In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sn
```

In [2]:
```
path = 'https://raw.githubusercontent.com/ovibaridar/Data_sets/main/cancer%20pa
```

In [3]:
```
data = pd.read_csv(path)
```

In [4]:
```
data.head()
```

Out[4]:

	index	Patient Id	Age	Gender	Air Pollution	Alcohol use	Dust Allergy	OccuPational Hazards	Genetic Risk	chronic Lung Disease	...
0	0	P1	33	1	2	4	5	4	3	2	...
1	1	P10	17	1	3	1	5	3	4	2	...
2	2	P100	35	1	4	5	6	5	5	4	...
3	3	P1000	37	1	7	7	7	7	6	7	...
4	4	P101	46	1	6	8	7	7	7	6	...

5 rows × 26 columns

In [5]:
```
data = data.drop(['index','Patient Id'], axis=1)
```

In [6]:
```
data.head()
```

Out[6]:

	Age	Gender	Air Pollution	Alcohol use	Dust Allergy	OccuPational Hazards	Genetic Risk	chronic Lung Disease	Balanced Diet	Obesity
0	33	1	2	4	5	4	3	2	2	4
1	17	1	3	1	5	3	4	2	2	2
2	35	1	4	5	6	5	5	4	6	7
3	37	1	7	7	7	7	6	7	7	7
4	46	1	6	8	7	7	7	6	7	7

5 rows × 24 columns

In [7]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 24 columns):
 #   Column                    Non-Null Count  Dtype 
---  ------                    --------------  ----- 
 0   Age                       1000 non-null   int64 
 1   Gender                    1000 non-null   int64 
 2   Air Pollution             1000 non-null   int64 
 3   Alcohol use               1000 non-null   int64 
 4   Dust Allergy              1000 non-null   int64 
 5   OccuPational Hazards      1000 non-null   int64 
 6   Genetic Risk              1000 non-null   int64 
 7   chronic Lung Disease      1000 non-null   int64 
 8   Balanced Diet             1000 non-null   int64 
 9   Obesity                   1000 non-null   int64 
 10  Smoking                   1000 non-null   int64 
 11  Passive Smoker            1000 non-null   int64 
 12  Chest Pain                1000 non-null   int64 
 13  Coughing of Blood         1000 non-null   int64 
 14  Fatigue                   1000 non-null   int64 
 15  Weight Loss               1000 non-null   int64 
 16  Shortness of Breath       1000 non-null   int64 
 17  Wheezing                  1000 non-null   int64 
 18  Swallowing Difficulty     1000 non-null   int64 
 19  Clubbing of Finger Nails  1000 non-null   int64 
 20  Frequent Cold             1000 non-null   int64 
 21  Dry Cough                 1000 non-null   int64 
 22  Snoring                   1000 non-null   int64 
 23  Level                     1000 non-null   object
dtypes: int64(23), object(1)
memory usage: 187.6+ KB
```

In [8]:
```
data.isnull().sum()
```

Out[8]:
```
Age                          0
Gender                       0
Air Pollution                0
Alcohol use                  0
Dust Allergy                 0
OccuPational Hazards         0
Genetic Risk                 0
chronic Lung Disease         0
Balanced Diet                0
Obesity                      0
Smoking                      0
Passive Smoker               0
Chest Pain                   0
Coughing of Blood            0
Fatigue                      0
Weight Loss                  0
Shortness of Breath          0
Wheezing                     0
Swallowing Difficulty        0
Clubbing of Finger Nails     0
Frequent Cold                0
Dry Cough                    0
Snoring                      0
Level                        0
dtype: int64
```

In [9]:
```
data.shape
```

Out[9]:
```
(1000, 24)
```

In [10]:
```
data.columns
```

Out[10]:
```
Index(['Age', 'Gender', 'Air Pollution', 'Alcohol use', 'Dust Allergy',
       'OccuPational Hazards', 'Genetic Risk', 'chronic Lung Disease',
       'Balanced Diet', 'Obesity', 'Smoking', 'Passive Smoker', 'Chest Pain',
       'Coughing of Blood', 'Fatigue', 'Weight Loss', 'Shortness of Breath',
       'Wheezing', 'Swallowing Difficulty', 'Clubbing of Finger Nails',
       'Frequent Cold', 'Dry Cough', 'Snoring', 'Level'],
      dtype='object')
```

In [11]:
```
data['Level'] = data['Level'].replace({'Low': 1, 'Medium': 2, 'High': 3})
```

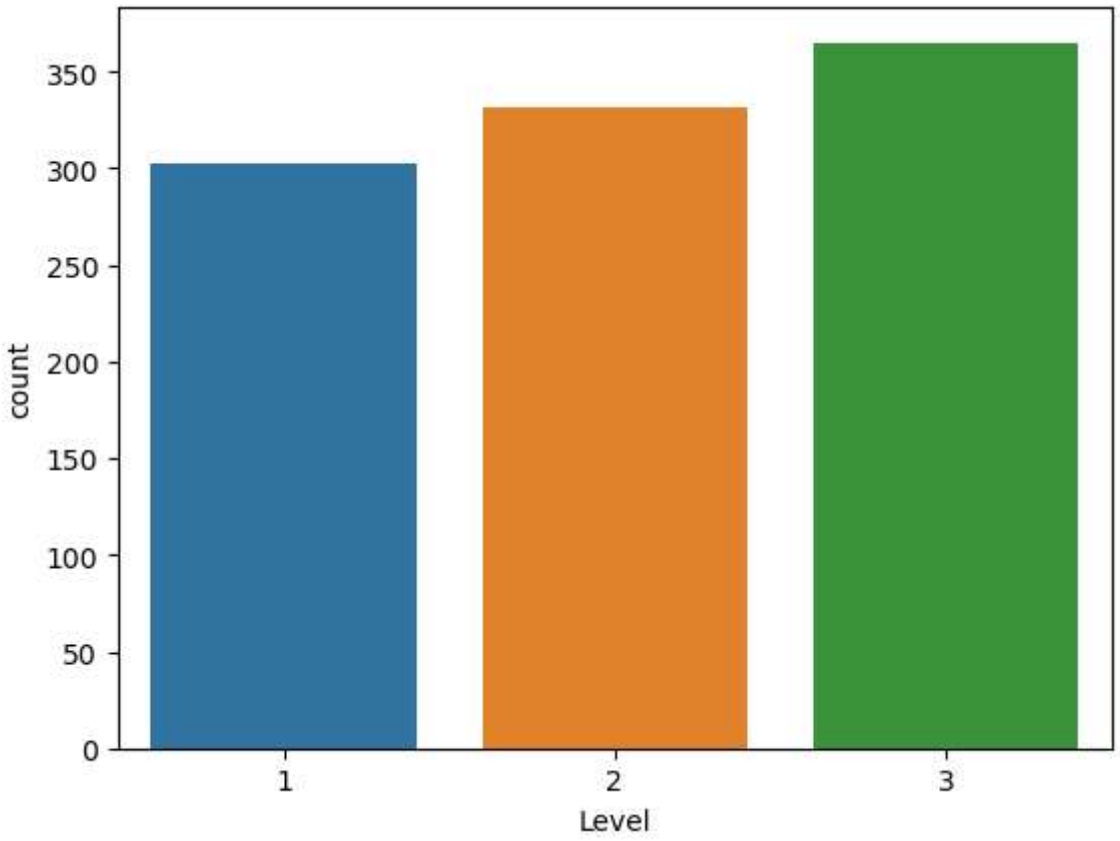
In [12]:
```
data['Level'].value_counts()
```

Out[12]:
```
Level
3    365
2    332
1    303
Name: count, dtype: int64
```

grafical view

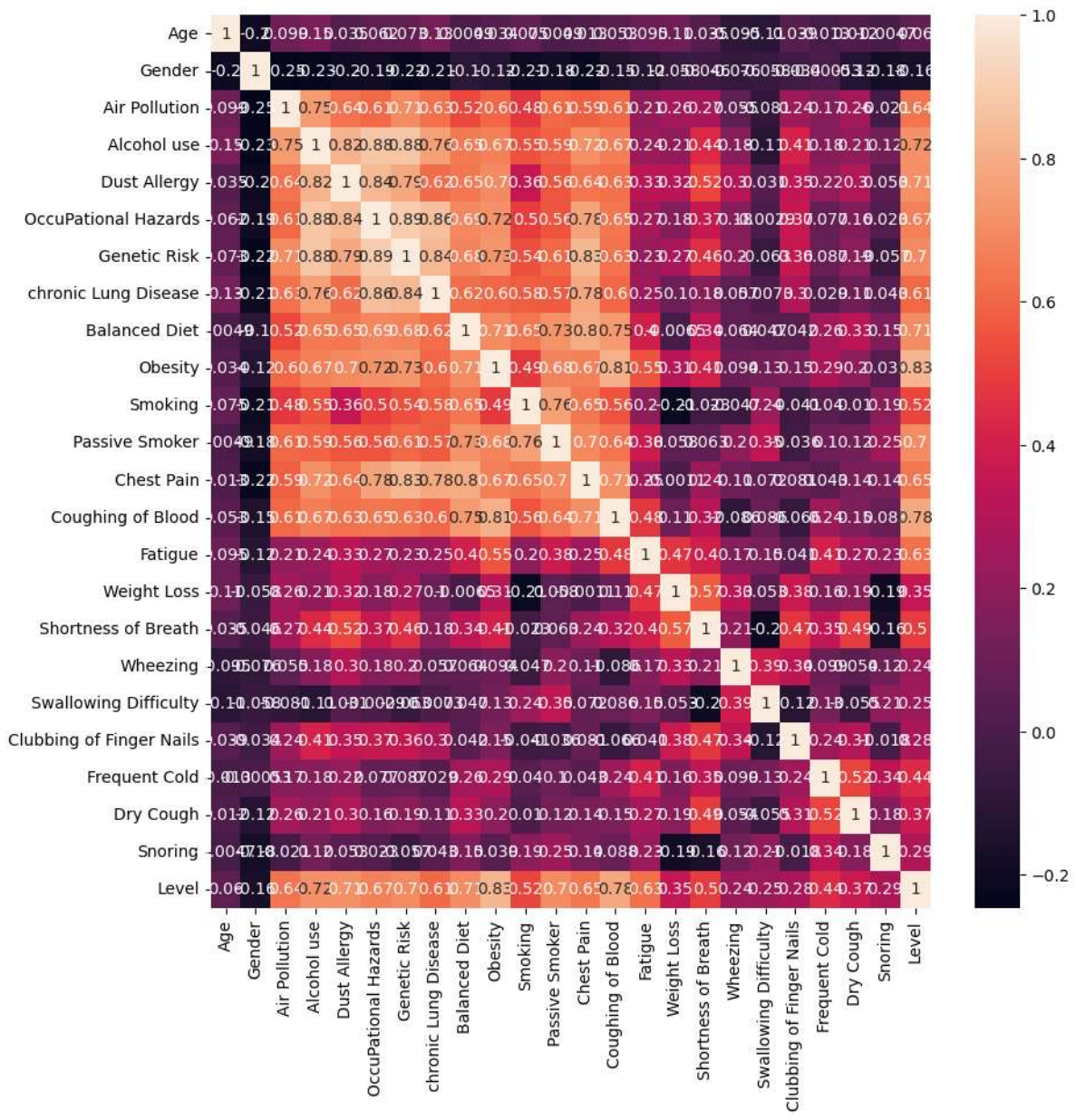
In [13]:
```
sn.countplot(data= data ,x='Level')
```

Out[13]:
```
<Axes: xlabel='Level', ylabel='count'>
```



In [14]:
```
plt.figure(figsize=(10,10))
sn.heatmap(data.corr() ,annot = True)
```

Out[14]: <Axes: >



In [15]:
```
data.duplicated().sum()
```

Out[15]: 848

In [16]:
```
data = data.drop_duplicates()
```

In [17]:
```
data.duplicated().sum()
```

Out[17]: 0

In [18]:
```
data.shape
```

Out[18]:
```
(152, 24)
```

In [19]:
```
x = data.drop('Level' , axis=1)
y = data[['Level']]
```

In [20]:
```
from sklearn.model_selection import train_test_split
```

In [21]:
```
xtrain,xtest,ytrain,ytest = train_test_split(x,y ,random_state = 42 ,test_size
```

In [22]:
```
xtrain.shape
```

Out[22]:
```
(106, 23)
```

In [23]:
```
xtest.shape
```

Out[23]:
```
(46, 23)
```

In [24]:
```
from sklearn.tree import DecisionTreeClassifier
```

In [25]:
```
dtc = DecisionTreeClassifier()
```

In [26]:
```
dtc.fit(xtrain,ytrain)
```

Out[26]:
```
DecisionTreeClassifier
DecisionTreeClassifier()
```

In [27]:
```
dtc.score(xtest,ytest)
```

Out[27]:
```
0.9347826086956522
```

In [28]:
```
dtc.score(xtrain,ytrain)
```

Out[28]:
```
1.0
```

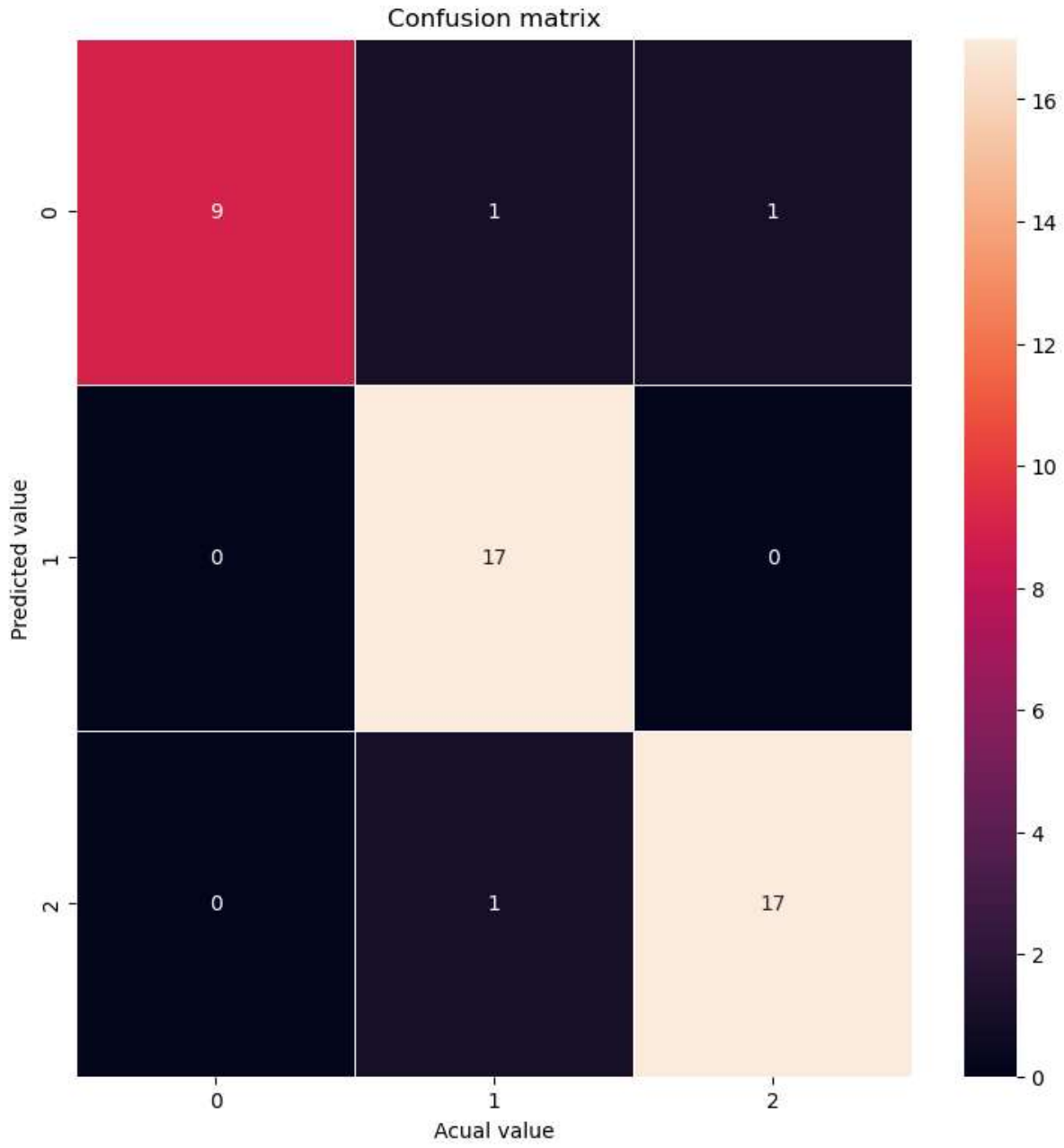
In [35]:
```
from sklearn.metrics import accuracy_score ,confusion_matrix ,classification_re
```

In [36]:
```
cm = confusion_matrix(ytest,dtc.predict(xtest))
cm
```

Out[36]:
```
array([[ 9,  1,  1],
       [ 0, 17,  0],
       [ 0,  1, 17]], dtype=int64)
```

In [37]:
```
plt.figure(figsize=(9,9))
sn.heatmap(cm,annot = True ,linewidth=.5)
plt.xlabel('Acual value')
plt.ylabel('Predicted value')
plt.title('Confusion matrix')
```

Out[37]: Text(0.5, 1.0, 'Confusion matrix')



In [39]:
```
print(classification_report(ytest,dtc.predict(xtest)))
```

```
              precision    recall  f1-score   support

           1       1.00      0.82      0.90        11
           2       0.89      1.00      0.94        17
           3       0.94      0.94      0.94        18

    accuracy                           0.93        46
   macro avg       0.95      0.92      0.93        46
weighted avg       0.94      0.93      0.93        46
```

In [ ]:
```

```