + ML | LBP | KNN | 0.7114 |
| HF + ML | LPQ | Extremely Trees | 0.7114 |
| HF + ML | LBP + LPQ | Decision Tree | 0.7099 |
| HF + ML | LPQ | SVM | 0.7083 |
| HF + ML | LBP + LPQ + GLCM | Decision Tree | 0.7038 |
| DL + ML (FT) | VGG 19 | Gradient Boosting | 0.7022 |
| HF + ML | LBP + LPQ | SGD | 0.7022 |
| DL + ML (TL) | VGG 19 + RESNET 152 | Decision Tree | 0.6992 |
| | VCC 10 | SGD | 0.6977 |
| DL + ML (FT) | VGG 19 | 300 | 0.0577 |

| DE | Model | 400X Feature | Technique | AUC |
|--|--------------|---------------------------------------|--|--|
| HF + ML | | - Catal C | | |
| HF + ML | HF + ML | LBP + LPQ | | 0.92 |
| | DL | Xception | LSTM | 0.92 |
| | HF + ML | LBP + LPQ | SVM | 0.91 |
| | HF + ML | LBP + LPQ + GLCM | Gradient Boosting | 0.9 |
| DL + ML | HF + ML | LBP + LPQ + GLCM | Linear SVM | 0.9 |
| DL + ML | HF + ML | LBP + LPQ + GLCM | SVM | 0.9 |
| DL + ML (TL) | DL + ML | VGG 19 | + | 0.89 |
| DL + ML TIJ VGG 19 + RESNET 152 + IV3 SVM 0.89 | DL + ML | | • | ! |
| | | | | |
| DL + ML | | | | |
| HF + ML | | · | | <u> </u> |
| HF + ML | | | | |
| HF + ML LBP + LPQ Adaboost 0.88 HF + ML LBP + LPQ + GLCM Adaboost 0.88 DL + ML VGG 19 + RESNET 152 Adaboost 0.85 DL + ML (TL) VGG 19 + RESNET 152 Adaboost 0.85 DL + ML (TL) VGG 19 + RESNET 152 Cardient Boosting 0.85 DL + ML (TL) VGG 19 + RESNET 152 Linear SVM 0.85 DL + ML (TL) VGG 19 + RESNET 152 + IV3 Linear SVM 0.85 HF + ML LBP Extremely Trees 0.85 DL + ML VGG 19 Adaboost 0.84 DL + ML VGG 19 Adaboost 0.84 DL + ML (TL) VGG 19 + RESNET 152 Extremely Trees 0.84 DL + ML (TL) VGG 19 + RESNET 152 + IV3 Adaboost 0.84 HF + ML LBP Gradient Boosting 0.84 HF + ML LBP Gradient Boosting 0.84 HF + ML LPQ Gradient Boosting 0.84 HF + ML LPQ Adaboost 0.82 | | | + | |
| | | | | 1 |
| DL + ML VGG 19 | | · · · · · · · · · · · · · · · · · · · | | + |
| DL + ML (TL) VGG 19 + RESNET 152 Adaboost 0.85 | | · | | |
| DL + ML (TL) | | | | <u> </u> |
| DL + ML (TL) | | | | <u> </u> |
| DL + ML (TL) | <u> </u> | | | 1 |
| HF + ML LBP Random Forest 0.85 DL + ML UPO Extremely Trees 0.85 DL + ML VGG 19 Adaboost 0.84 DL + ML VGG 19 Gradient Boosting 0.84 DL + ML (TL) VGG 19 + RESNET 152 Random Forest 0.84 DL + ML (TL) VGG 19 + RESNET 152 + IV3 Adaboost 0.84 DL + ML (TL) VGG 19 + RESNET 152 + IV3 Adaboost 0.84 HF + ML LBP Adaboost 0.84 HF + ML LBP Gradient Boosting 0.84 HF + ML LPQ Gradient Boosting 0.84 HF + ML LPQ Gradient Boosting 0.84 HF + ML LPQ Gradient Boosting 0.84 HF + ML LBP + LPQ Gradient Boosting 0.84 HF + ML LBP + LPQ Random Forest 0.83 DL + ML (TL) VGG 19 + RESNET 152 + IV3 Extremely Trees 0.83 DL + ML (FT) VGG 19 + RESNET 152 Linear SVM 0.82 | | | | <u> </u> |
| HF + ML | HF + ML | | | |
| DL + ML | HF + ML | | | + |
| DL + MIL VGG 19 | DL + ML | VGG 19 | <u> </u> | |
| DL + ML (TL) | DL + ML | | | <u> </u> |
| DL + ML (TL) | DL + ML (TL) | | + | 1 |
| DL + ML (TL) | | | Extremely Trees | 1 |
| HF + ML | | | - | 1 |
| HF + ML | DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | | 0.84 |
| HF + ML | HF + ML | LBP | Adaboost | 0.84 |
| | HF + ML | LBP | Gradient Boosting | 0.84 |
| DL + ML (TL) | HF + ML | LPQ | Gradient Boosting | 0.84 |
| DL + ML (TL) | HF + ML | LPQ | Linear SVM | 0.84 |
| HF+ML LBP+LPQ + GLCM Random Forest 0.83 DL+ML (FT) VGG 19 + RESNET 152 Linear SVM 0.82 HF+ML LPQ Adaboost 0.82 HF+ML LPQ SVM 0.82 HF+ML LBP+LPQ Extremely Trees 0.82 HF+ML LBP+LPQ + GLCM Extremely Trees 0.82 DL+ML VGG 19 SGD 0.8 DL+ML VGG 19 SGD 0.8 DL+ML (FT) VGG 19 RSD SGD 0.8 DL+ML (FT) VGG 19 + RESNET 152 Random Forest 0.8 DL+ML (FT) VGG 19 + RESNET 152 + IV3 Random Forest 0.8 DL+ML (FT) VGG 19 + RESNET 152 + IV3 Random Forest 0.8 DL+ML (TL) VGG 19 + RESNET 152 + IV3 SGD 0.79 DL+ML (FT) | | VGG 19 + RESNET 152 + IV3 | Gradient Boosting | 0.83 |
| HF + ML | DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Extremely Trees | |
| DL + ML (FT) VGG 19 + RESNET 152 | HF + ML | · | | 0.83 |
| HF + ML | | | | |
| HF+ML LPQ SVM 0.82 HF+ML LBP+LPQ Extremely Trees 0.82 HF+ML LBP+LPQ + GLCM Extremely Trees 0.82 HF+ML LBP+LPQ SGD 0.81 DL+ML VGG 19 SGD 0.8 DL+ML VGG 19 Naive Bayes 0.8 DL+ML (FT) VGG 19 + RESNET 152 Random Forest 0.8 DL+ML (FT) VGG 19 + RESNET 152 Extremely Trees 0.8 DL+ML (FT) VGG 19 + RESNET 152 + IV3 Random Forest 0.8 DL+ML (FT) VGG 19 + RESNET 152 + IV3 Extremely Trees 0.8 DL+ML (FT) VGG 19 + RESNET 152 + IV3 Extremely Trees 0.8 DL+ML (FT) VGG 19 + RESNET 152 + IV3 SGD 0.79 DL+ML (FT) VGG 19 + RESNET 152 + IV3 SGD 0.79 DL+ML (FT) VGG 19 SVM 0.79 DL+ML (FT) VGG 19 Extremely Trees 0.79 DL+ML (FT) VGG 19 + RESNET 152 + IV3 KNN 0.78 | | | | |
| HF + ML | | · | | _ |
| HF + ML | | ` | | |
| HF + ML | | · | <u> </u> | - |
| DL + ML | | · | <u> </u> | |
| DL + ML | | , | | |
| DL + ML (FT) | | | | |
| DL + ML (FT) VGG 19 + RESNET 152 Extremely Trees D.8 | | | <u> </u> | + |
| DL + ML (FT) VGG 19 + RESNET 152 + IV3 Random Forest 0.8 | <u></u> | | | + |
| DL + ML (FT) VGG 19 + RESNET 152 + IV3 Extremely Trees 0.8 | <u></u> | | <u> </u> | |
| HF + ML LPQ SGD 0.8 HF + ML LPQ Random Forest 0.8 DL + ML (TL) VGG 19 + RESNET 152 Naive Bayes 0.79 DL + ML (TL) VGG 19 + RESNET 152 + IV3 SGD 0.79 DL + ML (FT) VGG 19 Linear SVM 0.79 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Linear SVM 0.79 DL + ML (FT) VGG 19 + RESNET 152 + IV3 KNN 0.78 DL + ML VGG 19 KNN 0.78 0.79 DL + ML (TL) VGG 19 + RESNET 152 KNN 0.78 DL + ML (TL) VGG 19 + RESNET 152 + IV3 KNN 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77< | | | | 0.8 |
| HF + ML | HF + ML | | | |
| DL + ML (TL) VGG 19 + RESNET 152 + IV3 SGD 0.79 DL + ML (FT) VGG 19 SVM 0.79 DL + ML (FT) VGG 19 SVM 0.79 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Linear SVM 0.79 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Linear SVM 0.79 DL + ML (TL) VGG 19 + RESNET 152 KNN 0.78 DL + ML (TL) VGG 19 + RESNET 152 KNN 0.78 DL + ML (FT) VGG 19 SGD 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (FT) VGG 19 + RESNET 152 Linear SVM 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Gradient Boosting 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0.76 DL + ML (FT) VGG 19 + RESNET 152 VGM 0. | HF + ML | • | Random Forest | |
| DL + ML (TL) VGG 19 + RESNET 152 + IV3 SGD 0.79 DL + ML (FT) VGG 19 SVM 0.79 DL + ML (FT) VGG 19 SVM 0.79 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Linear SVM 0.79 DL + ML VGG 19 Extremely Trees 0.79 DL + ML VGG 19 KNN 0.78 DL + ML (TL) VGG 19 + RESNET 152 KNN 0.78 DL + ML (FT) VGG 19 + RESNET 152 + IV3 KNN 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (FT) VGG 19 + RESNET 152 Linear SVM 0.77 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) VGG 19 + RESNET 152 NG 0.76 DL + ML (FT) NG 19 + RESNET 152 NG 0.76 DL + ML (FT) NG 19 + RESNET 152 NG 19 DL + ML (FT) NG 19 + RESNET 152 NG 19 DL + ML (FT) NG 19 + RESNET 152 NG 19 | | | | 1 |
| DL + ML (FT) VGG 19 SVM 0.79 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Linear SVM 0.79 HF + ML LPQ Extremely Trees 0.79 DL + ML VGG 19 KNN 0.78 DL + ML (TL) VGG 19 + RESNET 152 KNN 0.78 DL + ML (FT) VGG 19 SGD 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (FT) VGG 19 + RESNET 152 SGD 0.77 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 <td><u></u></td> <td></td> <td><u> </u></td> <td></td> | <u></u> | | <u> </u> | |
| DL + ML (FT) | <u></u> | VGG 19 | Linear SVM | 0.79 |
| DL + ML | DL + ML (FT) | VGG 19 | SVM | 0.79 |
| DL + ML VGG 19 KNN 0.78 DL + ML (TL) VGG 19 + RESNET 152 KNN 0.78 DL + ML (TL) VGG 19 + RESNET 152 + IV3 KNN 0.78 DL + ML (FT) VGG 19 SGD 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 | | VGG 19 + RESNET 152 + IV3 | Linear SVM | 0.79 |
| DL + ML (TL) VGG 19 + RESNET 152 KNN 0.78 DL + ML (TL) VGG 19 + RESNET 152 + IV3 KNN 0.78 DL + ML (FT) VGG 19 SGD 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (TL) RESNET 152 Linear SVM 0.77 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET | HF + ML | , | <u> </u> | 1 |
| DL + ML (TL) VGG 19 + RESNET 152 + IV3 KNN 0.78 DL + ML (FT) VGG 19 SGD 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (TL) RESNET 152 Linear SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Gradient Boosting 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL | | | | . |
| DL + ML (FT) VGG 19 SGD 0.78 DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (TL) RESNET 152 Linear SVM 0.77 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP | DL + ML (TL) | | | |
| DL + ML (FT) VGG 19 Random Forest 0.78 DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (TL) RESNET 152 Linear SVM 0.77 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML <td< td=""><td>DL + ML (TL)</td><td></td><td></td><td> </td></td<> | DL + ML (TL) | | | |
| DL + ML (FT) VGG 19 + RESNET 152 Gradient Boosting 0.78 DL + ML (TL) RESNET 152 Linear SVM 0.77 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP | | | | |
| DL + ML (TL) RESNET 152 Linear SVM 0.77 DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | <u> </u> | | | |
| DL + ML (TL) VGG 19 + RESNET 152 SGD 0.77 DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | | 1 |
| DL + ML (FT) VGG 19 Adaboost 0.77 DL + ML (FT) VGG 19 Gradient Boosting 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | | ł |
| DL + ML (FT) VGG 19 Gradient Boosting 0.77 DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | <u></u> | | | <u> </u> |
| DL + ML (FT) VGG 19 Extremely Trees 0.77 DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | | |
| DL + ML (FT) VGG 19 + RESNET 152 SVM 0.77 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | + | <u> </u> |
| DL + ML (FT) VGG 19 + RESNET 152 + IV3 Gradient Boosting 0.77 HF + ML LBP + LPQ KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | | |
| HF + ML LBP + LPQ KNN 0.77 HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | <u> </u> | 1 |
| HF + ML LBP + LPQ + GLCM SGD 0.77 DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | <u> </u> | <u> </u> |
| DL + ML (TL) RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | · | 1 | |
| DL + ML (FT) VGG 19 + RESNET 152 Adaboost 0.76 DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | · · · · · · · · · · · · · · · · · · · | | <u> </u> |
| DL + ML (FT) VGG 19 + RESNET 152 + IV3 Adaboost 0.76 HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | . , | | | |
| HF + ML Haralick SVM 0.76 HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | | <u> </u> |
| HF + ML LBP KNN 0.76 HF + ML LBP Naive Bayes 0.76 | | | | 1 |
| HF + ML LBP Naive Bayes 0.76 | | | | 1 |
| · | | | | |
| DL + ML (TL) RESNET 152 Gradient Boosting 0.75 | | | - | 0.75 |

| DL + ML (TL) | RESNET 152 | Linnan CV/DA | 0.6046 |
|---|---|--|--|
| DI I MI (TI) | VGG 19 + RESNET 152 | Linear SVM | 0.6946 |
| DL + ML (TL) | | Naive Bayes | 0.6946 |
| DL + ML (FT) | VGG 19 | Adaboost | 0.6946 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Naive Bayes | 0.693 |
| DL + ML | VGG 19 | Decision Tree | 0.6916 |
| DL + ML (TL) | RESNET 152 | Adaboost | 0.69 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Decision Tree | 0.69 |
| DL + ML (FT) | RESNET 152 | Extremely Trees | 0.69 |
| DL + ML (TL) | RESNET 152 | Extremely Trees | 0.687 |
| HF + ML | LPQ | Decision Tree | 0.687 |
| DL + ML (TL) | RESNET 152 | Gradient Boosting | 0.6824 |
| | | + | |
| DL + ML (FT) | VGG 19 + RESNET 152 | Decision Tree | 0.6824 |
| DL + ML | VGG 19 | Naive Bayes | 0.6809 |
| HF + ML | LBP | SGD | 0.6778 |
| DL + ML (FT) | VGG 19 + RESNET 152 | Naive Bayes | 0.6732 |
| DL + ML (FT) | RESNET 152 | Random Forest | 0.6702 |
| DL + ML (TL) | RESNET 152 | SVM | 0.6687 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Naive Bayes | 0.6671 |
| DL + ML (FT) | VGG 19 | Naive Bayes | 0.6656 |
| DL + ML (FT) | RESNET 152 | SVM | 0.6641 |
| | | | |
| DL + ML (FT) | VGG 19 | KNN | 0.661 |
| DL + ML (TL) | RESNET 152 | KNN | 0.6549 |
| HF + ML | LBP + LPQ + GLCM | Naive Bayes | 0.6534 |
| DL + ML (TL) | RESNET 152 | Decision Tree | 0.6488 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Decision Tree | 0.6488 |
| DL + ML (FT) | RESNET 152 | Adaboost | 0.6458 |
| HF + ML | HOG | Extremely Trees | 0.6458 |
| | | | |
| HF + ML | Haralick | Gradient Boosting | 0.6458 |
| HF + ML | Haralick | Random Forest | 0.6427 |
| DL + ML (FT) | RESNET 152 | SGD | 0.6396 |
| HF + ML | LBP + LPQ | Naive Bayes | 0.6396 |
| DL + ML (TL) | IV3 | Linear SVM | 0.6381 |
| DL + ML (TL) | IV3 | SVM | 0.6381 |
| DL + ML (FT) | IV3 | SVM | 0.6381 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | SVM | 0.6381 |
| HF + ML | HOG | SVM | 0.6381 |
| HF + ML | | | |
| | SIFT | Linear SVM | 0.6381 |
| HF + ML | SIFT | SVM | 0.6381 |
| HF + ML | LPQ | SGD | 0.6381 |
| HF + ML | Haralick | Extremely Trees | 0.6369 |
| DL + ML (FT) | RESNET 152 | Naive Bayes | 0.6335 |
| HF + ML | Haralick | Adaboost | 0.6335 |
| DL + ML (FT) | VGG 19 + RESNET 152 | KNN | 0.632 |
| DL + ML (TL) | RESNET 152 | Naive Bayes | 0.629 |
| DL + ML (FT) | VGG 19 | Decision Tree | 0.629 |
| HF + ML | HOG | Random Forest | 0.629 |
| | | | |
| DL + ML (FT) | RESNET 152 | Gradient Boosting | 0.6274 |
| HF + ML | LPQ | Naive Bayes | 0.6213 |
| DL + ML (TL) | RESNET 152 | SGD | 0.6106 |
| HF + ML | HOG | SGD | 0.6091 |
| HF + ML | LBP + LPQ + GLCM | KNN | 0.6091 |
| DL + ML (FT) | RESNET 152 | Decision Tree | 0.6061 |
| DL + ML (FT) | RESNET 152 | KNN | 0.6045 |
| HF + ML | SIFT | Gradient Boosting | 0.6 |
| HF + ML | HOG | Gradient Boosting | 0.5954 |
| | | - | |
| HF + ML | HOG | Adaboost | 0.5908 |
| HF + ML | HOG | Linear SVM | 0.5893 |
| HF + ML | ноб | Naive Bayes | 0.5877 |
| HF + ML | Haralick | KNN | 0.5877 |
| | SIFT | KNN | 0.5832 |
| HF + ML | <u> </u> | | |
| HF + ML HF + ML | SIFT | Extremely Trees | 0.5832 |
| | | Extremely Trees Decision Tree | 0.5832 0.5786 |
| HF + ML HF + ML | SIFT SIFT | Decision Tree | 0.5786 |
| HF + ML HF + ML HF + ML | SIFT SIFT SIFT | Decision Tree Random Forest | 0.5786 0.574 |
| HF + ML HF + ML HF + ML | SIFT SIFT LBP | Decision Tree Random Forest Naive Bayes | 0.5786 0.574 0.5725 |
| HF + ML HF + ML HF + ML HF + ML | SIFT SIFT SIFT LBP Haralick | Decision Tree Random Forest Naive Bayes Decision Tree | 0.5786 0.574 0.5725 0.5694 |
| HF + ML | SIFT SIFT SIFT LBP Haralick HOG | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree | 0.5786 0.574 0.5725 0.5694 0.5648 |
| HF + ML | SIFT SIFT SIFT LBP Haralick HOG | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 |
| HF + ML | SIFT SIFT SIFT LBP Haralick HOG SIFT | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 |
| HF + ML | SIFT SIFT SIFT LBP Haralick HOG | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 |
| HF + ML | SIFT SIFT SIFT LBP Haralick HOG SIFT | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 |
| HF + ML DL + ML HT + ML | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5648 |
| HF + ML DL + ML DL + ML (TL) DL + ML (TL) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 |
| HF + ML DL + ML (TL) DL + ML (TL) DL + ML (TL) HF + ML | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 IV3 IV3 SIFT | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 |
| HF + ML DL + ML (TL) DL + ML (TT) DL + ML (TT) HF + ML DL + ML (TT) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 IV3 IV3 SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5541 0.5541 |
| HF + ML DL + ML (TL) DL + ML (TT) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 IV3 IV3 IV3 SIFT IV3 IV3 IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 |
| HF + ML DL + ML (TL) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD Decision Tree | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 0.5297 |
| HF + ML DL + ML (TL) DL + ML (TL) DL + ML (TT) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD Decision Tree Gradient Boosting | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 0.5297 0.5282 |
| HF + ML DL + ML (TL) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD Decision Tree | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 0.5297 |
| HF + ML DL + ML (TL) DL + ML (TL) DL + ML (TT) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD Decision Tree Gradient Boosting | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 0.5297 0.5282 |
| HF + ML DL + ML (TL) DL + ML (TT) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD Decision Tree Gradient Boosting Extremely Trees | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 0.5297 0.5282 0.5282 0.5267 |
| HF + ML DL + ML (TL) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD Decision Tree Gradient Boosting Extremely Trees SGD KNN | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 0.5297 0.5282 0.5282 0.5282 0.5267 0.5251 |
| HF + ML DL + ML (TL) DL + ML (TT) | SIFT SIFT SIFT LBP Haralick HOG SIFT SIFT IV3 | Decision Tree Random Forest Naive Bayes Decision Tree Decision Tree SGD Adaboost Extremely Trees Decision Tree Random Forest Naive Bayes Random Forest SGD Decision Tree Gradient Boosting Extremely Trees | 0.5786 0.574 0.5725 0.5694 0.5648 0.5648 0.5648 0.5618 0.5541 0.5511 0.548 0.5419 0.5328 0.5297 0.5282 0.5282 0.5267 |

| DL + ML (TL) | RESNET 152 | Random Forest | 0.75 |
|---|---|---|--|
| DL + ML (TL) | RESNET 152 | Extremely Trees | 0.75 |
| DL + ML (FT) | RESNET 152 | Linear SVM | 0.75 |
| HF + ML | LPQ | KNN | 0.75 |
| DL + ML (TL) | RESNET 152 | SGD | 0.74 |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Naive Bayes | 0.74 |
| DL + ML (FT) | | - | |
| | RESNET 152 | Random Forest | 0.74 |
| HF + ML | Haralick | Linear SVM | 0.74 |
| HF + ML | LBP | SGD | 0.74 |
| DL + ML (FT) | RESNET 152 | Extremely Trees | 0.73 |
| DL + ML (TL) | RESNET 152 | SVM | 0.72 |
| HF + ML | LBP | Decision Tree | 0.72 |
| | Haralick | SGD | |
| HF + ML | | | 0.71 |
| HF + ML | Haralick | Naive Bayes | 0.71 |
| DL + ML (TL) | RESNET 152 | Naive Bayes | 0.7 |
| DL + ML (TL) | VGG 19 + RESNET 152 | Decision Tree | 0.7 |
| DL + ML (FT) | VGG 19 | KNN | 0.7 |
| DL + ML (FT) | RESNET 152 | Gradient Boosting | 0.7 |
| HF + ML | HOG | Naive Bayes | 0.7 |
| DL + ML | VGG 19 | Decision Tree | 0.69 |
| | | | |
| DL + ML (TL) | VGG 19 + RESNET 152 + IV3 | Decision Tree | 0.69 |
| HF + ML | HOG | Random Forest | 0.69 |
| HF + ML | HOG | Extremely Trees | 0.69 |
| DL + ML (TL) | RESNET 152 | KNN | 0.68 |
| DL + ML (FT) | RESNET 152 | Adaboost | 0.68 |
| DL + ML (FT) | RESNET 152 | SVM | 0.68 |
| HF + ML | Haralick | Gradient Boosting | 0.68 |
| | | | |
| HF + ML | Haralick | Extremely Trees | 0.68 |
| HF + ML | LBP + LPQ | Decision Tree | 0.67 |
| HF + ML | LBP + LPQ + GLCM | Decision Tree | 0.67 |
| DL + ML (FT) | VGG 19 + RESNET 152 | Decision Tree | 0.66 |
| HF + ML | Haralick | Adaboost | 0.66 |
| HF + ML | Haralick | Random Forest | 0.66 |
| DL + ML (FT) | VGG 19 | Decision Tree | 0.65 |
| | | | |
| DL + ML (FT) | VGG 19 + RESNET 152 | KNN | 0.65 |
| HF + ML | нос | Linear SVM | 0.65 |
| HF + ML | HOG | SVM | 0.64 |
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | Decision Tree | 0.63 |
| HF + ML | ноб | Gradient Boosting | 0.63 |
| HF + ML | LPQ | Decision Tree | 0.63 |
| HF + ML | LBP + LPQ + GLCM | KNN | 0.63 |
| | EDI I EI Q I GECIVI | KINIA | 0.03 |
| DI . NAI /TI\ | DECNET 4E3 | Danisian Tuan | 0.00 |
| | RESNET 152 | Decision Tree | 0.62 |
| HF + ML | ноG | Adaboost | 0.62 |
| HF + ML DL + ML (FT) | HOG RESNET 152 | Adaboost KNN | 0.62 0.61 |
| HF + ML DL + ML (FT) | ноG | Adaboost | 0.62 |
| HF + ML DL + ML (FT) DL + ML (FT) | HOG RESNET 152 | Adaboost KNN | 0.62 0.61 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) | HOG RESNET 152 RESNET 152 | Adaboost KNN Naive Bayes | 0.62 0.61 0.61 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 | Adaboost KNN Naive Bayes Naive Bayes SGD | 0.62 0.61 0.61 0.61 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting | 0.62 0.61 0.61 0.61 0.61 0.61 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees | 0.62 0.61 0.61 0.61 0.61 0.61 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.5 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML HF + ML HF + ML HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.5 0.59 0.59 0.59 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.59 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes | 0.62 0.61 0.61 0.61 0.61 0.61 0.66 0.6 0.6 0.59 0.59 0.59 0.58 0.58 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.59 0.58 0.58 0.58 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM | 0.62 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.59 0.58 0.58 0.58 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.58 0.57 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.58 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.59 0.58 0.58 0.58 0.58 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.58 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.58 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.58 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| DL + ML (TL) HF + ML DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML (FT) DL + ML HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree Random Forest | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 |
| HF + ML DL + ML (FT) DL + ML (FT) DL + ML (FT) HF + ML DL + ML (FT) | HOG RESNET 152 RESNET 152 VGG 19 + RESNET 152 + IV3 HOG SIFT SIFT VGG 19 VGG 19 + RESNET 152 LBP + LPQ + GLCM SIFT Haralick LBP + LPQ HOG SIFT LPQ RESNET 152 IV3 IV3 SIFT SIFT SIFT SIFT SIFT SIFT SIFT SIFT | Adaboost KNN Naive Bayes Naive Bayes SGD Gradient Boosting Extremely Trees Naive Bayes Naive Bayes Naive Bayes Naive Bayes KNN KNN Naive Bayes KNN Random Forest Naive Bayes Decision Tree Linear SVM Random Forest SGD Naive Bayes Adaboost Linear SVM SVM Decision Tree Gradient Boosting Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree Random Forest SGD Extremely Trees SGD Extremely Trees KNN Adaboost Decision Tree Decision Tree | 0.62 0.61 0.61 0.61 0.61 0.61 0.61 0.6 0.6 0.6 0.6 0.59 0.59 0.59 0.58 0.58 0.58 0.57 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.55 0.55 |

| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | KNN | 0.5083 |
|--------------|---------------------------|-------------|--------|
| DL + ML (FT) | VGG 19 + RESNET 152 + IV3 | SGD | 0.5007 |
| DL + ML (TL) | RESNET 152 | KNN | 0.4977 |
| DL + ML (TL) | IV3 | Adaboost | 0.4839 |
| DL + ML (FT) | IV3 | SGD | 0.4641 |
| HF + ML | Haralick | SGD | 0.4595 |
| HF + ML | Haralick | Naive Bayes | 0.4458 |
| DL + ML (TL) | IV3 | Naive Bayes | 0.4427 |
| HF + ML | HOG | KNN | 0.3877 |
| DL + ML (FT) | IV3 | Naive Bayes | 0.3832 |

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|--------------|---------------------|-------------------|------|
| DL + ML (TL) | IV3 | Gradient Boosting | 0.5 |
| DL + ML (TL) | IV3 | SVM | 0.5 |
| DL + ML (FT) | VGG 19 + RESNET 152 | SGD | 0.5 |
| DL + ML (FT) | IV3 | Naive Bayes | 0.49 |
| DL + ML (TL) | IV3 | Decision Tree | 0.48 |
| DL + ML (FT) | IV3 | SVM | 0.47 |
| DL + ML (TL) | IV3 | KNN | 0.46 |
| DL + ML (TL) | IV3 | Adaboost | 0.45 |
| DL + ML (TL) | IV3 | Naive Bayes | 0.44 |
| DL + ML (TL) | IV3 | SGD | 0.41 |