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Untitled2.i...	21 days ago
varietiesne...	22 days ago

project.ipynb

Code Python 3

[1]:
```
import pandas as pd
cep = pd.read_excel("cep1.xlsx")
cep
```

[1]:

	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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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	1	1	2	0

303 rows × 14 columns

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varietiesne...	22 days ago

project.ipynb

Code Python 3

[2]:
```
cep.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
```

[3]:
```
cep.describe()
```

[3]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	s

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varietiesne...	22 days ago

project.ipynb

Code Python 3

[3]:
```
cep.describe()
```

[3]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slop
unt	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.00000
ean	54.366337	0.683168	0.966997	131.623762	246.264026	0.148515	0.528053	149.646865	0.326733	1.039604	1.39934
std	9.082101	0.466011	1.032052	17.538143	51.830751	0.356198	0.525860	22.905161	0.469794	1.161075	0.61622
min	29.000000	0.000000	0.000000	94.000000	126.000000	0.000000	0.000000	71.000000	0.000000	0.000000	0.00000
25%	47.500000	0.000000	0.000000	120.000000	211.000000	0.000000	0.000000	133.500000	0.000000	0.000000	1.00000
50%	55.000000	1.000000	1.000000	130.000000	240.000000	0.000000	1.000000	153.000000	0.000000	0.800000	1.00000
75%	61.000000	1.000000	2.000000	140.000000	274.500000	0.000000	1.000000	166.000000	1.000000	1.600000	2.00000
max	77.000000	1.000000	3.000000	200.000000	564.000000	1.000000	2.000000	202.000000	1.000000	6.200000	2.00000

[4]:
```
import statsmodels.formula.api as smf
```

[5]:
```
log_reg = smf.logit("target ~ age + sex + cp + trestbps + chol + fbs + restecg + thalach + exang + oldpeak + slope + (
```

```
Optimization terminated successfully.
         Current function value: 0.348904
         Iterations 7
```

[6]:
```
print(log_reg.summary())
```

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Untitled1.i...	22 days ago
Untitled2.i...	21 days ago
varietiesne...	22 days ago

project.ipynb

Code Python 3

```
[5]: log_reg = smf.logit("target ~ age + sex + cp + trestbps + chol + fbs + restecg + thalach + exang + oldpeak + slope + c
```

```
Optimization terminated successfully.
         Current function value: 0.348904
         Iterations 7
```

```
[6]: print(log_reg.summary())
```

```
                           Logit Regression Results
==============================================================================
Dep. Variable:                 target   No. Observations:                  303
Model:                          Logit   Df Residuals:                      289
Method:                           MLE   Df Model:                           13
Date:                Wed, 14 Dec 2022   Pseudo R-squ.:                 0.4937
Time:                        11:27:47   Log-Likelihood:                -105.72
converged:                       True   LL-Null:                       -208.82
Covariance Type:            nonrobust   LLR p-value:                 7.262e-37
==============================================================================
                 coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept      3.4505      2.571      1.342      0.180      -1.590       8.490
age           -0.0049      0.023     -0.212      0.832      -0.050       0.041
sex           -1.7582      0.469     -3.751      0.000      -2.677      -0.839
cp             0.8599      0.185      4.638      0.000       0.496       1.223
trestbps      -0.0195      0.010     -1.884      0.060      -0.040       0.001
chol          -0.0046      0.004     -1.224      0.221      -0.012       0.003
fbs            0.0349      0.529      0.066      0.947      -1.003       1.073
```

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varietiesne...	22 days ago

project.ipynb

Code Python 3

[8]:
```
import numpy as np
odds_ratios = pd.DataFrame(
    {
        "OR": log_reg.params,
        "Lower CI": log_reg.conf_int()[0],
        "Upper CI": log_reg.conf_int()[1],
    }
)
odds_ratios = np.exp(odds_ratios)
print(odds_ratios)
```

```
                  OR  Lower CI     Upper CI
Intercept  31.515277  0.204020  4868.205549
age         0.995104  0.950914     1.041346
sex         0.172358  0.068772     0.431970
cp          2.362808  1.642927     3.398121
trestbps    0.980712  0.961039     1.000787
chol        0.995380  0.988029     1.002787
fbs         1.035503  0.366834     2.923029
restecg     1.594057  0.805483     3.154650
thalach     1.023482  1.002713     1.044682
exang       0.375318  0.168109     0.837932
oldpeak     0.582589  0.383119     0.885912
slope       1.784767  0.899137     3.542726
ca          0.461465  0.317437     0.670842
thal        0.406394  0.230152     0.717595
```

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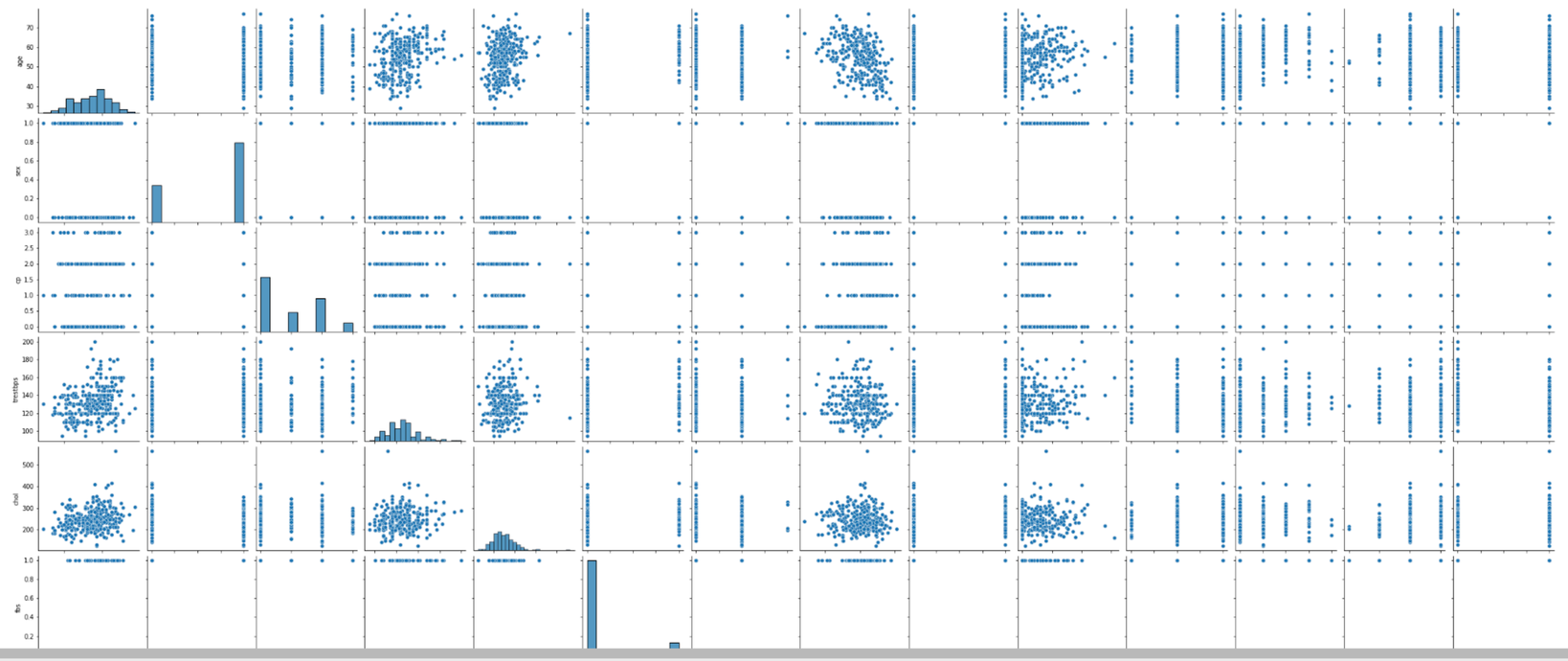
varietiesne...	22 days ago

project.ipynb

Code Python 3

```
[10]: import seaborn as sns
      sns.pairplot(cep)
```

```
[10]: <seaborn.axisgrid.PairGrid at 0x7f109d11c0d0>
```



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project.ipynb

Code Python 3

```
[15]: y_pred=logreg.predict(x_test)
      y_pred
```

```
[15]: array([1, 0, 0, 0, 1, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0,
             1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1,
             1, 0, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 0, 0, 1, 1, 1, 0, 1,
             1, 1, 0, 1, 0, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 0, 0, 1,
             1, 0, 0, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 1, 1, 0, 1, 0, 1, 1, 1,
             1, 0, 1, 1, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1,
             1, 0, 0, 1, 1, 1, 0, 1, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 1, 0])
```

```
[16]: y_preda=logreg.predict_proba(x_test)
      y_preda
```

```
[16]: array([[1.71096108e-02, 9.82890389e-01],
             [9.32881253e-01, 6.71187470e-02],
             [9.80779586e-01, 1.92204142e-02],
             [9.92705108e-01, 7.29489192e-03],
             [7.90593197e-02, 9.20940680e-01],
             [9.89432909e-01, 1.05670907e-02],
             [6.72549265e-02, 9.32745074e-01],
             [6.38502884e-01, 3.61497116e-01],
             [2.10315881e-02, 9.78968412e-01],
             [4.05232046e-01, 5.94767954e-01],
             [9.12260038e-01, 8.77399618e-02],
             [7.87928986e-01, 2.12071014e-01],
             [9.98360816e-01, 1.63918382e-03],
```

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varietiesne...	22 days ago

project.ipynb

Code Python 3

```
[5.07392747e-03, 9.94926073e-01],
[9.14759472e-01, 8.52405279e-02],
[9.31926459e-01, 6.80735408e-02],
[6.27982473e-01, 3.72017527e-01],
[9.73614396e-01, 2.63856043e-02],
[2.21493580e-02, 9.77850642e-01],
[2.72485433e-02, 9.72751457e-01],
[3.12393030e-02, 9.68760697e-01],
[9.31428805e-01, 6.85711953e-02],
[3.47186394e-01, 6.52813606e-01],
[9.96239016e-01, 3.76098381e-03]])
```

[17]:
```
from sklearn.metrics import confusion_matrix, classification_report
print(confusion_matrix(y_test, y_pred))
print(classification_report(y_test, y_pred))
```

```
[[52 20]
 [13 67]]
              precision    recall  f1-score   support

           0       0.80      0.72      0.76        72
           1       0.77      0.84      0.80        80

    accuracy                           0.78       152
   macro avg       0.79      0.78      0.78       152
weighted avg       0.78      0.78      0.78       152
```

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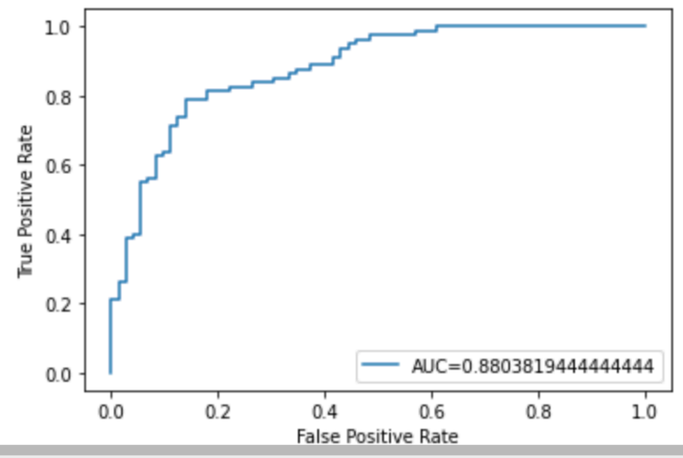
project.ipynb

Code Python 3

[19]:
```
from sklearn.metrics import roc_curve
import matplotlib.pyplot as plt
from sklearn.metrics import roc_auc_score
y_pred_proba = logreg.predict_proba(x_test)[:,1]
fpr, tpr, threshu = roc_curve(y_test, y_pred_proba)
auc = roc_auc_score(y_test, y_pred_proba)
plt.plot(fpr,tpr,label="AUC="+str(auc))
plt.ylabel('True Positive Rate')
plt.xlabel('False Positive Rate')
plt.legend(loc=4)
plt.show()
```



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project.ipynb

Code Python 3

```
0.85   0.85   0.8625 0.8625 0.875  0.875  0.8875 0.8875 0.9125 0.9125
0.9375 0.9375 0.95   0.95   0.9625 0.9625 0.975  0.975  0.9875 0.9875
1.     1.    ]
```

[26]:
```
import numpy as np
def find_best_threshold(threshold, fpr, tpr):
 t = threshold[np.argmax(tpr*(1-fpr))]
 print("the maximum value of tpr*(1-fpr)", max(tpr*(1-fpr)), "for threshold", np.round(t,3))
 return t
find_best_threshold(threshu, fpr, tpr)
```

```
the maximum value of tpr*(1-fpr) 0.678125 for threshold 0.678
```

[26]:
```
0.6782703084986412
```

[28]:
```
np.where(logreg.predict_proba(x_test)[:,1] > 0.6782703084986412,1,0)
```

[28]:
```
array([1, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0,
       1, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1,
       1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 0, 0, 1, 0, 1, 0, 1,
       1, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 0, 0, 1,
       1, 0, 0, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 1, 1, 0, 1, 0, 0, 0, 1,
       0, 0, 1, 0, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1,
       0, 0, 0, 1, 1, 1, 0, 1, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0])
```

[30]:
```
y_pred_proba = np.where(logreg.predict_proba(x_test)[:,1] > 0.6782703084986412,1,0)
fpr, tpr, thresh = roc_curve(y_test, y_pred_proba)
auc = roc_auc_score(y_test, y_pred_proba)
```

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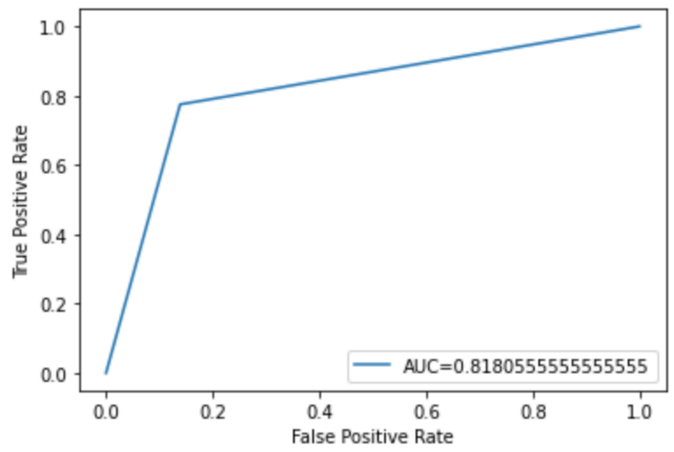
Untitled1.i...	22 days ago
Untitled2.i...	21 days ago
varietiesne...	22 days ago

project.ipynb

Code Python 3

```
[30]: y_pred_proba = np.where(logreg.predict_proba(x_test)[:,1] > 0.6782703084986412,1,0)
fpr, tpr, thresh = roc_curve(y_test, y_pred_proba)
auc = roc_auc_score(y_test, y_pred_proba)
plt.plot(fpr,tpr,label="AUC="+str(auc))
plt.ylabel('True Positive Rate')
plt.xlabel('False Positive Rate')
plt.legend(loc=4)
plt.show()
```



Simple 0 1 Python 3 | Idle Mode: Edit Ln 1, Col 1 project.ipynb

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seeds.csv	a month ago
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Untitled2.i...	21 days ago
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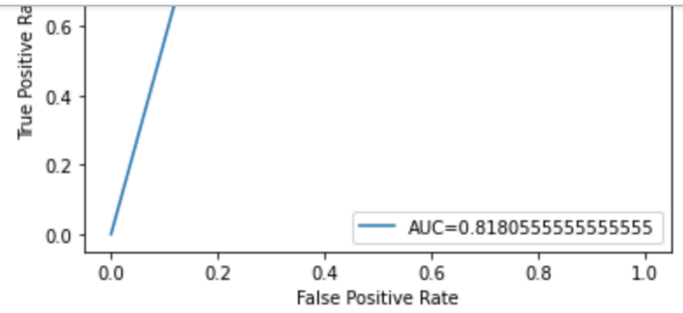
project.ipynb

Code Python 3



[31]:
```
from sklearn.metrics import classification_report, confusion_matrix
print(confusion_matrix(y_test, y_pred_proba))
print(classification_report(y_test, y_pred_proba))
```

```
[[62 10]
 [18 62]]
              precision    recall  f1-score   support

           0       0.78      0.86      0.82        72
           1       0.86      0.78      0.82        80

    accuracy                           0.82       152
   macro avg       0.82      0.82      0.82       152
weighted avg       0.82      0.82      0.82       152
```

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Untitled2.i...	21 days ago
varietiesne...	22 days ago

project.ipynb

Code Python 3

```
weighted avg       0.82      0.82      0.82       152
```

[33]:
```
from sklearn.ensemble import RandomForestClassifier
classifier_rf = RandomForestClassifier(random_state=42, max_depth=5,n_estimators=100,oob_score=True)
classifier_rf.fit(x_train, y_train)
RandomForestClassifier(max_depth=5, oob_score=True, random_state=42)
classifier_rf.oob_score_
```

[33]:
```
0.8675496688741722
```

[34]:
```
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
print(confusion_matrix(y_test, y_pred))
print(classification_report(y_test, y_pred))
```

```
[[52 20]
 [13 67]]
              precision    recall  f1-score   support

           0       0.80      0.72      0.76        72
           1       0.77      0.84      0.80        80

    accuracy                           0.78       152
   macro avg       0.79      0.78      0.78       152
weighted avg       0.78      0.78      0.78       152
```

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