HealthCareProject

May 30, 2023

Health Care. Course-end Project 5

DESCRIPTION

Cardiovascular diseases are the leading cause of death globally. It is therefore necessary to identify the causes and develop a system to predict heart attacks in an effective manner. The data below has the information about the factors that might have an impact on cardiovascular health.

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

import warnings
warnings.filterwarnings('ignore')
```

[3]:
```
Healthcare = pd.read_excel("1645792390_cep1_dataset.xlsx")
```

[5]:
```
Healthcare.head()
```

[5]:

	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

[6]:
```
Healthcare.tail()
```

[6]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
298	57	0	0	140	241	0	1	123	1	0.2	1	0	3	0
299	45	1	3	110	264	0	1	132	0	1.2	1	0	3	0
300	68	1	0	144	193	1	1	141	0	3.4	1	2	3	0
301	57	1	0	130	131	0	1	115	1	1.2	1	1	3	0

```
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
```

[7]:
```
Healthcare.shape
```

[7]:
```
(303, 14)
```

[8]:
```
Healthcare.info()
```

```
<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
```

[9]:
```
Healthcare.dtypes
```

[9]:
```
age           int64
sex           int64
cp            int64
trestbps      int64
chol          int64
fbs           int64
restecg       int64
thalach       int64
```

```
exang         int64
oldpeak     float64
slope         int64
ca            int64
thal          int64
target        int64
dtype: object
```

1 Checking for missing values

[11]:
```
Healthcare.isnull().sum(axis = 0)
```

[11]:
```
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
```

[12]:
```
Healthcare.describe()
```

[12]:

	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	

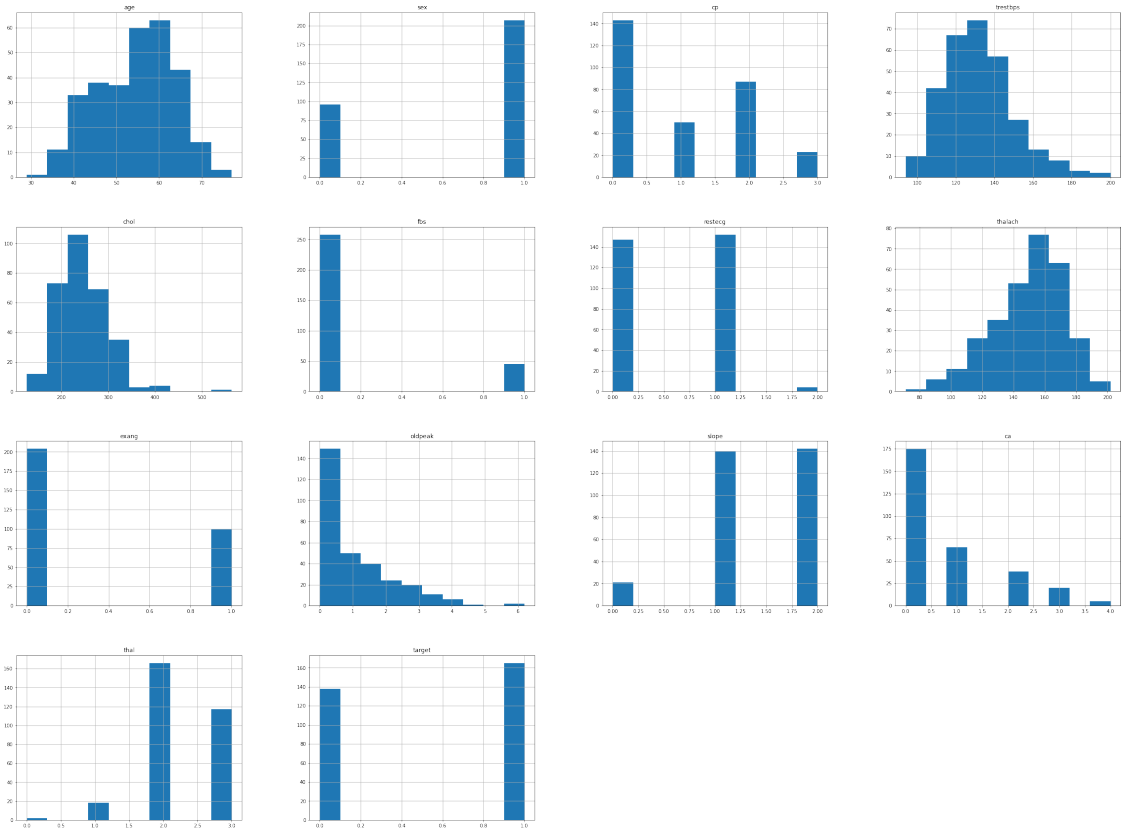
```
25%      0.000000  133.500000    0.000000    0.000000    1.000000    0.000000
50%      1.000000  153.000000    0.000000    0.800000    1.000000    0.000000
75%      1.000000  166.000000    1.000000    1.600000    2.000000    1.000000
max      2.000000  202.000000    1.000000    6.200000    2.000000    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
```

2 For visualizations

[13]:
```
import matplotlib.pyplot as plt
from matplotlib import rcParams
from matplotlib.cm import rainbow
%matplotlib inline
import seaborn as sns
```

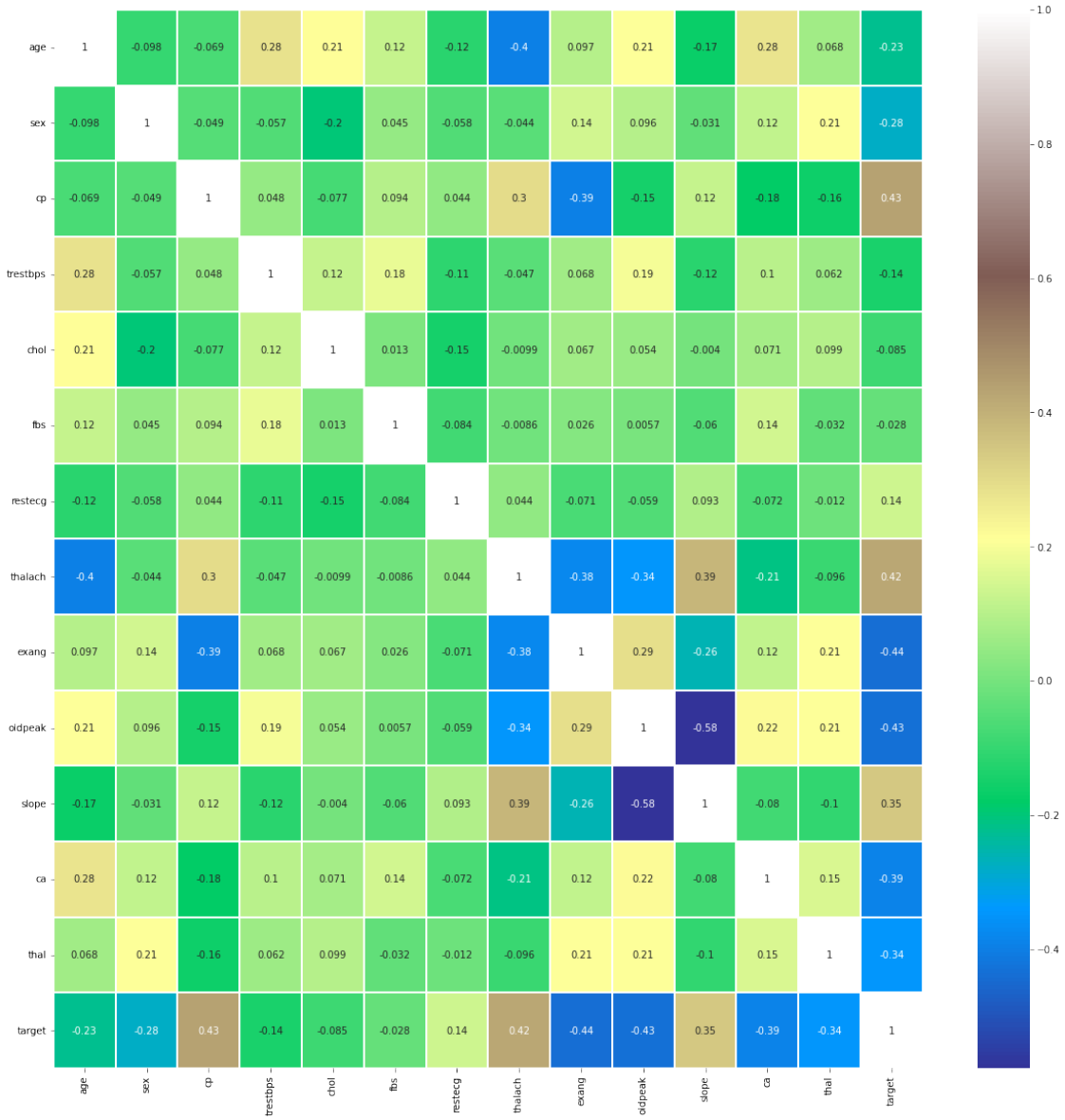
3 Histogram of the Heart Dataset

[14]:
```
fig = plt.figure(figsize = (40,30))
Healthcare.hist(ax = fig.gca());
```



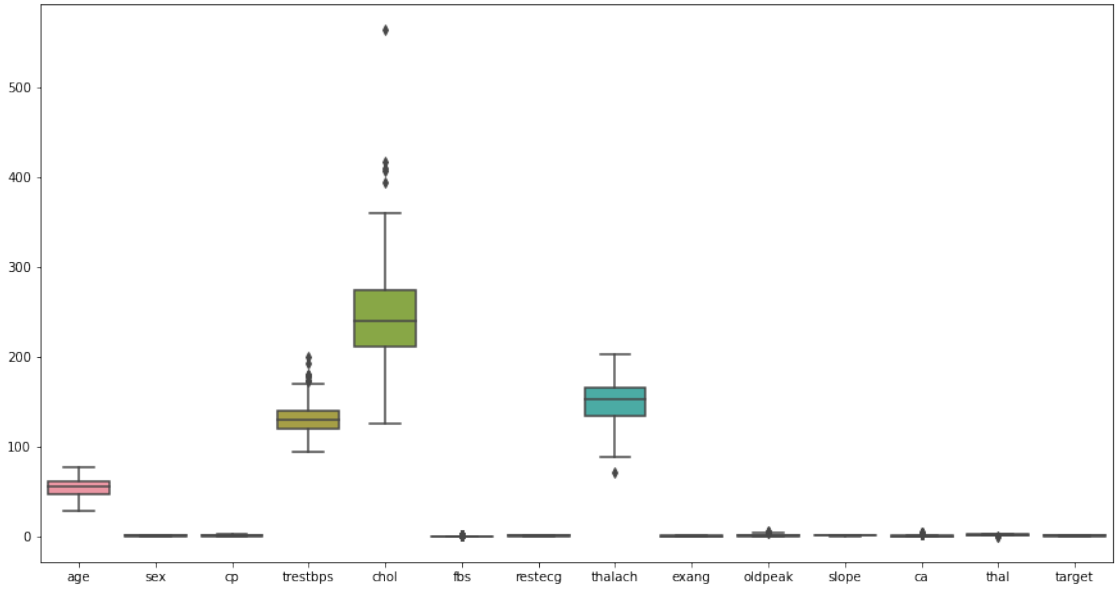
4 Creating a correlation heatmap

[15]:
```
sns.heatmap(Healthcare.corr(),annot=True, cmap='terrain', linewidths=0.1)
fig=plt.gcf()
fig.set_size_inches(20,20)
plt.show()
```



5 Boxplots

[16]:
```
fig_dims = (15,8)
fig, ax = plt.subplots(figsize=fig_dims)
sns.boxplot(data=Healthcare, ax=ax);
```



[18]:
```
Healthcare["target"].value_counts()
```

[18]:
```
1    165
0    138
Name: target, dtype: int64
```

[20]:
```
X = Healthcare.drop("target",axis=1)
y = Healthcare["target"]
```

[21]:
```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.
 ↪20,stratify=y,random_state=7)
```

[22]:
```
from sklearn.linear_model import LogisticRegression
```

[23]:
```
lr = LogisticRegression()
lr.fit(X_train, y_train)
```

[23]:
```
LogisticRegression()
```

[24]:
```
pred = lr.predict(X_test)
```

[25]:
```
from sklearn.metrics import accuracy_score, confusion_matrix,␣
 ↪classification_report
```

[26]:
```
accuracy_score(y_test, pred)
```

[26]: 0.8032786885245902

[27]:
```
accuracy_score(y_train, lr.predict(X_train))
```

[27]: 0.8471074380165289

[28]:
```
import warnings
in_data = (57,0,0,140,241,0,1,123,1,0.2,1,0,3)


in_data_as_numpy_array = np.array(in_data)


in_data_reshape = in_data_as_numpy_array.reshape(1,-1)
pred = lr.predict(in_data_reshape)
print(pred)

if(pred[0] == 0):
    print('The person does not have heart disease.')
else:
    print('The person has heart disease.')
```

```
[0]
The person does not have heart disease.
```