```
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
```

```
from google.colab import files
uploaded = files.upload()
import io
iris = pd.read_csv(io.BytesIO(uploaded['iris.data']), names=['sepal_length',
                           'sepal_width', 'petal_length', 'petal_width', 'species'])
# iris = pd.read_csv('C:\Users\14115\Desktop\iris.data')
iris.shape
col_list = iris.columns
print(type(col_list))
print(col_list[:])
iris['species'].value_counts()
iris_data = iris.iloc[:,0:4] # select all the rows and col indices 0 to 3
iris_lables = iris.iloc[:,4:] # select all trhe rows and 4th cloumn
iris_data.shape
iris_data.head(2)
```

选择文件 iris.data

- **iris.data**(n/a) - 4551 bytes, last modified: 2021/6/5 - 100% done

```
Saving iris.data to iris (5).data
<class 'pandas.core.indexes.base.Index'>
Index(['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

test

```
iris_lables.shape
iris_lables.head(2)
```

	species
0	Iris-setosa
1	Iris-setosa

```
#standardizing using sklearn pre-processing
iris_standard = StandardScaler().fit_transform(iris_data)  # this has transformed dataframe to nump
#each row in df is a list we will have n inner lists in a outer list,thats why length of iris_stand
#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]))
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  1.03205722 -1.3412724  -1.31297673]
 [-1.14301691 -0.1249576  -1.3412724  -1.31297673]
 [-1.38535265  0.33784833 -1.39813811 -1.31297673]]
```

```
#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=0.3
print(x_test[0:2],y_test[0:2])
print(len(x_test),len(y_test))
print(len(x_train),len(y_train))
```

```
[[ 0.31099753 -0.58776353  0.53529583  0.00175297]
 [-0.17367395  1.72626612 -1.17067529 -1.18150376]] ['Iris-versicolor' 'Iris-setosa']
50 50
100 100
```

```
#Training using K_NN

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

```
KNeighborsClassifier(algorithm='auto', leaf_size=30, metric='minkowski',
                     metric_params=None, n_jobs=None, n_neighbors=5, p=2,
                     weights='uniform')
```

```
#predicting

predict_array = neigh.predict(x_test)
print(metrics.accuracy_score(y_test, predict_array))
#print(predict_array[0])
#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 Iris-virginica but predicted is Iris-versicolor
Wrong
```

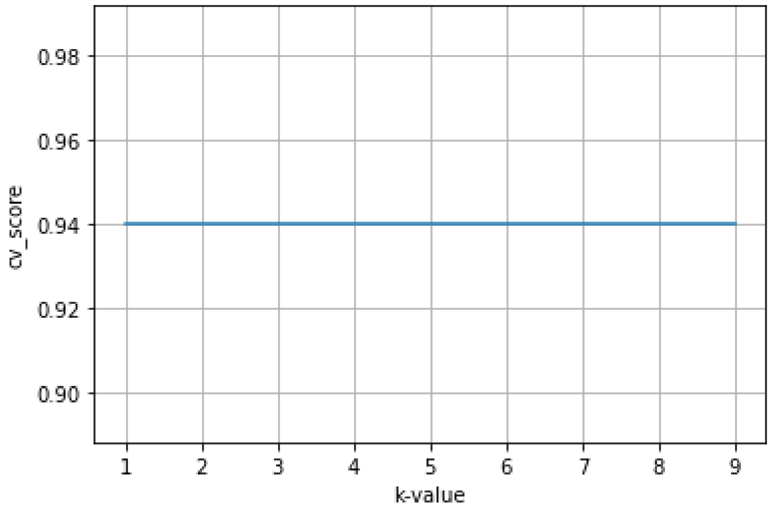
```
#prediction on non standardized data
x_train, x_test, y_train, y_test = train_test_split(iris_data, iris_lables_np[0], test_size=0.33, r
neigh2 = KNeighborsClassifier(n_neighbors=5)
neigh2.fit(x_train, y_train)
predict_array = neigh2.predict(x_test)
print(metrics.accuracy_score(y_test, predict_array))
```

```
0.98
```

```
#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()

# based on above observations we are getting maximum accuracy when k=7,
#So we will use K-value 7 and predict on test datsset 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, 0.940000000C
(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

    Iris-setosa       1.00      1.00      1.00        19
Iris-versicolor       0.88      1.00      0.94        15
 Iris-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
```

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