dns30ria5

September 14, 2023

[11]:
```
# This Python 3 environment comes with many helpful analytics libraries␣
 ↪installed
# It is defined by the kaggle/python Docker image: https://github.com/kaggle/
 ↪docker-python
# For example, here's several helpful packages to load
# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list␣
 ↪all files under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

```
/kaggle/input/cardiovascular-disease-dataset/cardio_train.csv
```

1 Importing The Necessary Libraries

[12]:
```
import pandas as pd
import numpy as np
import os,sys
import xgboost as xgb
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

2 Read CSV data into a DataFrame

[13]:
```
df = pd.read_csv("/kaggle/input/cardiovascular-disease-dataset/cardio_train.
 ↪csv", sep=';')
```

3 Checking the Shape of the data

[14]:
```
df.shape
```

[14]:
```
(70000, 13)
```

[29]:
```
df.head(5)
```

[29]:

	id	age	gender	height	weight	ap_hi	ap_lo	cholesterol	gluc	smoke	\
0	0	18393	2	168	62.0	110	80	1	1	0	
1	1	20228	1	156	85.0	140	90	3	1	0	
2	2	18857	1	165	64.0	130	70	3	1	0	
3	3	17623	2	169	82.0	150	100	1	1	0	
4	4	17474	1	156	56.0	100	60	1	1	0	

	alco	active	cardio
0	0	1	0
1	0	1	1
2	0	0	1
3	0	1	1
4	0	0	0

4 Checking for any duplicate values

[16]:
```
df.duplicated().sum()
```

[16]:
```
0
```

5 Checking for any Null Values

[17]:
```
df.isnull().sum()
```

[17]:
```
id             0
age            0
gender         0
height         0
weight         0
ap_hi          0
ap_lo          0
cholesterol    0
gluc           0
smoke          0
alco           0
active         0
cardio         0
```

```
dtype: int64
```

[18]:
```
df.columns
```

[18]:
```
Index(['id', 'age', 'gender', 'height', 'weight', 'ap_hi', 'ap_lo',
       'cholesterol', 'gluc', 'smoke', 'alco', 'active', 'cardio'],
      dtype='object')
```

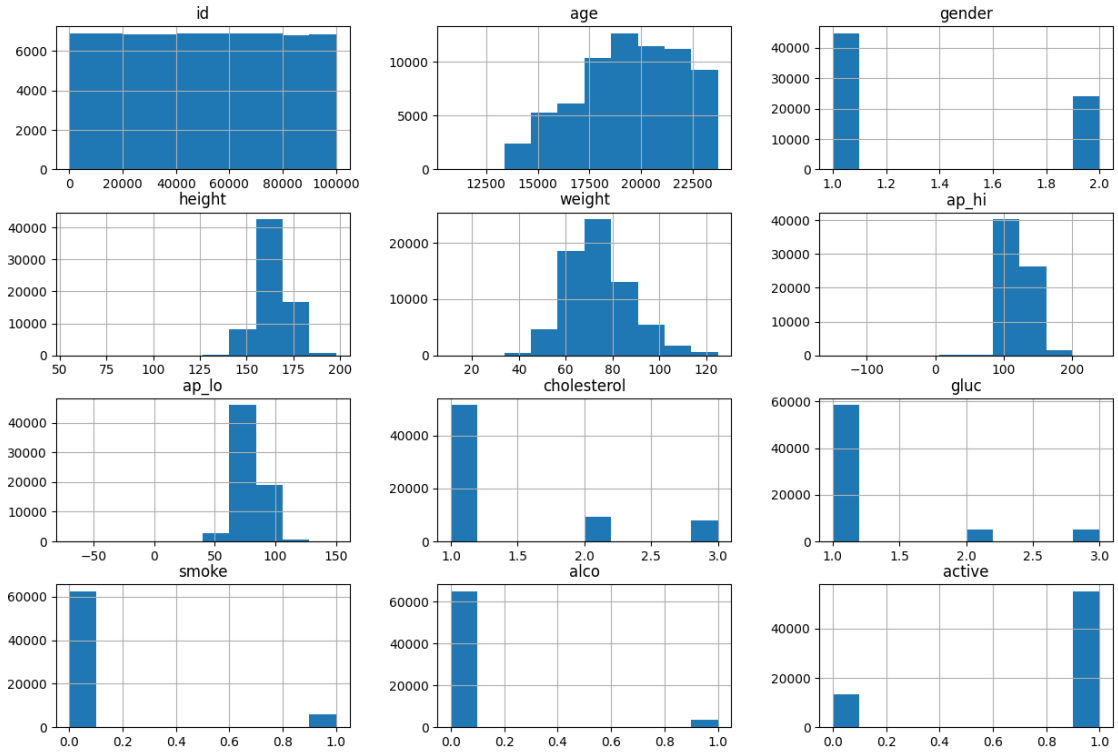
[19]:
```
df.skew()
```

[19]:
```
id             -0.001278
age            -0.307055
gender          0.630960
height         -0.642187
weight          1.012070
ap_hi          85.296214
ap_lo          32.114083
cholesterol     1.587123
gluc            2.397462
smoke           2.905867
alco            3.956607
active         -1.529473
cardio          0.001200
dtype: float64
```

[20]:
```
df=df[df.ap_hi<=250]
df=df[df.ap_lo<=150]
df=df[df.weight<=125]
df=df[df.height<=200]
```

6 Plotting the Columns

[21]:
```
x=df.loc[:,df.columns!='cardio'].values[:,1:]
x1=df.loc[:,df.columns!='cardio']
y=df.loc[:,'cardio'].values
y1=df.loc[:,'cardio']
x1.hist(figsize=(15,10))
plt.show()
```



7 Scale the features to between -1 and 1

[22]:
```
scaler=MinMaxScaler((-1,1))
x1=scaler.fit_transform(x)
y1=y
```

8 Split the dataset into Train and Test Datasets

[23]:
```
xtrain,xtest,ytrain,ytest=train_test_split(x1, y1, test_size=0.
↪24,random_state=42)
```

9 Train the model using XGBoost Classifier

[24]:
```
# Train the model
from xgboost import XGBClassifier
model=XGBClassifier()
model.fit(xtrain,ytrain)
predict=model.predict(xtest)
```

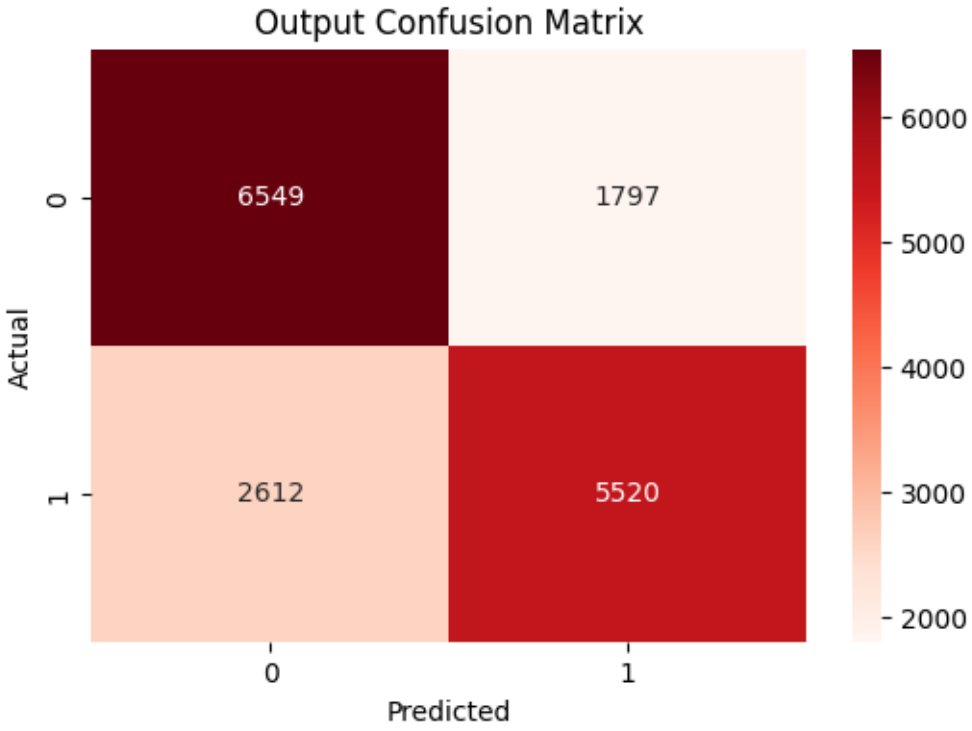
10 Confusion Matrix

[25]:
```
from sklearn.metrics import confusion_matrix
import seaborn as sns
import matplotlib.pyplot as plt

# Create the confusion matrix
cm = confusion_matrix(ytest, predict)

# Plot the confusion matrix heatmap
plt.figure(figsize=(6, 4))
fg = sns.heatmap(cm, annot=True, cmap="Reds", fmt='d')
figure = fg.get_figure()

# Add labels and title
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.title("Output Confusion Matrix")
plt.show()
```



11 Printing the Confusion Matrix

[26]:
```
print('True Positive Cases : {}'.format(cm[1][1]))
print('True Negative Cases : {}'.format(cm[0][0]))
print('False Positive Cases : {}'.format(cm[0][1]))
print('False Negative Cases : {}'.format(cm[1][0]))
```

```
True Positive Cases : 5520
True Negative Cases : 6549
False Positive Cases : 1797
False Negative Cases : 2612
```

12 Calculating the Precison, Recall and F1-Score

[27]:
```
pre = round(8486 / (8486 + 2767),3)
print("The Precision is:", pre)
rec = round(8486 / (8486 + 3794),3)
print("The Recall is:", rec)
f1_score = round(2 * (pre * rec) / (pre + rec),3)
print("The F1 Score is:", f1_score)
```

```
The Precision is: 0.754
The Recall is: 0.691
The F1 Score is: 0.721
```

13 Model Prediction Accuracy

[28]:
```
print("The Model Accuracy is:",round(accuracy_score(ytest,predict)*100,3),"%")
```

```
The Model Accuracy is: 73.243 %
```