wine data analysis useing logistic regression

June 30, 2023

1 modul 7: case study using machine learning

2 Problem Statement:

You work in XYZ Company as a Python developer. The company officials want you to build a data science model. Tasks To Be Performed: 1. Using sklearn import the wine dataset 2. Split the data into train and test set 3. Train the model 4. Make Predictions 5. Check the performance of the model using r2_score

[ ]:

```

```

[1]:

```
## import the required library
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:

```
## import your dataset
data=pd.read_csv(r'C:/Users/Vikas/Downloads/wine.csv')
```

[3]:

```
data
```

[3]:

```
     Wine  Alcohol  Malic.acid   Ash   Acl   Mg  Phenols  Flavanoids  \
0       1    14.23        1.71  2.43  15.6  127     2.80        3.06
1       1    13.20        1.78  2.14  11.2  100     2.65        2.76
2       1    13.16        2.36  2.67  18.6  101     2.80        3.24
3       1    14.37        1.95  2.50  16.8  113     3.85        3.49
4       1    13.24        2.59  2.87  21.0  118     2.80        2.69
..    …        …           …   …    …   …     …        …
173     3    13.71        5.65  2.45  20.5   95     1.68        0.61
174     3    13.40        3.91  2.48  23.0  102     1.80        0.75
175     3    13.27        4.28  2.26  20.0  120     1.59        0.69
176     3    13.17        2.59  2.37  20.0  120     1.65        0.68
177     3    14.13        4.10  2.74  24.5   96     2.05        0.76

     Nonflavanoid.phenols  Proanth  Color.int   Hue    OD  Proline
0                    0.28     2.29       5.64  1.04  3.92     1065
1                    0.26     1.28       4.38  1.05  3.40     1050
```

```
2                    0.30     2.81       5.68  1.03  3.17     1185
3                    0.24     2.18       7.80  0.86  3.45     1480
4                    0.39     1.82       4.32  1.04  2.93      735
..                    …        …       …    …     …     …
173                  0.52     1.06       7.70  0.64  1.74      740
174                  0.43     1.41       7.30  0.70  1.56      750
175                  0.43     1.35      10.20  0.59  1.56      835
176                  0.53     1.46       9.30  0.60  1.62      840
177                  0.56     1.35       9.20  0.61  1.60      560

[178 rows x 14 columns]
```

[5]:
```python
## i want to see the first five rows
data.head()
```

[5]:
```
   Wine  Alcohol  Malic.acid   Ash   Acl   Mg  Phenols  Flavanoids  \
0     1    14.23        1.71  2.43  15.6  127     2.80        3.06
1     1    13.20        1.78  2.14  11.2  100     2.65        2.76
2     1    13.16        2.36  2.67  18.6  101     2.80        3.24
3     1    14.37        1.95  2.50  16.8  113     3.85        3.49
4     1    13.24        2.59  2.87  21.0  118     2.80        2.69

   Nonflavanoid.phenols  Proanth  Color.int   Hue    OD  Proline
0                  0.28     2.29       5.64  1.04  3.92     1065
1                  0.26     1.28       4.38  1.05  3.40     1050
2                  0.30     2.81       5.68  1.03  3.17     1185
3                  0.24     2.18       7.80  0.86  3.45     1480
4                  0.39     1.82       4.32  1.04  2.93      735
```

[4]:
```python
## i want to see the all col
data.columns
```

[4]:
```
Index(['Wine', 'Alcohol', 'Malic.acid', 'Ash', 'Acl', 'Mg', 'Phenols',
       'Flavanoids', 'Nonflavanoid.phenols', 'Proanth', 'Color.int', 'Hue',
       'OD', 'Proline'],
      dtype='object')
```

[6]:
```python
## i want to see the shape of data
data.shape
```

[6]:
```
(178, 14)
```

[7]:
```python
## i want to see all information of my dataset.
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 178 entries, 0 to 177
Data columns (total 14 columns):
```

```
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   Wine                  178 non-null    int64
 1   Alcohol               178 non-null    float64
 2   Malic.acid            178 non-null    float64
 3   Ash                   178 non-null    float64
 4   Acl                   178 non-null    float64
 5   Mg                    178 non-null    int64
 6   Phenols               178 non-null    float64
 7   Flavanoids            178 non-null    float64
 8   Nonflavanoid.phenols  178 non-null    float64
 9   Proanth               178 non-null    float64
 10  Color.int             178 non-null    float64
 11  Hue                   178 non-null    float64
 12  OD                    178 non-null    float64
 13  Proline               178 non-null    int64
dtypes: float64(11), int64(3)
memory usage: 19.6 KB
```

[10]:
```
## i wnt to see the count,min max,std,
data.describe().T
```

[10]:
```
                      count        mean         std     min       25%  \
Wine                  178.0    1.938202    0.775035    1.00    1.0000
Alcohol               178.0   13.000618    0.811827   11.03   12.3625
Malic.acid            178.0    2.336348    1.117146    0.74    1.6025
Ash                   178.0    2.366517    0.274344    1.36    2.2100
Acl                   178.0   19.494944    3.339564   10.60   17.2000
Mg                    178.0   99.741573   14.282484   70.00   88.0000
Phenols               178.0    2.295112    0.625851    0.98    1.7425
Flavanoids            178.0    2.029270    0.998859    0.34    1.2050
Nonflavanoid.phenols  178.0    0.361854    0.124453    0.13    0.2700
Proanth               178.0    1.590899    0.572359    0.41    1.2500
Color.int             178.0    5.058090    2.318286    1.28    3.2200
Hue                   178.0    0.957449    0.228572    0.48    0.7825
OD                    178.0    2.611685    0.709990    1.27    1.9375
Proline               178.0  746.893258  314.907474  278.00  500.5000

                          50%       75%     max
Wine                    2.000    3.0000    3.00
Alcohol                13.050   13.6775   14.83
Malic.acid              1.865    3.0825    5.80
Ash                     2.360    2.5575    3.23
Acl                    19.500   21.5000   30.00
Mg                     98.000  107.0000  162.00
Phenols                 2.355    2.8000    3.88
Flavanoids              2.135    2.8750    5.08
```

```
Nonflavanoid.phenols    0.340    0.4375     0.66
Proanth                 1.555    1.9500     3.58
Color.int               4.690    6.2000    13.00
Hue                     0.965    1.1200     1.71
OD                      2.780    3.1700     4.00
Proline               673.500  985.0000  1680.00
```

[8]:
```
##  i want to see the how much null values in my dataset
data.isnull().sum()
```

[8]:
```
Wine                    0
Alcohol                 0
Malic.acid              0
Ash                     0
Acl                     0
Mg                      0
Phenols                 0
Flavanoids              0
Nonflavanoid.phenols    0
Proanth                 0
Color.int               0
Hue                     0
OD                      0
Proline                 0
dtype: int64
```

[80]:

[ ]:

[81]:
```
## here we divide the dataset into independent(x) & dependent(y).
x=data.iloc[:,1:14].values
y=data.iloc[:,0].values
```

[45]:
```
x
```

[45]:
```
array([[1.423e+01, 1.710e+00, 2.430e+00, …, 1.040e+00, 3.920e+00,
        1.065e+03],
       [1.320e+01, 1.780e+00, 2.140e+00, …, 1.050e+00, 3.400e+00,
        1.050e+03],
       [1.316e+01, 2.360e+00, 2.670e+00, …, 1.030e+00, 3.170e+00,
        1.185e+03],
       …,
       [1.327e+01, 4.280e+00, 2.260e+00, …, 5.900e-01, 1.560e+00,
        8.350e+02],
       [1.317e+01, 2.590e+00, 2.370e+00, …, 6.000e-01, 1.620e+00,
        8.400e+02],
```

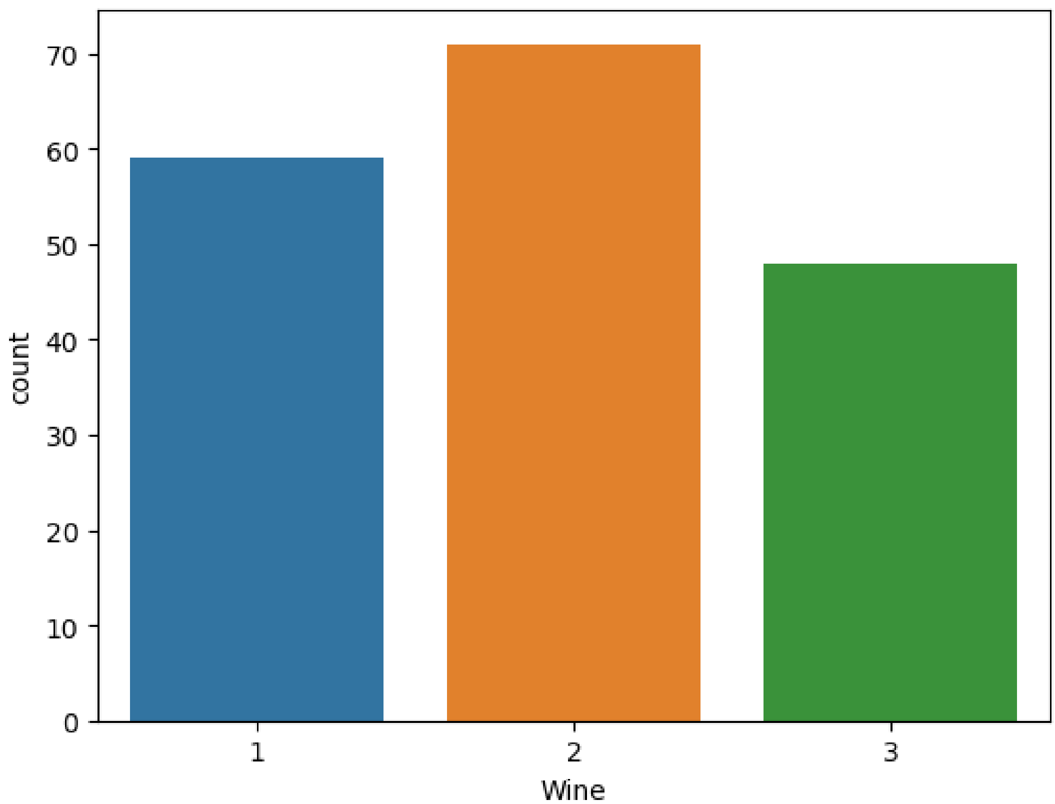
```
       [1.413e+01, 4.100e+00, 2.740e+00, …, 6.100e-01, 1.600e+00,
        5.600e+02]])
```

[46]:
```python
y
```

[46]:
```
array([1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 3, 3,
       3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3,
       3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3,
       3, 3], dtype=int64)
```

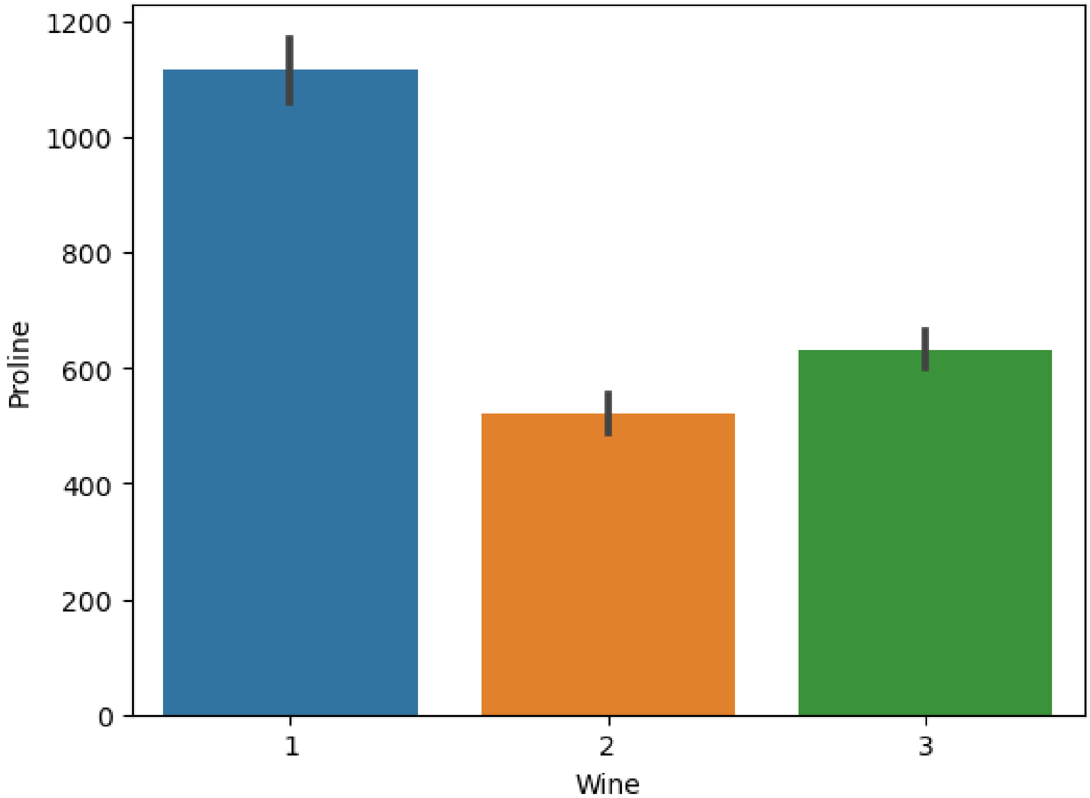
[48]:
```python
## we can visualize the data,
sns.countplot(x='Wine',data=data)
```

[48]:
```
<Axes: xlabel='Wine', ylabel='count'>
```



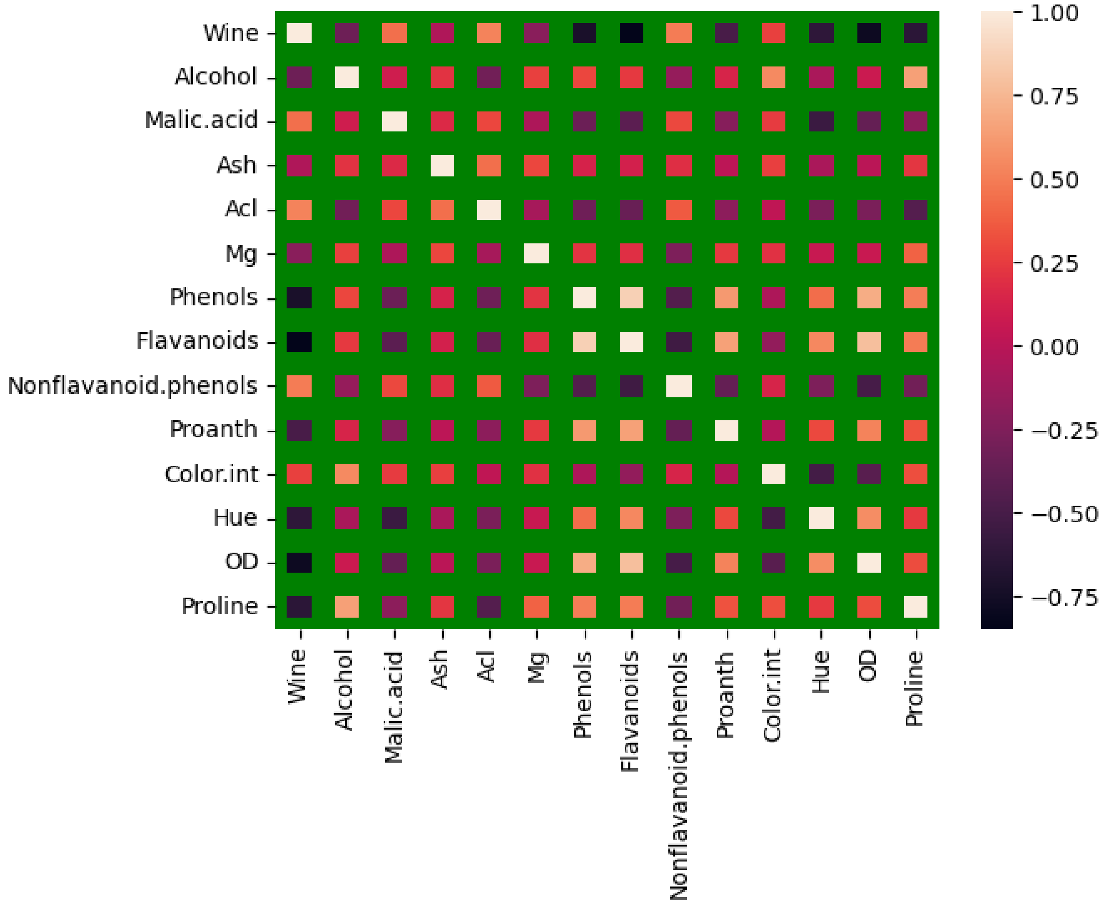
[50]:
```
## another way we can visualize the data
sns.barplot(x='Wine',y='Proline',data=data)
```

[50]: <Axes: xlabel='Wine', ylabel='Proline'>



[61]:
```
## another way we can visualize the data
sns.heatmap(data.corr(),linewidth=10,linecolor='g')
```

[61]: <Axes: >



3 what i mentioned above visualization is the 100% correlation

[82]:
```
##split the data into traning set and testing set,

from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(
x, y, test_size=0.33, random_state=42)
```

[83]:
```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
x_train = scaler.fit_transform(x_train)
x_test = scaler.transform(x_test)
```

[84]:
```
## fitting the LogisticRegression into training  set,
from sklearn.linear_model import LogisticRegression
logr=LogisticRegression(random_state=42)
logr.fit(x_train,y_train)
```

[84]: LogisticRegression(random_state=42)

[66]:
```
## predicting the testing set,
y_pred=logr.predict(x_test)
y_pred
```

[66]:
```
array([1, 1, 3, 1, 2, 1, 2, 3, 2, 3, 1, 3, 1, 2, 1, 2, 2, 2, 1, 2, 1, 2,
       2, 3, 3, 3, 2, 2, 2, 1, 1, 2, 3, 1, 1, 1, 3, 3, 2, 3, 1, 2, 2, 3,
       3, 1, 2, 2, 3, 1, 2, 1, 1, 3, 3, 2, 2, 1, 2], dtype=int64)
```

[67]:
```
## i want to see the score,
logr.score(x_test,y_test)
```

[67]: 0.9830508474576272

[85]:
```

```

[ ]:
```

```