

In [1]:

```
import os, sys, time
import numpy as np
from sklearn.metrics import accuracy_score
from sklearn.metrics import f1_score
from sklearn.metrics import recall_score
from sklearn.metrics import precision_score
from sklearn.metrics import confusion_matrix
from sklearn.metrics import f1_score
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import mean_squared_error

from sklearn import datasets
from sklearn.model_selection import train_test_split
```

In [2]:

```

# KNN
from sklearn.neighbors import KNeighborsClassifier

# let's try to use pandas' fast csv reader
try:
    import pandas
    readcsv = lambda f, c, t=np.float64: pandas.read_csv(f, usecols=c, delimiter=',', header=None,
except:
    # fall back to numpy loadtxt
    readcsv = lambda f, c, t=np.float64: np.loadtxt(f, usecols=c, delimiter=',', ndmin=2)

start = time.clock() # 开始计时

# Input data set parameters
train_file = os.path.join('data', 'k_nearest_neighbors_train.csv')
predict_file = os.path.join('data', 'k_nearest_neighbors_test.csv')

# Read data. Let's use 5 features per observation
nFeatures = 5
nClasses = 5
train_data = readcsv(train_file, range(nFeatures))
train_labels = readcsv(train_file, range(nFeatures, nFeatures+1))
predict_data = readcsv(predict_file, range(nFeatures))
predict_labels = readcsv(predict_file, range(nFeatures, nFeatures+1))

knn = KNeighborsClassifier()#得到分类器

knn.fit(train_data, train_labels)#训练模型

predictedLabel = knn.predict(predict_data) # 进行预测
end=time.clock() #结束计时
print("time", end-start)

print("accuracy_score", accuracy_score(predict_labels, predictedLabel))
print("precision_score", precision_score(predict_labels, predictedLabel, average="macro"))
print("recall_score", recall_score(predict_labels, predictedLabel, average="micro"))
print("f1_score", f1_score(predict_labels, predictedLabel, average="micro"))
print("confusion_matrix\n", confusion_matrix(predict_labels, predictedLabel))
"""
micro算法是指把所有的类放在一起算，具体到precision，就是把所有类的TP加和，再除以所有类的TP和FN的加和
因此micro方法下的precision和recall都等于accuracy
"""

```

```

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:12: DeprecationWarning: time.clock has been deprecated in Python 3.3 and will be removed from Python 3.8: use time.perf_counter or time.process_time instead
  if sys.path[0] == '':
f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:28: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples, ), for example using ravel().
f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:31: DeprecationWarning: time.clock has been deprecated in Python 3.3 and will be removed from Python 3.8: use time.perf_counter or time.process_time instead

```

```
time 0.40486999999999895  
accuracy_score 0.9655
```

In [3]:

```

# 支持向量机
from sklearn.svm import SVC

# let's try to use pandas' fast csv reader
try:
    import pandas
    readcsv = lambda f, c, t=np.float64: pandas.read_csv(f, usecols=c, delimiter=',', header=None,
except:
    # fall back to numpy loadtxt
    readcsv = lambda f, c, t=np.float64: np.loadtxt(f, usecols=c, delimiter=',', ndmin=2)

start = time.clock() # 开始计时
# input data file
infile = "./data/svm_two_class_train_dense.csv"
testfile = "./data/svm_two_class_test_dense.csv"

data = readcsv(infile, range(20))
labels = readcsv(infile, range(20, 21))
pdata = readcsv(testfile, range(20))
plabels = readcsv(testfile, range(20, 21))

clf = SVC()
clf.fit(data, labels)
predictedLabel = clf.predict(pdata)

end=time.clock() #结束计时
print("time", end-start)

print("accuracy_score", accuracy_score(plabels, predictedLabel))
print("precision_score", precision_score(plabels, predictedLabel, average="macro"))
print("recall_score", recall_score(plabels, predictedLabel, average="macro"))
print("f1_score", f1_score(plabels, predictedLabel, average="macro"))
print("confusion_matrix\n", confusion_matrix(plabels, predictedLabel))

```

```

time 0.14200089999999932
accuracy_score 0.986
precision_score 0.9864077669902913
recall_score 0.9859719438877755
f1_score 0.985996415082261
confusion_matrix
[[1002   0]
 [  28 970]]

```

```

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:12: Deprecatio
nWarning: time.clock has been deprecated in Python 3.3 and will be removed from Pyt
hon 3.8: use time.perf_counter or time.process_time instead
  if sys.path[0] == '':
f:\pearl\anaconda3\envs\daal\lib\site-packages\sklearn\utils\validation.py:73: Data
ConversionWarning: A column-vector y was passed when a 1d array was expected. Pleas
e change the shape of y to (n_samples, ), for example using ravel().
  return f(**kwargs)
f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:26: Deprecatio
nWarning: time.clock has been deprecated in Python 3.3 and will be removed from Pyt
hon 3.8: use time.perf_counter or time.process_time instead

```

In [4]:

```

# 朴素贝叶斯
from sklearn.naive_bayes import GaussianNB

# let's try to use pandas' fast csv reader
try:
    import pandas
    read_csv = lambda f, c, t=np.float64: pandas.read_csv(f, usecols=c, delimiter=',', header=None)
except:
    # fall back to numpy loadtxt
    read_csv = lambda f, c, t=np.float64: np.loadtxt(f, usecols=c, delimiter=',', ndmin=2)

start = time.clock() # 开始计时

# input data file
infile = "./data/naivebayes_train_dense.csv"
testfile = "./data/naivebayes_test_dense.csv"
data = readcsv(infile, range(20))
labels = readcsv(infile, range(20, 21))
pdata = readcsv(testfile, range(20))
plabels = readcsv(testfile, range(20, 21))

gnb = GaussianNB()
predictedLabel = gnb.fit(data, labels).predict(pdata)

end=time.clock() #结束计时
print("time", end-start)

print("accuracy_score", accuracy_score(plabels, predictedLabel))
print("precision_score", precision_score(plabels, predictedLabel, average="macro"))
print("recall_score", recall_score(plabels, predictedLabel, average="macro"))
print("f1_score", f1_score(plabels, predictedLabel, average="macro"))
print("confusion_matrix\n", confusion_matrix(plabels, predictedLabel))

```

```

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:12: Deprecatio
nWarning: time.clock has been deprecated in Python 3.3 and will be removed from Pyt
hon 3.8: use time.perf_counter or time.process_time instead
    if sys.path[0] == '':

```

```

time 0.22989250000000006
accuracy_score 1.0
precision_score 1.0
recall_score 1.0
f1_score 1.0
confusion_matrix
[[ 83  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
   0  0]
 [ 0 90  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
   0  0]
 [ 0  0 104  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
   0  0]
 [ 0  0  0 91  0  0  0  0  0  0  0  0  0  0  0  0  0  0
   0  0]
 [ 0  0  0  0 95  0  0  0  0  0  0  0  0  0  0  0  0  0
   0  0]
 [ 0  0  0  0  0 93  0  0  0  0  0  0  0  0  0  0  0  0
   0  0]
 [ 0  0  0  0  0  0 97  0  0  0  0  0  0  0  0  0  0  0
   0  0]

```

```

[ 0 0]
[ 0 0 0 0 0 0 0 106 0 0 0 0 0 0 0 0 0 0]
[ 0 0 0 0 0 0 0 0 92 0 0 0 0 0 0 0 0 0]
[ 0 0 0 0 0 0 0 0 0 105 0 0 0 0 0 0 0 0]
[ 0 0 0 0 0 0 0 0 0 0 107 0 0 0 0 0 0 0]
[ 0 0 0 0 0 0 0 0 0 0 0 98 0 0 0 0 0 0]
[ 0 0 0 0 0 0 0 0 0 0 0 0 115 0 0 0 0 0]
[ 0 0 0 0 0 0 0 0 0 0 0 0 0 103 0 0 0 0]
[ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 109 0 0 0]
[ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 109 0 0]
[ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 106 0]
[ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 97]
[ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
101 0]
[ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
0 99]]

```

f:\pearl\anaconda3\envs\daal\lib\site-packages\sklearn\utils\validation.py:73: Data ConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().

return f(**kwargs)

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:25: DeprecationWarning: time.clock has been deprecated in Python 3.3 and will be removed from Python 3.8: use time.perf_counter or time.process_time instead

In [5]:

```

# adaboost
from sklearn.ensemble import AdaBoostClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.datasets import make_gaussian_quantiles

# let's try to use pandas' fast csv reader
try:
    import pandas
    read_csv = lambda f, c, t=np.float64: pandas.read_csv(f, usecols=c, delimiter=',', header=None)
except:
    # fall back to numpy loadtxt
    read_csv = lambda f, c, t=np.float64: np.loadtxt(f, usecols=c, delimiter=',', ndmin=2)

start = time.clock() # 开始计时

infile = "./data/adaboost_train.csv"
testfile = "./data/adaboost_test.csv"

# Read data. Let's have 20 independent, and 1 dependent variable (for each observation)
indep_data = readcsv(infile, range(20))
dep_data = readcsv(infile, range(20,21))
pdata = readcsv(testfile, range(20))
predict_labels = np.loadtxt(testfile, usecols=range(20,21), delimiter=',', ndmin=2)

bdt = AdaBoostClassifier(DecisionTreeClassifier(max_depth=2, min_samples_split=20, min_samples_leaf=
                                algorithm="SAMME",
                                n_estimators=200, learning_rate=0.8)
bdt.fit(indep_data, dep_data)
predictedLabel = bdt.predict(pdata)

end=time.clock() #结束计时
print("time", end-start)

print("accuracy_score", accuracy_score(predict_labels, predictedLabel))
print("precision_score", precision_score(predict_labels, predictedLabel))
print("recall_score", recall_score(predict_labels, predictedLabel))
print("f1_score", f1_score(predict_labels, predictedLabel))
print("confusion_matrix\n", confusion_matrix(predict_labels, predictedLabel))

```

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:14: DeprecationWarning: time.clock has been deprecated in Python 3.3 and will be removed from Python 3.8: use time.perf_counter or time.process_time instead

f:\pearl\anaconda3\envs\daal\lib\site-packages\sklearn\utils\validation.py:73: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().

```

    return f(**kwargs)

```

```

time 0.22888370000000008
accuracy_score 1.0
precision_score 1.0
recall_score 1.0
f1_score 1.0
confusion_matrix
[[1599   0]
 [   0 4011]]

```

```
f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:31: Deprecatio
nWarning: time.clock has been deprecated in Python 3.3 and will be removed from Pyt
hon 3.8: use time.perf_counter or time.process_time instead
```


In [6]:

```

# 随机森林
from sklearn.ensemble import RandomForestClassifier
from sklearn.datasets import make_classification
# let's try to use pandas' fast csv reader
try:
    import pandas
    read_csv = lambda f, c, t=np.float64: pandas.read_csv(f, usecols=c, delimiter=',', header=None)
except:
    # fall back to numpy loadtxt
    read_csv = lambda f, c, t=np.float64: np.loadtxt(f, usecols=c, delimiter=',', ndmin=2, dtype=t)

# Get Intel(R) Data Analytics Acceleration Library (Intel(R) DAAL) version

start = time.clock() # 开始计时

# input data file
infile = "./data/df_classification_train.csv"
testfile = "./data/df_classification_test.csv"
# Read data. Let's use 3 features per observation
data = readcsv(infile, range(3), t=np.float32)
labels = readcsv(infile, range(3,4), t=np.float32)
pdata = readcsv(testfile, range(3), t=np.float32)
plabels = readcsv(testfile, range(3,4), t=np.float32)

clf = RandomForestClassifier(max_depth=3, random_state=0)
clf.fit(data, labels)
predictedLabel = clf.predict(pdata)

end=time.clock() #结束计时
print("time", end-start)

print("accuracy_score", accuracy_score(plabels, predictedLabel))
print("precision_score", precision_score(plabels, predictedLabel, average="macro"))
print("recall_score", recall_score(plabels, predictedLabel, average="macro"))
print("f1_score", f1_score(plabels, predictedLabel, average="macro"))
print("confusion_matrix\n", confusion_matrix(plabels, predictedLabel))

```

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:14: DeprecationWarning: time.clock has been deprecated in Python 3.3 and will be removed from Python 3.8: use time.perf_counter or time.process_time instead

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:26: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().

```

time 4.819738899999999
accuracy_score 0.363
precision_score 0.17200956937799045
recall_score 0.24420454545454545
f1_score 0.16618381618381614
confusion_matrix
[[ 0  0 163  0  0]
 [ 0  0 160  0  0]
 [ 0  0 318  2  0]
 [ 0  0 153 45  0]
 [ 0  0 118 41  0]]

```

```
f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:29: Deprecatio
nWarning: time.clock has been deprecated in Python 3.3 and will be removed from Pyt
hon 3.8: use time.perf_counter or time.process_time instead
f:\pearl\anaconda3\envs\daal\lib\site-packages\sklearn\metrics\_classification.py:1
221: UndefinedMetricWarning: Precision is ill-defined and being set to 0.0 in label
s with no predicted samples. Use `zero_division` parameter to control this behavio
r.
    _warn_prf(average, modifier, msg_start, len(result))
```

In [7]:

```
# EM算法
from sklearn.mixture import GaussianMixture
start = time.clock() # 开始计时

#鸢尾花数据集
X, y = datasets.load_iris(return_X_y=True)
#X_train, X_test, y_train, y_test = train_test_split(X, y, stratify=y, test_size=0.7, random_state=4

gmm = GaussianMixture(n_components=3)

predictedLabel = gmm.fit_predict(X)
end=time.clock() #结束计时
print("time", end-start)

print("accuracy_score", accuracy_score(y, predictedLabel))
print("precision_score", precision_score(y, predictedLabel, average="macro"))
print("recall_score", recall_score(y, predictedLabel, average="macro"))
print("f1_score", f1_score(y, predictedLabel, average="macro"))
print("confusion_matrix\n", confusion_matrix(y, predictedLabel))
```

```
time 0.013235599999999792
accuracy_score 0.36666666666666664
precision_score 0.3636363636363636
recall_score 0.36666666666666667
f1_score 0.3650793650793651
confusion_matrix
[[50  0  0]
 [ 0  5 45]
 [ 0 50  0]]
```

```
f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:3: Deprecation
Warning: time.clock has been deprecated in Python 3.3 and will be removed from Pyth
on 3.8: use time.perf_counter or time.process_time instead
This is separate from the ipykernel package so we can avoid doing imports until
f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:12: Deprecatio
nWarning: time.clock has been deprecated in Python 3.3 and will be removed from Pyt
hon 3.8: use time.perf_counter or time.process_time instead
    if sys.path[0] == '':
```

In [8]:

#随机森林 回归

```

from sklearn.ensemble import RandomForestRegressor
from sklearn.datasets import make_regression

# let's try to use pandas' fast csv reader
try:
    import pandas
    read_csv = lambda f, c, t=np.float64: pandas.read_csv(f, usecols=c, delimiter=',', header=None)
except:
    # fall back to numpy loadtxt
    read_csv = lambda f, c, t=np.float64: np.loadtxt(f, usecols=c, delimiter=',', ndmin=2, dtype=n

start = time.clock() # 开始计时
infile = "./data/df_regression_train.csv"
testfile = "./data/df_regression_test.csv"
# Read data. Let's have 13 independent, and 1 dependent variables (for each observation)
indep_data = readcsv(infile, range(13), t=np.float32)
dep_data = readcsv(infile, range(13,14), t=np.float32)
pdata = readcsv(testfile, range(13), t=np.float32)
pdata = readcsv(testfile, range(13,14), t=np.float32)

regr = RandomForestRegressor(n_estimators=100, random_state=0)
regr.fit(indep_data, dep_data)
predict_result = regr.predict(pdata)

end=time.clock() #结束计时
print("time", end-start)

print("MAE", mean_absolute_error(pdata, predict_result))
print("MSE", mean_squared_error(pdata, predict_result))

```

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:15: DeprecationWarning: time.clock has been deprecated in Python 3.3 and will be removed from Python 3.8: use time.perf_counter or time.process_time instead

```
from ipykernel import kernelapp as app
```

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:25: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().

time 0.2722697000000007

MAE 2.511535433070865

MSE 12.542506133858259

f:\pearl\anaconda3\envs\daal\lib\site-packages\ipykernel_launcher.py:28: DeprecationWarning: time.clock has been deprecated in Python 3.3 and will be removed from Python 3.8: use time.perf_counter or time.process_time instead

In []:

In []: