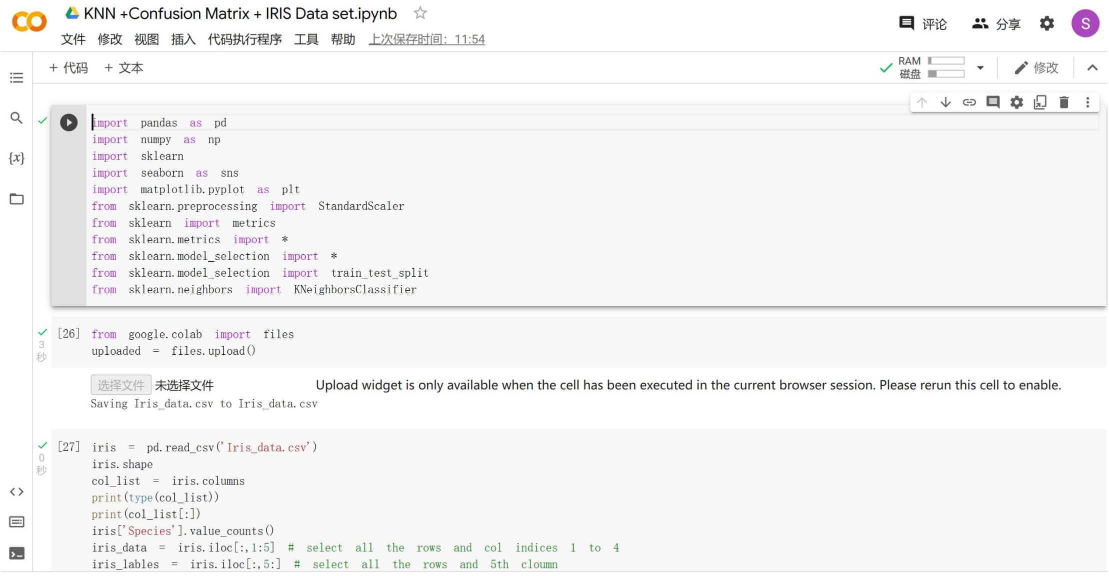
KNN +Confusion Matrix + IRIS Data set.ipynb
文件 修改 视图 插入 代码执行程序 工具 帮助 上次保存时间：11:54
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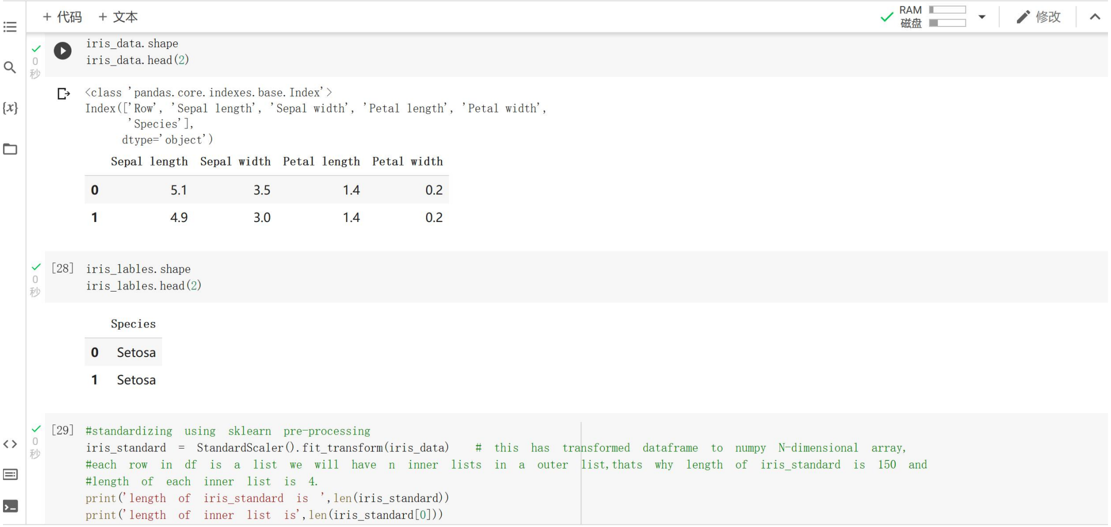
```
import pandas as pd
import numpy as np
import sklearn
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.preprocessing import StandardScaler
from sklearn import metrics
from sklearn.metrics import *
from sklearn.model_selection import *
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
```

```
[26] from google.colab import files
     uploaded = files.upload()
```

选择文件 未选择文件 Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
Saving Iris_data.csv to Iris_data.csv
```

```
[27] iris = pd.read_csv('Iris_data.csv')
     iris.shape
     col_list = iris.columns
     print(type(col_list))
     print(col_list[:])
     iris['Species'].value_counts()
     iris_data = iris.iloc[:,1:5] # select all the rows and col indices 1 to 4
     iris_lables = iris.iloc[:,5:] # select all the rows and 5th cloumn
```



```
iris_data.shape
iris_data.head(2)
```

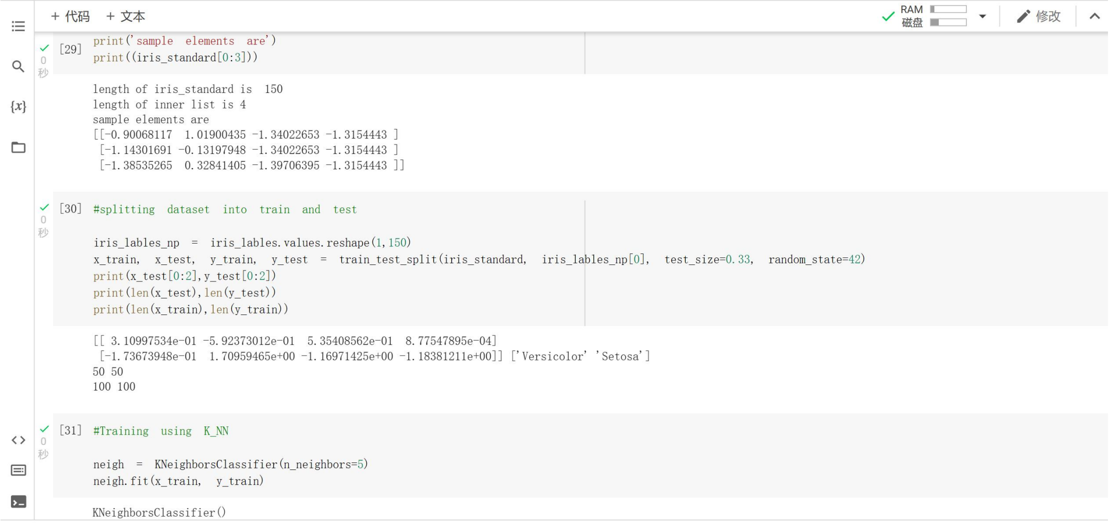
```
<class 'pandas.core.indexes.base.Index'>
Index(['Row', 'Sepal length', 'Sepal width', 'Petal length', 'Petal width',
       'Species'],
      dtype='object')
```

	Sepal length	Sepal width	Petal length	Petal width
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2

```
[28] iris_lables.shape
     iris_lables.head(2)
```

	Species
0	Setosa
1	Setosa

```
[29] #standardizing using sklearn pre-processing
     iris_standard = StandardScaler().fit_transform(iris_data)  # this has transformed dataframe to numpy N-dimensional array,
     #each row in df is a list we will have n inner lists in a outer list,thats why length of iris_standard is 150 and
     #length of each inner list is 4.
     print('length of iris_standard is ',len(iris_standard))
     print('length of inner list is',len(iris_standard[0]))
```



```
[29] print('sample elements are')
     print((iris_standard[0:3]))
```

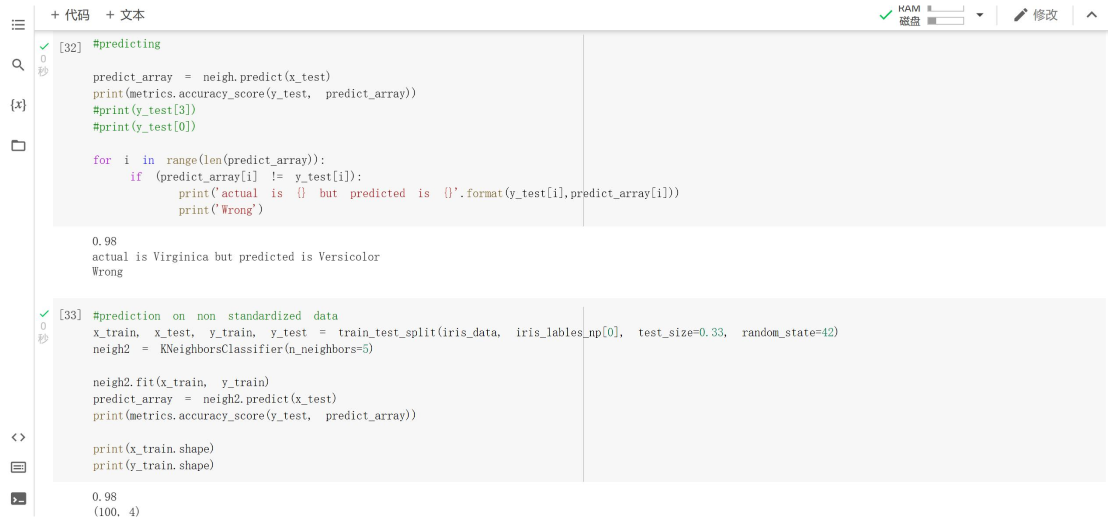
```
length of iris_standard is  150
length of inner list is 4
sample elements are
[[-0.90068117  1.01900435 -1.34022653 -1.3154443 ]
 [-1.14301691 -0.13197948 -1.34022653 -1.3154443 ]
 [-1.38535265  0.32841405 -1.39706395 -1.3154443 ]]
```

```
[30] #splitting dataset into train and test

     iris_lables_np = iris_lables.values.reshape(1,150)
     x_train, x_test, y_train, y_test = train_test_split(iris_standard, iris_lables_np[0], test_size=0.33, random_state=42)
     print(x_test[0:2],y_test[0:2])
     print(len(x_test),len(y_test))
     print(len(x_train),len(y_train))
```

```
[[ 3.10997534e-01 -5.92373012e-01  5.35408562e-01  8.77547895e-04]
 [-1.73673948e-01  1.70959465e+00 -1.16971425e+00 -1.18381211e+00]] ['Versicolor' 'Setosa']
50 50
100 100
```

```
[31] #Training using K_NN

     neigh = KNeighborsClassifier(n_neighbors=5)
     neigh.fit(x_train, y_train)
```

```
KNeighborsClassifier()
```

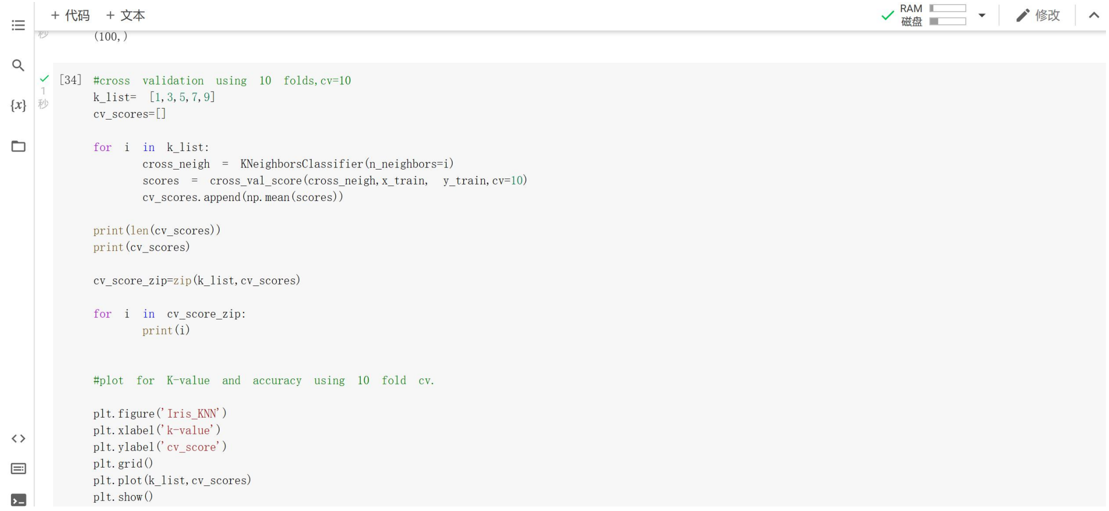


[32]
```
#predicting

predict_array = neigh.predict(x_test)
print(metrics.accuracy_score(y_test, predict_array))
#print(y_test[3])
#print(y_test[0])

for i in range(len(predict_array)):
     if (predict_array[i] != y_test[i]):
          print('actual is {} but predicted is {}'.format(y_test[i],predict_array[i]))
          print('Wrong')
```

```
0.98
actual is Virginica but predicted is Versicolor
Wrong
```

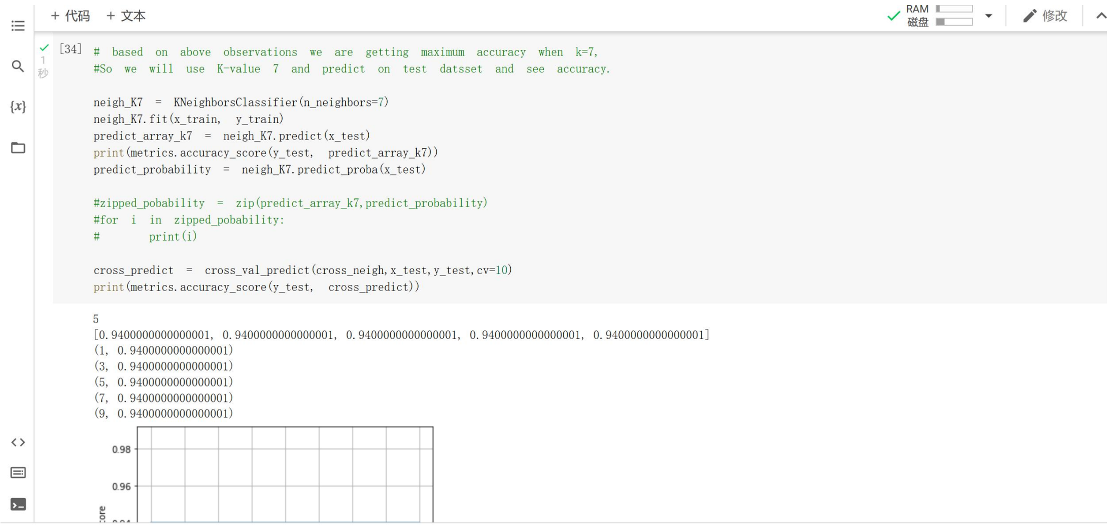
[33]
```
#prediction on non standardized data
x_train, x_test, y_train, y_test = train_test_split(iris_data, iris_lables_np[0], test_size=0.33, random_state=42)
neigh2 = KNeighborsClassifier(n_neighbors=5)

neigh2.fit(x_train, y_train)
predict_array = neigh2.predict(x_test)
print(metrics.accuracy_score(y_test, predict_array))

print(x_train.shape)
print(y_train.shape)
```

```
0.98
(100, 4)
```



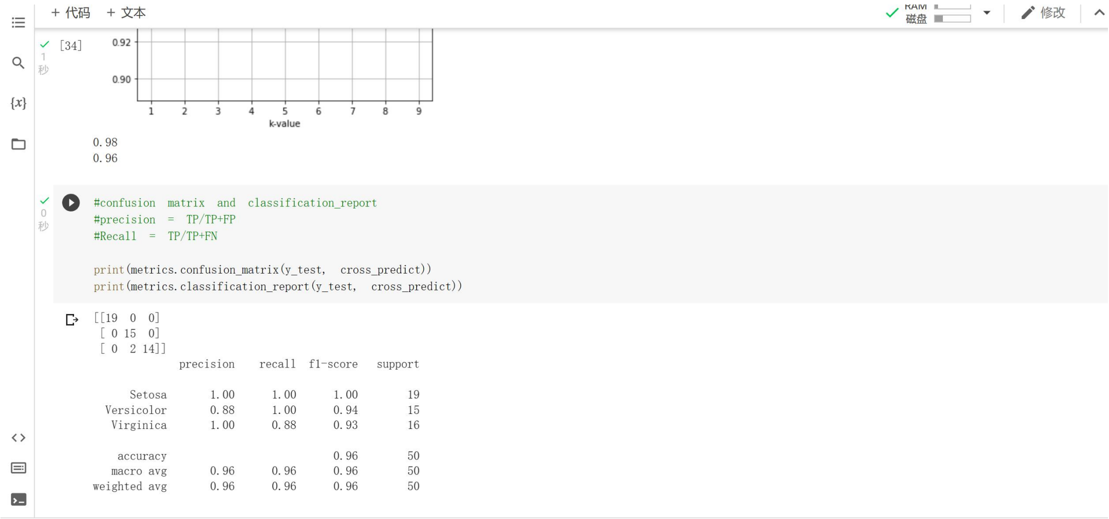
```
(100,)
```

[34]
```
#cross validation using 10 folds,cv=10
k_list= [1,3,5,7,9]
cv_scores=[]

for i in k_list:
        cross_neigh = KNeighborsClassifier(n_neighbors=i)
        scores = cross_val_score(cross_neigh,x_train, y_train,cv=10)
        cv_scores.append(np.mean(scores))

print(len(cv_scores))
print(cv_scores)

cv_score_zip=zip(k_list,cv_scores)

for i in cv_score_zip:
        print(i)


#plot for K-value and accuracy using 10 fold cv.

plt.figure('Iris_KNN')
plt.xlabel('k-value')
plt.ylabel('cv_score')
plt.grid()
plt.plot(k_list,cv_scores)
plt.show()
```



[34]
```
# based on above observations we are getting maximum accuracy when k=7,
#So we will use K-value 7 and predict on test datset and see accuracy.

neigh_K7 = KNeighborsClassifier(n_neighbors=7)
neigh_K7.fit(x_train, y_train)
predict_array_k7 = neigh_K7.predict(x_test)
print(metrics.accuracy_score(y_test, predict_array_k7))
predict_probability = neigh_K7.predict_proba(x_test)

#zipped_pobability = zip(predict_array_k7,predict_probability)
#for i in zipped_pobability:
#        print(i)

cross_predict = cross_val_predict(cross_neigh,x_test,y_test,cv=10)
print(metrics.accuracy_score(y_test, cross_predict))
```

```
5
[0.9400000000000001, 0.9400000000000001, 0.9400000000000001, 0.9400000000000001, 0.9400000000000001]
(1, 0.9400000000000001)
(3, 0.9400000000000001)
(5, 0.9400000000000001)
(7, 0.9400000000000001)
(9, 0.9400000000000001)
```



```
0.98
0.96
```

```
#confusion  matrix  and  classification_report
#precision  =  TP/TP+FP
#Recall  =  TP/TP+FN

print(metrics.confusion_matrix(y_test,  cross_predict))
print(metrics.classification_report(y_test,  cross_predict))
```

```
[[19  0  0]
 [ 0 15  0]
 [ 0  2 14]]
              precision    recall  f1-score   support

      Setosa       1.00      1.00      1.00        19
  Versicolor       0.88      1.00      0.94        15
   Virginica       1.00      0.88      0.93        16

    accuracy                           0.96        50
   macro avg       0.96      0.96      0.96        50
weighted avg       0.96      0.96      0.96        50
```