Cyclic Features

SVM Best Parameters

{'C': 1, 'gamma': 'scale', 'kernel': 'linear'}

Best Hyperparameters (SVM): {'C': 1, 'gamma': 'scale', 'kernel': 'linear'}

Classification Report (SVM)

precision recall f1-score support

0 1.00 1.00 1.00 12

1 1.00 0.92 0.96 12

2 1.00 1.00 1.00 8

3 1.00 0.92 0.96 12

4 0.93 1.00 0.97 14

5 1.00 1.00 1.00 11

6 0.89 1.00 0.94 8

7 1.00 1.00 1.00 6

8 1.00 1.00 1.00 13

9 0.91 0.91 0.91 11

10 1.00 1.00 1.00 13

11 1.00 1.00 1.00 9

12 1.00 1.00 1.00 8

13 0.93 1.00 0.97 14

14 0.88 1.00 0.93 7

15 1.00 1.00 1.00 11

16 1.00 1.00 1.00 11

17 0.92 0.86 0.89 14

18 1.00 0.89 0.94 9

19 1.00 1.00 1.00 9

accuracy 0.97 212

macro avg 0.97 0.97 0.97 212

weighted avg 0.97 0.97 0.97 212

Accuracy (SVM): 0.9716981132075472

KNN Best Parameters

{'n\_neighbors': 3, 'p': 1, 'weights': 'distance'}

Best Hyperparameters (KNN): {'n\_neighbors': 3, 'p': 1, 'weights': 'distance'}

Classification Report (KNN)

precision recall f1-score support

0 0.92 1.00 0.96 12

1 1.00 0.92 0.96 12

2 1.00 1.00 1.00 8

3 1.00 1.00 1.00 12

4 0.93 1.00 0.97 14

5 1.00 1.00 1.00 11

6 1.00 1.00 1.00 8

7 1.00 1.00 1.00 6

8 1.00 1.00 1.00 13

9 1.00 0.91 0.95 11

10 1.00 1.00 1.00 13

11 0.82 1.00 0.90 9

12 1.00 1.00 1.00 8

13 0.93 1.00 0.97 14

14 0.78 1.00 0.88 7

15 1.00 0.82 0.90 11

16 1.00 1.00 1.00 11

17 1.00 0.86 0.92 14

18 1.00 0.89 0.94 9

19 1.00 1.00 1.00 9

accuracy 0.97 212

macro avg 0.97 0.97 0.97 212

weighted avg 0.97 0.97 0.97 212

Accuracy (KNN): 0.9669811320754716

Random Forest Best Parameters

{'max\_depth': None, 'min\_samples\_leaf': 2, 'min\_samples\_split': 5, 'n\_estimators': 100}

Best Hyperparameters: {'max\_depth': None, 'min\_samples\_leaf': 2, 'min\_samples\_split': 5, 'n\_estimators': 100}

Classification Report

precision recall f1-score support

0 0.86 1.00 0.92 12

1 1.00 1.00 1.00 12

2 1.00 1.00 1.00 8

3 1.00 0.92 0.96 12

4 1.00 1.00 1.00 14

5 1.00 1.00 1.00 11

6 0.89 1.00 0.94 8

7 1.00 1.00 1.00 6

8 1.00 1.00 1.00 13

9 1.00 1.00 1.00 11

10 1.00 1.00 1.00 13

11 1.00 1.00 1.00 9

12 1.00 1.00 1.00 8

13 1.00 1.00 1.00 14

14 1.00 1.00 1.00 7

15 1.00 1.00 1.00 11

16 1.00 1.00 1.00 11

17 1.00 0.86 0.92 14

18 1.00 1.00 1.00 9

19 1.00 1.00 1.00 9

accuracy 0.99 212

macro avg 0.99 0.99 0.99 212

weighted avg 0.99 0.99 0.99 212

Accuracy: 0.9858490566037735

LDA Best Parameters

{'n\_components': None, 'shrinkage': None, 'solver': 'svd'}

Best Hyperparameters (LDA): {'n\_components': None, 'shrinkage': None, 'solver': 'svd'}

Classification Report (LDA)

precision recall f1-score support

0 1.00 1.00 1.00 12

1 1.00 1.00 1.00 12

2 1.00 1.00 1.00 8

3 1.00 0.83 0.91 12

4 1.00 1.00 1.00 14

5 1.00 1.00 1.00 11

6 0.73 1.00 0.84 8

7 1.00 1.00 1.00 6

8 1.00 1.00 1.00 13

9 1.00 1.00 1.00 11

10 1.00 1.00 1.00 13

11 1.00 1.00 1.00 9

12 1.00 1.00 1.00 8

13 0.93 1.00 0.97 14

14 1.00 1.00 1.00 7

15 1.00 1.00 1.00 11

16 1.00 1.00 1.00 11

17 1.00 0.86 0.92 14

18 1.00 1.00 1.00 9

19 1.00 1.00 1.00 9

accuracy 0.98 212

macro avg 0.98 0.98 0.98 212

weighted avg 0.99 0.98 0.98 212

Accuracy (LDA): 0.9811320754716981

XGBoost Best Parameters

{'learning\_rate': 0.1, 'max\_depth': None, 'n\_estimators': 200, 'subsample': 0.5}

Best Hyperparameters (XGBoost): {'learning\_rate': 0.1, 'max\_depth': None, 'n\_estimators': 200, 'subsample': 0.5}

Classification Report (XGBoost)

precision recall f1-score support

0 0.92 1.00 0.96 12

1 1.00 1.00 1.00 12

2 1.00 1.00 1.00 8

3 1.00 0.92 0.96 12

4 1.00 1.00 1.00 14

5 1.00 1.00 1.00 11

6 0.89 1.00 0.94 8

7 1.00 1.00 1.00 6

8 1.00 1.00 1.00 13

9 1.00 0.91 0.95 11

10 1.00 1.00 1.00 13

11 1.00 1.00 1.00 9

12 1.00 1.00 1.00 8

13 1.00 1.00 1.00 14

14 1.00 1.00 1.00 7

15 1.00 0.91 0.95 11

16 0.85 1.00 0.92 11

17 0.92 0.86 0.89 14

18 1.00 1.00 1.00 9

19 1.00 1.00 1.00 9

accuracy 0.98 212

macro avg 0.98 0.98 0.98 212

weighted avg 0.98 0.98 0.98 212

Accuracy (XGBoost): 0.9764150943396226