6

April 15, 2024

[1]:
```
import pandas as pd
import numpy as np
```

[4]:
```
pwd
```

[4]:
```
'C:\\Users\\Tej'
```

[5]:
```
cd E:\
```

```
E:\
```

[6]:
```
df=pd.read_csv("iris.csv")
df
```

[6]:

	sepallength	sepalwidth	petallength	petalwidth	class
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
..	…	…	…	…	…
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

[150 rows x 5 columns]

[7]:
```
df.dtypes
```

[7]:
```
sepallength    float64
sepalwidth     float64
petallength    float64
petalwidth     float64
class           object
dtype: object
```

[8]:
```
df['class']=df['class'].astype('category')
df.dtypes
```

[8]:
```
sepallength     float64
sepalwidth      float64
petallength     float64
petalwidth      float64
class          category
dtype: object
```

[9]:
```
df['class']=df['class'].cat.codes
df
```

[9]:

	sepallength	sepalwidth	petallength	petalwidth	class
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0
..	…	…	…	…	…
145	6.7	3.0	5.2	2.3	2
146	6.3	2.5	5.0	1.9	2
147	6.5	3.0	5.2	2.0	2
148	6.2	3.4	5.4	2.3	2
149	5.9	3.0	5.1	1.8	2

[150 rows x 5 columns]

[10]:
```
df.isnull().sum()
```

[10]:
```
sepallength    0
sepalwidth     0
petallength    0
petalwidth     0
class          0
dtype: int64
```

[11]:
```
(df <= 0).sum()
```

[11]:
```
sepallength     0
sepalwidth      0
petallength     0
petalwidth      0
class          50
dtype: int64
```

[12]:
```
print(df.shape)
```

```
(150, 5)
```

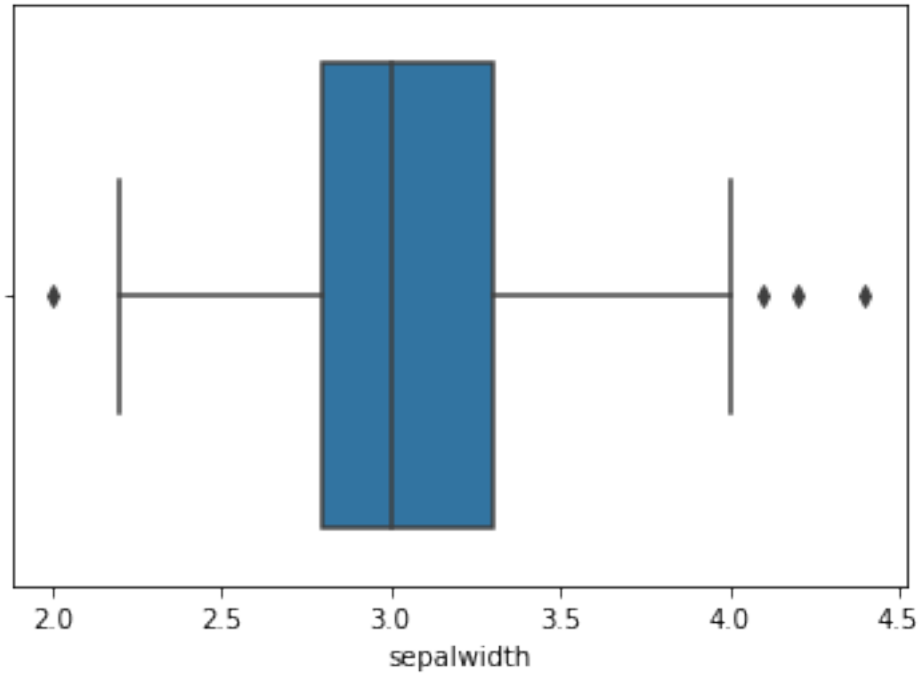
[13]:
```
# co-relation matrix
def DetectOutlier(df,var):
  Q1 = df[var].quantile(0.25)
  Q3 = df[var].quantile(0.75)
  IQR = Q3 - Q1
  high, low = Q3+1.5*IQR, Q1-1.5*IQR

  print("Highest allowed in variable:", var, high)
  print("lowest allowed in variable:", var, low)

  count = df[(df[var] > high) | (df[var] < low)][var].count()

  print('Total outliers in:',var,':',count)



DetectOutlier(df,'sepallength')

DetectOutlier(df,'sepalwidth')

DetectOutlier(df,'petallength')

DetectOutlier(df,'petalwidth')
```

```
Highest allowed in variable: sepallength 8.350000000000001
lowest allowed in variable: sepallength 3.1499999999999986
Total outliers in: sepallength : 0
Highest allowed in variable: sepalwidth 4.05
lowest allowed in variable: sepalwidth 2.05
Total outliers in: sepalwidth : 4
Highest allowed in variable: petallength 10.349999999999998
lowest allowed in variable: petallength -3.649999999999999
Total outliers in: petallength : 0
Highest allowed in variable: petalwidth 4.05
lowest allowed in variable: petalwidth -1.95
Total outliers in: petalwidth : 0
```

[15]:
```
import seaborn as sns
sns.boxplot(df['sepalwidth'])
```

```
C:\Users\Tej\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

[15]: <matplotlib.axes._subplots.AxesSubplot at 0x2c174523b20>



[16]:
```
def OutlierRemoval(df,var):
  Q1 = df[var].quantile(0.25)
  Q3 = df[var].quantile(0.75)
  IQR = Q3 - Q1
  high, low = Q3+1.5*IQR, Q1-1.5*IQR

  print("Highest allowed in variable:", var, high)
  print("lowest allowed in variable:", var, low)

  count = df[(df[var] > high) | (df[var] < low)][var].count()


  print('Total outliers in:',var,':',count)

  df = df[((df[var] >= low) & (df[var] <= high))]
  return df
```

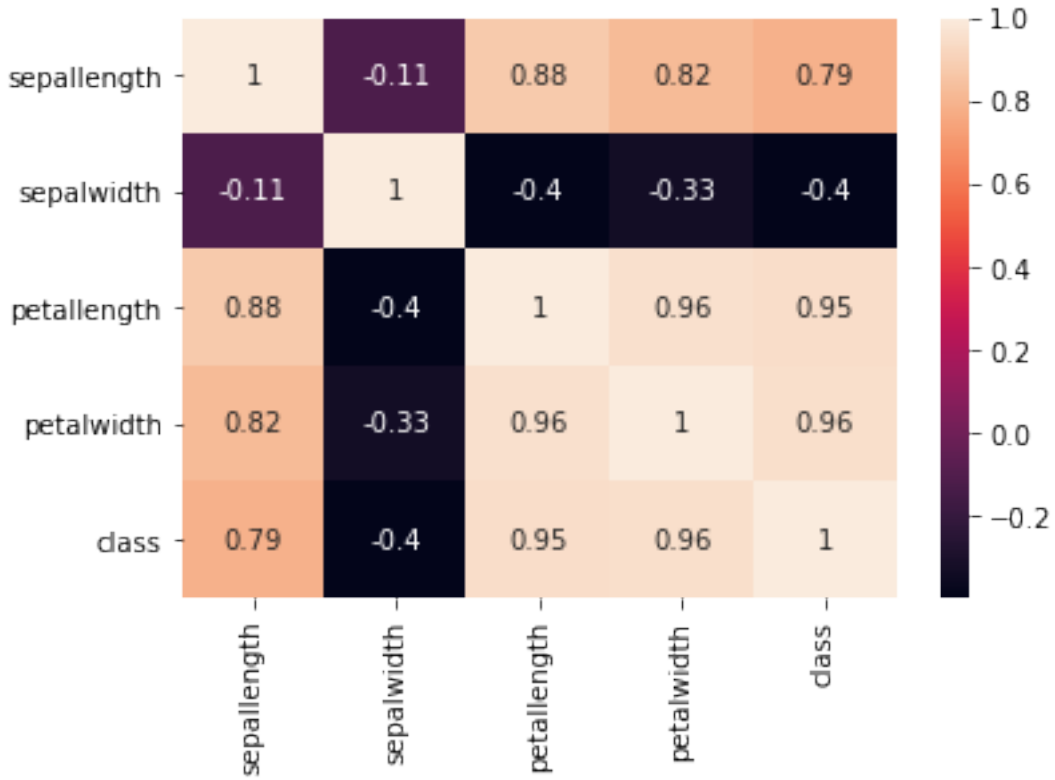
[17]:
```
print(df.shape)
df = OutlierRemoval(df,'sepalwidth')
print(df.shape)
```

```
(150, 5)
Highest allowed in variable: sepalwidth 4.05
```

```
lowest allowed in variable: sepalwidth 2.05
Total outliers in: sepalwidth : 4
(146, 5)
```

[18]:
```
import seaborn as sns
sns.heatmap(df.corr(),annot=True)
```

[18]: <matplotlib.axes._subplots.AxesSubplot at 0x2c1745762e0>



[19]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns
```

[20]:
```
# split the data into inputs and outputs
X = df.iloc[:, [0,2,3]].values
y = df.iloc[:, 4].values
```

[21]:
```
# training and testing data
from sklearn.model_selection import train_test_split

# assign test data size 25%
```

```
X_train, X_test, y_train, y_test =train_test_split(X,y,test_size= 0.25,␣
 ↪random_state=0)
```

[22]:
```
# importing standard scaler
from sklearn.preprocessing import StandardScaler

# scalling the input data
sc_X = StandardScaler()
X_train = sc_X.fit_transform(X_train)
X_test = sc_X.fit_transform(X_test)
```

[23]:
```
# importing standard scaler
from sklearn.preprocessing import StandardScaler

# scalling the input data
sc_X = StandardScaler()
X_train = sc_X.fit_transform(X_train)
X_test = sc_X.fit_transform(X_test)
```

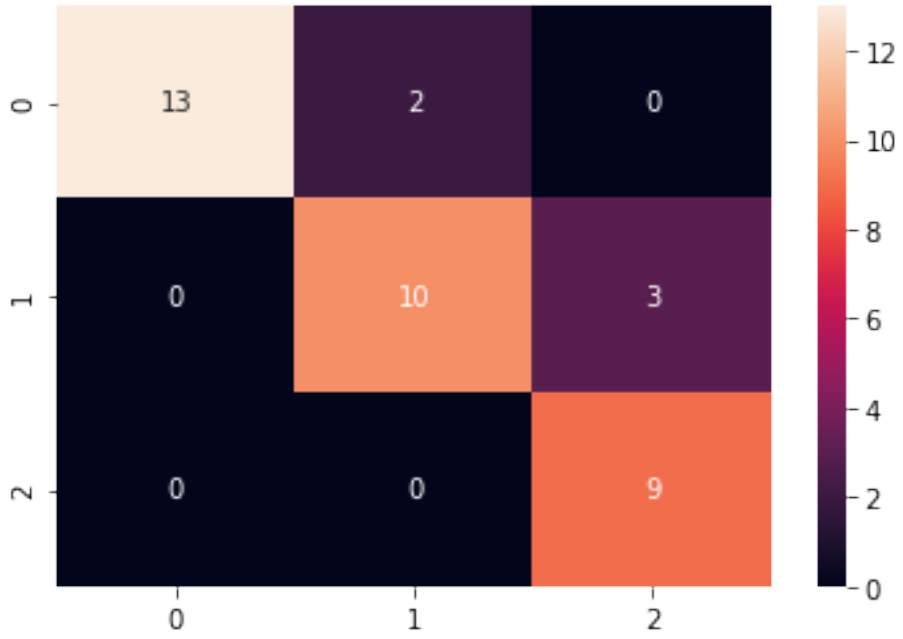
[24]:
```
# import Gaussian Naive Bayes classifier
from sklearn.naive_bayes import GaussianNB

# create a Gaussian Classifier
classifer1 = GaussianNB()

# training the model
classifer1.fit(X_train, y_train)

# testing the model
y_pred1 = classifer1.predict(X_test)
```

[25]:
```
# importing accuracy score
from sklearn.metrics import accuracy_score

# printing the accuracy of the model
print(accuracy_score(y_test,y_pred1))
```

```
0.8648648648648649
```

[26]:
```
# importing the required modules
import seaborn as sns
from sklearn.metrics import confusion_matrix

# passing actual and predicted values
cm = confusion_matrix(y_test, y_pred1)

# true write data values in each cell of the matrix
```

```
sns.heatmap(cm, annot=True)
plt.savefig('confusion.png')
```



[27]:
```
# importing classification report
from sklearn.metrics import classification_report

# printing the report
print(classification_report(y_test, y_pred1))
```

```
              precision    recall  f1-score   support

           0       1.00      0.87      0.93        15
           1       0.83      0.77      0.80        13
           2       0.75      1.00      0.86         9

    accuracy                           0.86        37
   macro avg       0.86      0.88      0.86        37
weighted avg       0.88      0.86      0.87        37
```