Training data: Testing data=0.8:0.2 based on stratify.

Hyperparameters are searched by GridSearchCV, cv=5.

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| --- | --- | --- | --- |
| **No.** | **Estimator** | **Hyperparameter** | **Score(train/test)** |
| 1 | Ridge Classifier | 'clf\_\_alpha': 1e-08, 'pca\_\_n\_components': 27 | 0.98/0.98 |
| 2 | Logistic Regression | 'pca\_\_n\_components': 27, 'clf\_\_solver': 'liblinear', 'clf\_\_penalty': ‘l1’, 'clf\_\_C': 3, 'clf\_\_intercept\_scaling': 10(This result may be varied because of RandomizedSearchCV | 0.98/1.00 |
| 3 | LDA | 'clf\_\_solver': 'svd', 'pca\_\_n\_components': 28 | 0.96/0.98 |
| 4 | QDA | 'clf\_\_reg\_param': 0, 'pca\_\_n\_components': 29 | 0.97/0.98 |
| 5 | KNN | 'clf\_\_leaf\_size': 1, 'clf\_\_metric': 'euclidean', 'clf\_\_n\_neighbors': 10, 'clf\_\_weights': 'uniform', 'pca\_\_n\_components': 6 | 0.93/0.98 |
| 6 | Decision Tree | 'criterion': 'entropy', 'max\_features': 26, 'min\_samples\_leaf': 2, 'splitter': 'random' | 0.98/0.93 |
| 7 | Decision Tree(ccp) | 'ccp\_alpha': 0.0, 'criterion': gini, 'splitter': 'best' | 1.00/0.96 |
| 8 | Bagging | 'base\_estimator':RidgeClassifier(alpha=1e-05,class\_weight='balanced',random\_state=40), 'bootstrap\_features':True,'max\_features':0.7,'max\_samples': 0.7, 'n\_estimators': 40 | 0.97/0.99 |
| 9 | Random Forrest | 'max\_features': 'sqrt', 'max\_samples': 0.8, 'n\_estimators': 50 | 1.00/0.99 |
| 10 | gbdt | 'learning\_rate': 0.3, 'max\_depth': 1, 'n\_estimators': 160 | 1.00/0.98 |
| 11 | Stacking | estimators=[('knn',KNeighborsClassifier(n\_neighbors=7,weights='distance',leaf\_size=1, metric='manhattan')),('ridge',RidgeClassifier(random\_state=40,class\_weight='balanced',alpha=0.00001)),],  final\_estimator=LogisticRegression(random\_state=40,class\_weight='balanced',max\_iter=10000) | 1.00/0.99 |
| 12 | SVM | 'C': 0.3, 'kernel': 'linear' | 0.96/0.98 |
| 13 | Gussian Naïve Bayes | N/A | 0.94/0.96 |
| 14 | LightGBM\_gbdt | 'boosting\_type': 'gbdt', 'n\_estimators': 100, 'num\_leaves': 3 | 1.00/1.00 |
| 15 | LightGBM\_rf | 'bagging\_fraction': 0.5, 'bagging\_freq': 1, 'boosting': 'rf', 'class\_weight': 'balanced', 'feature\_fraction': 0.3, 'n\_estimators': 250, 'num\_leaves': 6, 'random\_state': 40, 'verbose': -1 | 0.96/0.96 |
| 16 | Thundersvm | 'clf\_\_C': 0.01, 'clf\_\_kernel': 'linear', 'pca\_\_n\_components': 27 | 0.96/0.98 |