|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Algorithms | Precision | Recall | F1Score | MAE | MSE | RMSE | Accuracy |
| DT | 0.986 | 0.985 | 0.985 | 0.016 | 0.018 | 0.133 | 98.490% |
| KNN | 0.996 | 0.996 | 0.996 | 0.005 | 0.007 | 0.084 | 99.556% |
| RF | 0.996 | 0.996 | 0.996 | 0.005 | 0.007 | 0.084 | 99.556% |
| ET | 0.996 | 0.996 | 0.996 | 0.005 | 0.007 | 0.084 | 99.556% |
| XGB | 0.996 | 0.996 | 0.996 | 0.005 | 0.007 | 0.084 | 99.556% |
| SVM | 0.996 | 0.996 | 0.996 | 0.005 | 0.007 | 0.084 | 99.556% |
| LR | 0.989 | 0.989 | 0.989 | 0.014 | 0.021 | 0.146 | 98.934% |

**Morphological Feature Extraction Results**

**Table**: Classification Results of Machine Learning using Morphological Feature Extraction.

**Comparative Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| Algorithms | Raw Data | Morphological Feature Extraction | Transfer Learning |
| DT | 0.871 | 0.985 | 0.969 |
| KNN | 0.967 | 0.996 | 0.967 |
| RF | 0.951 | 0.996 | 0.986 |
| ET | 0.991 | 0.996 | 0.991 |
| XGB | 0.995 | 0.996 | 0.995 |
| SVM | 0.963 | 0.996 | 0.966 |
| LR | 1.000 | 0.989 | 1.000 |

**Table:** F1 Score Comparison

**Figure:** Bar Plot of F1 Score Comparison

|  |  |  |  |
| --- | --- | --- | --- |
| Algorithms | Raw Data | Morphological Feature Extraction | Transfer Learning |
| DT | 86.878% | 98.490% | 96.833% |
| KNN | 96.833% | 99.556% | 96.833% |
| RF | 95.475% | 99.556% | 98.643% |
| ET | 99.095% | 99.556% | 99.095% |
| XGB | 99.548% | 99.556% | 99.548% |
| SVM | 96.380% | 99.556% | 96.833% |
| LR | 100.00% | 98.934% | 100.00% |

**Table:** Accuracy Comparison

**Figure:** Bar Plot of Accuracy Comparison

**Training Time Comparison**

|  |  |  |  |
| --- | --- | --- | --- |
| Algorithms | Raw Data | Morphological Feature Extraction | Transfer Learning |
| DT | 64.652 | 0.011 | 20.476 |
| KNN | 0.190 | 0.014 | 0.146 |
| RF | 10.973 | 0.339 | 4.955 |
| ET | 8.132 | 0.236 | 6.217 |
| XGB | 617.490 | 0.806 | 300.629 |
| SVM | 73.834 | 0.032 | 44.826 |
| LR | 49.486 | 0.333 | 37.519 |

**Table**: Training Time Comparison Table in Seconds.

**Figure:** Bar Plot of Training Time Comparison in Seconds.