health-care-project-ml-submission

June 18, 2023

1 Health Care Project

[1]:
```
#Importing the libraries
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
import warnings
warnings.filterwarnings('ignore')
```

[2]:
```
#loading the dataset
health_data = pd.read_csv('1645792390_cep1_dataset.csv')
```

[3]:
```
health_data.head() #Extracting top 5 rows of data
```

[3]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	63	1	3	145	233	1	0	150	0	2.3	0	0	1	1
1	37	1	2	130	250	0	1	187	0	3.5	0	0	2	1
2	41	0	1	130	204	0	0	172	0	1.4	2	0	2	1
3	56	1	1	120	236	0	1	178	0	0.8	2	0	2	1
4	57	0	0	120	354	0	1	163	1	0.6	2	0	2	1

[4]:
```
health_data.tail() #Extracting bottom 5 rows of data
```

[4]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak
298	57	0	0	140	241	0	1	123	1	0.2
299	45	1	3	110	264	0	1	132	0	1.2
300	68	1	0	144	193	1	1	141	0	3.4
301	57	1	0	130	131	0	1	115	1	1.2

```
302   57    0   1       130   236    0        0       174       0       0.0

     slope  ca  thal  target
298      1   0     3       0
299      1   0     3       0
300      1   2     3       0
301      1   1     3       0
302      1   1     2       0
```

[5]:
```
health_data.shape #Evaluating the shape(Rows, Columns)
```

[5]:
```
(303, 14)
```

[6]:
```
health_data.info() #Extracting the information of dataset
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 303 entries, 0 to 302
Data columns (total 14 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   age       303 non-null    int64
 1   sex       303 non-null    int64
 2   cp        303 non-null    int64
 3   trestbps  303 non-null    int64
 4   chol      303 non-null    int64
 5   fbs       303 non-null    int64
 6   restecg   303 non-null    int64
 7   thalach   303 non-null    int64
 8   exang     303 non-null    int64
 9   oldpeak   303 non-null    float64
 10  slope     303 non-null    int64
 11  ca        303 non-null    int64
 12  thal      303 non-null    int64
 13  target    303 non-null    int64
dtypes: float64(1), int64(13)
memory usage: 33.3 KB
```

[7]:
```
health_data.describe() #Extracting the general statistical criteras of dataset
```

[7]:
```
              age         sex          cp    trestbps        chol         fbs  \
count  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000
mean    54.366337    0.683168    0.966997  131.623762  246.264026    0.148515
std      9.082101    0.466011    1.032052   17.538143   51.830751    0.356198
min     29.000000    0.000000    0.000000   94.000000  126.000000    0.000000
25%     47.500000    0.000000    0.000000  120.000000  211.000000    0.000000
50%     55.000000    1.000000    1.000000  130.000000  240.000000    0.000000
75%     61.000000    1.000000    2.000000  140.000000  274.500000    0.000000
```

```
max     77.000000    1.000000    3.000000  200.000000  564.000000    1.000000

          restecg     thalach       exang     oldpeak       slope          ca  \
count  303.000000  303.000000  303.000000  303.000000  303.000000  303.000000
mean     0.528053  149.646865    0.326733    1.039604    1.399340    0.729373
std      0.525860   22.905161    0.469794    1.161075    0.616226    1.022606
min      0.000000   71.000000    0.000000    0.000000    0.000000    0.000000
25%      0.000000  133.500000    0.000000    0.000000    1.000000    0.000000
50%      1.000000  153.000000    0.000000    0.800000    1.000000    0.000000
75%      1.000000  166.000000    1.000000    1.600000    2.000000    1.000000
max      2.000000  202.000000    1.000000    6.200000    2.000000    4.000000

             thal      target
count  303.000000  303.000000
mean     2.313531    0.544554
std      0.612277    0.498835
min      0.000000    0.000000
25%      2.000000    0.000000
50%      2.000000    1.000000
75%      3.000000    1.000000
max      3.000000    1.000000
```

[8]:
```
health_data.columns #Extracting the columns names of dataset
```

[8]:
```
Index(['age', 'sex', 'cp', 'trestbps', 'chol', 'fbs', 'restecg', 'thalach',
       'exang', 'oldpeak', 'slope', 'ca', 'thal', 'target'],
      dtype='object')
```

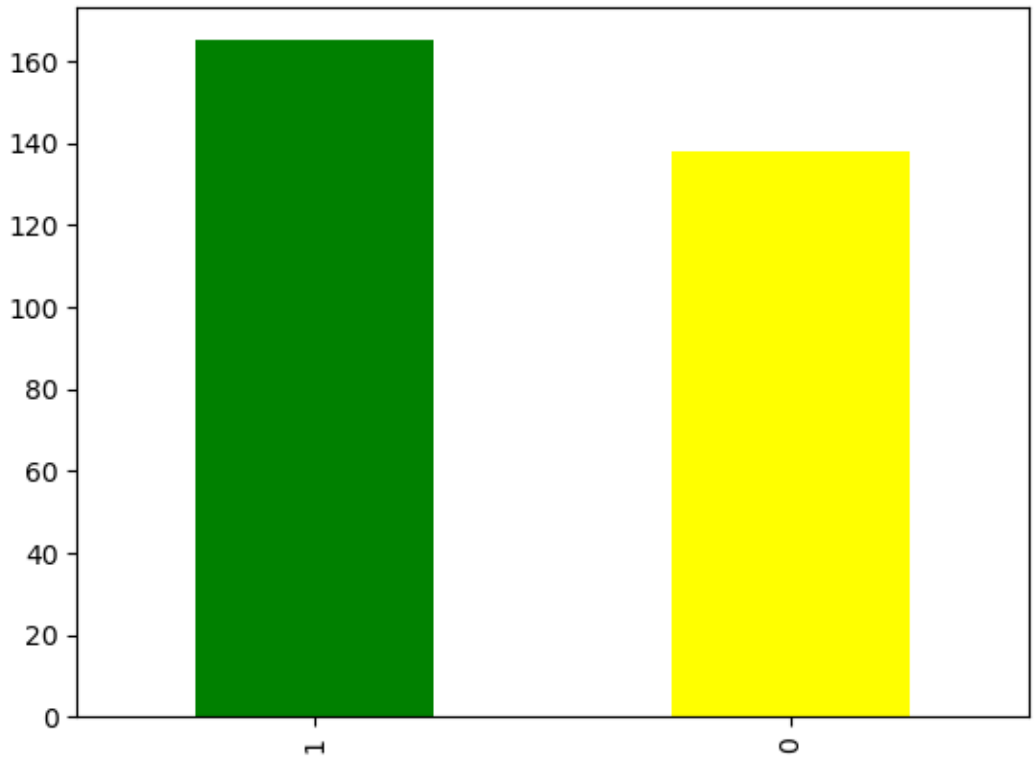
[9]:
```
health_data.isnull().sum() #Checking for the null values
```

[9]:
```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          0
thal        0
target      0
dtype: int64
```

[10]:
```
#Checking if our dataset is balanced
health_data['target'].value_counts()
```

[10]:
```
1    165
0    138
Name: target, dtype: int64
```

[26]:
```
#here 1 = male; 0 = female
health_data["target"].value_counts().plot(kind='bar', color=["green","yellow"])
plt.show()
```



[12]:
```
#Creating feature and Dependent variabe sets
X = health_data.iloc[:,:-1] #all the row , all columns except last one
y = health_data.iloc[:,-1] #all rows and the last column
```

[13]:
```
X.shape
```

[13]:
```
(303, 13)
```

[14]:
```
y.shape
```

[14]:
```
(303,)
```

[15]:
```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test = train_test_split(X,y,random_state=90)
```

[16]:
```
from sklearn.ensemble import RandomForestClassifier
```

[17]:
```
#Instanciating class to obj
rclf = RandomForestClassifier(criterion='gini',max_depth=7,␣
 ↪n_estimators=100,random_state=5)
```

[18]:
```
rclf.fit(X_train,y_train)
```

[18]:
```
RandomForestClassifier(max_depth=7, random_state=5)
```

[19]:
```
#feature importances
rclf.feature_importances_
```

[19]:
```
array([0.08304076, 0.01581108, 0.15361364, 0.07054868, 0.07464994,
       0.00738674, 0.01935261, 0.10792509, 0.05140065, 0.12874262,
       0.06231756, 0.08722058, 0.13799003])
```

[20]:
```
#displaying features
health_data.columns
```

[20]:
```
Index(['age', 'sex', 'cp', 'trestbps', 'chol', 'fbs', 'restecg', 'thalach',
       'exang', 'oldpeak', 'slope', 'ca', 'thal', 'target'],
      dtype='object')
```

[21]:
```
#generating the predictions
y_pred = rclf.predict(X_test)
```

[22]:
```
y_pred
```

[22]:
```
array([0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 0,
       0, 1, 0, 0, 1, 1, 1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0,
       0, 1, 1, 0, 1, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 1, 1, 0, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 0, 1, 1], dtype=int64)
```

[23]:
```
#Accuracy of our random forest classifier
from sklearn.metrics import confusion_matrix
confusion_matrix(y_test,y_pred)
```

[23]:
```
array([[22,  9],
       [ 8, 37]], dtype=int64)
```

[24]:
```
from sklearn.metrics import accuracy_score
accuracy_score(y_test,y_pred)
```

[24]: 0.7763157894736842

[25]:
```
#Cross validation
from sklearn.model_selection import cross_val_score
cross_val_score(rclf,X_train,y_train,cv=10)
```

[25]:
```
array([0.86956522, 0.7826087 , 0.82608696, 0.86956522, 0.7826087 ,
       0.86956522, 0.86956522, 0.77272727, 0.81818182, 0.81818182])
```

[ ]: