训练样本数是------>107

测试样本数是------>40

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*SVM（支持向量机）\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

SVM模型为：

SVC(C=1.0, cache\_size=200, class\_weight=None, coef0=0.0,

decision\_function\_shape='ovr', degree=3, gamma='auto', kernel='rbf',

max\_iter=-1, probability=False, random\_state=None, shrinking=True,

tol=0.001, verbose=False)

precision recall f1-score support

0 0.78 0.97 0.86 29

1 0.75 0.27 0.40 11

avg / total 0.77 0.78 0.73 40

[[28 1]

[ 8 3]]

<function matrix\_rank at 0x0000000004A9EAE8>

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*SVMCV\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Fitting 3 folds for each of 14 candidates, totalling 42 fits

[Parallel(n\_jobs=1)]: Done 42 out of 42 | elapsed: 0.1s finished

SVMCV模型参数信息为：

C 1000

cache\_size 200

class\_weight None

coef0 0.0

decision\_function\_shape ovr

degree 3

gamma 0.0001

kernel rbf

max\_iter -1

probability True

random\_state None

shrinking True

tol 0.001

verbose False

SVMCV模型为：

SVC(C=1000, cache\_size=200, class\_weight=None, coef0=0.0,

decision\_function\_shape='ovr', degree=3, gamma=0.0001, kernel='rbf',

max\_iter=-1, probability=True, random\_state=None, shrinking=True,

tol=0.001, verbose=False)

--------------------------SVMCV 测试准确度为-------------------------------------------

[1 1 0 0 1 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0

0 0 0]

precision recall f1-score support

0 0.88 0.97 0.92 29

1 0.88 0.64 0.74 11

avg / total 0.88 0.88 0.87 40

[[28 1]

[ 4 7]]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*GBDT\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

GBDT模型为：

GradientBoostingClassifier(criterion='friedman\_mse', init=None,

learning\_rate=0.1, loss='deviance', max\_depth=3,

max\_features=None, max\_leaf\_nodes=None,

min\_impurity\_decrease=0.0, min\_impurity\_split=None,

min\_samples\_leaf=1, min\_samples\_split=2,

min\_weight\_fraction\_leaf=0.0, n\_estimators=200,

presort='auto', random\_state=None, subsample=1.0, verbose=0,

warm\_start=False)

--------------------------GBDT 测试准确度为-------------------------------------------

[1 1 0 1 1 0 0 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0

0 0 0]

precision recall f1-score support

0 0.90 0.93 0.92 29

1 0.80 0.73 0.76 11

avg / total 0.87 0.88 0.87 40

[[27 2]

[ 3 8]]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*RF\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RF模型为：

RandomForestClassifier(bootstrap=True, class\_weight=None, criterion='gini',

max\_depth=None, max\_features='auto', max\_leaf\_nodes=None,

min\_impurity\_decrease=0.0, min\_impurity\_split=None,

min\_samples\_leaf=1, min\_samples\_split=2,

min\_weight\_fraction\_leaf=0.0, n\_estimators=8, n\_jobs=1,

oob\_score=False, random\_state=None, verbose=0,

warm\_start=False)

--------------------------RF测试准确度为-------------------------------------------

[1 1 0 1 1 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0

0 0 0]

precision recall f1-score support

0 0.90 0.97 0.93 29

1 0.89 0.73 0.80 11

avg / total 0.90 0.90 0.90 40

[[28 1]

[ 3 8]]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*朴素贝叶斯\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NB模型为：

GaussianNB(priors=None)

------------------------------------------朴素贝叶斯测试准确度为-------------------------------------------

[1 1 0 1 1 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0

0 0 0]

precision recall f1-score support

0 0.90 0.93 0.92 29

1 0.80 0.73 0.76 11

avg / total 0.87 0.88 0.87 40

[[27 2]

[ 3 8]]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*KNN\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

KNN模型为：

KNeighborsClassifier(algorithm='auto', leaf\_size=30, metric='minkowski',

metric\_params=None, n\_jobs=1, n\_neighbors=5, p=2,

weights='uniform')

--------------------------KNN 测试准确度为-------------------------------------------

[1 1 0 0 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0

0 0 0]

precision recall f1-score support

0 0.82 0.97 0.89 29

1 0.83 0.45 0.59 11

avg / total 0.83 0.82 0.81 40

[[28 1]

[ 6 5]]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*决策树,分类和回归树（CART）\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CART模型为：

DecisionTreeClassifier(class\_weight=None, criterion='gini', max\_depth=None,

max\_features=None, max\_leaf\_nodes=None,

min\_impurity\_decrease=0.0, min\_impurity\_split=None,

min\_samples\_leaf=1, min\_samples\_split=2,

min\_weight\_fraction\_leaf=0.0, presort=False, random\_state=None,

splitter='best')

-------------------------------------------决策树,分类和回归树（CART）----------------------------------

[1 1 0 1 1 0 0 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0

0 0 0]

precision recall f1-score support

0 0.90 0.93 0.92 29

1 0.80 0.73 0.76 11

avg / total 0.87 0.88 0.87 40

[[27 2]

[ 3 8]]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*特征重要性为\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[0.64927778 0. 0. 0. 0.14834437 0.

0.08146591 0.12091194]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*逻辑回归\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

LR模型为：

LogisticRegression(C=1.0, class\_weight=None, dual=False, fit\_intercept=True,

intercept\_scaling=1, max\_iter=100, multi\_class='ovr', n\_jobs=1,

penalty='l2', random\_state=None, solver='liblinear', tol=0.0001,

verbose=0, warm\_start=False)

[1 1 0 1 1 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0

0 0 0]

precision recall f1-score support

0 0.90 0.97 0.93 29

1 0.89 0.73 0.80 11

avg / total 0.90 0.90 0.90 40

[[28 1]

[ 3 8]]

{'C': 1.0, 'class\_weight': None, 'dual': False, 'fit\_intercept': True, 'intercept\_scaling': 1, 'max\_iter': 100, 'multi\_class': 'ovr', 'n\_jobs': 1, 'penalty': 'l2', 'random\_state': None, 'solver': 'liblinear', 'tol': 0.0001, 'verbose': 0, 'warm\_start': False}

[[ 0.49964456 -0.12156225 -1.36823956 0.392815 -0.03118308 -0.03231093

0.03051106 -0.97854186]]

[-0.44373783]