```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import sys
```

```python
data=pd.read_csv("fetal_health.csv")
data.head()
```

```
   baseline value  accelerations  fetal_movement  uterine_contractions
\
0           120.0          0.000             0.0                 0.000

1           132.0          0.006             0.0                 0.006

2           133.0          0.003             0.0                 0.008

3           134.0          0.003             0.0                 0.008

4           132.0          0.007             0.0                 0.008


   light_decelerations  severe_decelerations  prolongued_decelerations
\
0                0.000                   0.0                       0.0

1                0.003                   0.0                       0.0

2                0.003                   0.0                       0.0

3                0.003                   0.0                       0.0

4                0.000                   0.0                       0.0


   abnormal_short_term_variability
mean_value_of_short_term_variability  \
0                             73.0
0.5
1                             17.0
2.1
2                             16.0
2.1
3                             16.0
2.4
4                             16.0
2.4

   percentage_of_time_with_abnormal_long_term_variability  ...
```

```
histogram_min  \
0                                               43.0       ...
62.0
1                                                0.0       ...
68.0
2                                                0.0       ...
68.0
3                                                0.0       ...
53.0
4                                                0.0       ...
53.0

   histogram_max  histogram_number_of_peaks
histogram_number_of_zeroes  \
0          126.0                        2.0
0.0
1          198.0                        6.0
1.0
2          198.0                        5.0
1.0
3          170.0                       11.0
0.0
4          170.0                        9.0
0.0

   histogram_mode  histogram_mean  histogram_median
histogram_variance  \
0           120.0           137.0             121.0
73.0
1           141.0           136.0             140.0
12.0
2           141.0           135.0             138.0
13.0
3           137.0           134.0             137.0
13.0
4           137.0           136.0             138.0
11.0

   histogram_tendency  fetal_health
0                 1.0           2.0
1                 0.0           1.0
2                 0.0           1.0
3                 1.0           1.0
4                 1.0           1.0

[5 rows x 22 columns]
```

```
data['fetal_health'] = data['fetal_health'].replace(1.0,0)
data['fetal_health'] = data['fetal_health'].replace(2.0,0)
```

```
data['fetal_health'] = data['fetal_health'].replace(3.0,1)
data
```

```
      baseline value  accelerations  fetal_movement
uterine_contractions  \
0              120.0          0.000           0.000
0.000
1              132.0          0.006           0.000
0.006
2              133.0          0.003           0.000
0.008
3              134.0          0.003           0.000
0.008
4              132.0          0.007           0.000
0.008
...              ...            ...             ...
...
2121           140.0          0.000           0.000
0.007
2122           140.0          0.001           0.000
0.007
2123           140.0          0.001           0.000
0.007
2124           140.0          0.001           0.000
0.006
2125           142.0          0.002           0.002
0.008

      light_decelerations  severe_decelerations
prolongued_decelerations  \
0                   0.000                   0.0
0.0
1                   0.003                   0.0
0.0
2                   0.003                   0.0
0.0
3                   0.003                   0.0
0.0
4                   0.000                   0.0
0.0
...                   ...                   ...
...
2121                0.000                   0.0
0.0
2122                0.000                   0.0
0.0
2123                0.000                   0.0
0.0
2124                0.000                   0.0
0.0
```

```
2125                0.000                   0.0
0.0

      abnormal_short_term_variability
mean_value_of_short_term_variability  \
0                                 73.0
0.5
1                                 17.0
2.1
2                                 16.0
2.1
3                                 16.0
2.4
4                                 16.0
2.4
...                                ...
...
2121                              79.0
0.2
2122                              78.0
0.4
2123                              79.0
0.4
2124                              78.0
0.4
2125                              74.0
0.4

      percentage_of_time_with_abnormal_long_term_variability  ...  \
0                                                  43.0       ...
1                                                   0.0       ...
2                                                   0.0       ...
3                                                   0.0       ...
4                                                   0.0       ...
...                                                 ...       ...
2121                                               25.0       ...
2122                                               22.0       ...
2123                                               20.0       ...
2124                                               27.0       ...
2125                                               36.0       ...

      histogram_min  histogram_max  histogram_number_of_peaks  \
0              62.0          126.0                        2.0
1              68.0          198.0                        6.0
2              68.0          198.0                        5.0
3              53.0          170.0                       11.0
4              53.0          170.0                        9.0
...             ...            ...                        ...
2121          137.0          177.0                        4.0
2122          103.0          169.0                        6.0
```

```
2123          103.0          170.0                        5.0
2124          103.0          169.0                        6.0
2125          117.0          159.0                        2.0

      histogram_number_of_zeroes  histogram_mode  histogram_mean  \
0                            0.0           120.0           137.0
1                            1.0           141.0           136.0
2                            1.0           141.0           135.0
3                            0.0           137.0           134.0
4                            0.0           137.0           136.0
...                          ...             ...             ...
2121                         0.0           153.0           150.0
2122                         0.0           152.0           148.0
2123                         0.0           153.0           148.0
2124                         0.0           152.0           147.0
2125                         1.0           145.0           143.0

      histogram_median  histogram_variance  histogram_tendency
fetal_health
0                121.0                73.0                 1.0
0.0
1                140.0                12.0                 0.0
0.0
2                138.0                13.0                 0.0
0.0
3                137.0                13.0                 1.0
0.0
4                138.0                11.0                 1.0
0.0
...                ...                 ...                 ...
...
2121             152.0                 2.0                 0.0
0.0
2122             151.0                 3.0                 1.0
0.0
2123             152.0                 4.0                 1.0
0.0
2124             151.0                 4.0                 1.0
0.0
2125             145.0                 1.0                 0.0
0.0

[2126 rows x 22 columns]
```

```python
X = data.drop('fetal_health', axis = 1)
```

```python
y = data['fetal_health']
```

```python
from sklearn.model_selection import train_test_split
```

```
x_train,x_test,y_train,y_test = train_test_split(X,y,test_size=0.2,
random_state=142)
x_train
```

```
      baseline value  accelerations  fetal_movement  
uterine_contractions  \
199            120.0          0.000           0.013   
0.000   
340            133.0          0.000           0.000   
0.000   
440            142.0          0.001           0.003   
0.001   
1427           144.0          0.006           0.000   
0.004   
1015           139.0          0.007           0.000   
0.005   
...              ...            ...             ...   
...   
1420           142.0          0.006           0.000   
0.007   
1616           144.0          0.003           0.049   
0.002   
1050           125.0          0.007           0.000   
0.005   
511            154.0          0.007           0.001   
0.002   
277            123.0          0.001           0.000   
0.004   

      light_decelerations  severe_decelerations  
prolongued_decelerations  \
199                 0.001                   0.0   
0.000   
340                 0.000                   0.0   
0.000   
440                 0.002                   0.0   
0.000   
1427                0.000                   0.0   
0.000   
1015                0.000                   0.0   
0.000   
...                   ...                   ...   
...   
1420                0.000                   0.0   
0.000   
1616                0.006                   0.0   
0.001   
1050                0.000                   0.0   
0.000   
511                 0.000                   0.0   
```

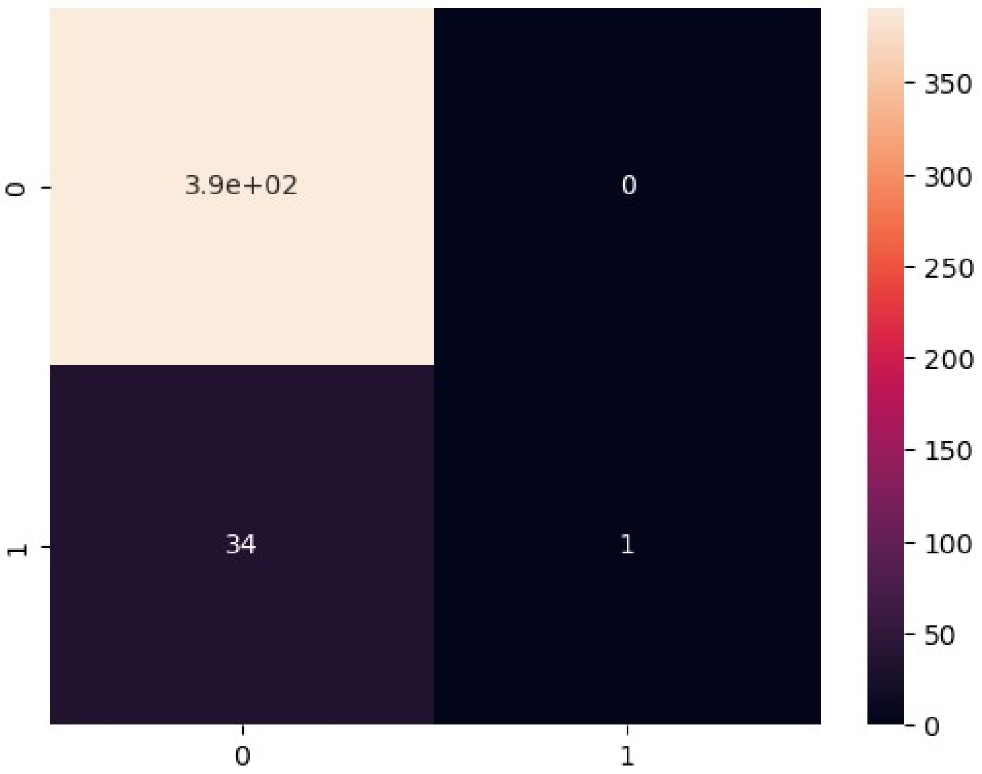
```
0.000
277                 0.000                   0.0
0.000

      abnormal_short_term_variability
mean_value_of_short_term_variability  \
199                              53.0
0.7
340                              75.0
0.2
440                              55.0
1.3
1427                             39.0
1.0
1015                             38.0
0.9
...                               ...
...
1420                             42.0
1.0
1616                             66.0
3.4
1050                             26.0
1.3
511                              45.0
0.8
277                              54.0
0.5

      percentage_of_time_with_abnormal_long_term_variability  ...  \
199                                                    7.0       ...
340                                                   91.0       ...
440                                                   10.0       ...
1427                                                   5.0       ...
1015                                                   0.0       ...
...                                                    ...       ...
1420                                                   0.0       ...
1616                                                   0.0       ...
1050                                                   0.0       ...
511                                                    0.0       ...
277                                                    9.0       ...

      histogram_width  histogram_min  histogram_max  \
199              77.0           56.0          133.0
340               7.0          131.0          138.0
440             115.0           52.0          167.0
1427             43.0          136.0          179.0
1015             34.0          136.0          170.0
...               ...            ...            ...
1420             97.0           74.0          171.0
```

```
1616            113.0          67.0         180.0
1050             87.0          79.0         166.0
511              47.0         142.0         189.0
277              29.0         116.0         145.0

      histogram_number_of_peaks  histogram_number_of_zeroes
histogram_mode  \
199                         6.0                         0.0
123.0
340                         1.0                         0.0
133.0
440                        12.0                         3.0
148.0
1427                        1.0                         0.0
157.0
1015                        1.0                         0.0
144.0
...                         ...                         ...
...
1420                        6.0                         0.0
148.0
1616                        7.0                         0.0
141.0
1050                        4.0                         0.0
131.0
511                         2.0                         1.0
161.0
277                         4.0                         0.0
126.0

      histogram_mean  histogram_median  histogram_variance
histogram_tendency
199            121.0             123.0                 3.0
1.0
340            134.0             135.0                 0.0
0.0
440            143.0             147.0                17.0
1.0
1427           157.0             157.0                 4.0
0.0
1015           146.0             146.0                 4.0
-1.0
...              ...               ...                 ...
...
1420           148.0             149.0                 5.0
1.0
1616           110.0             147.0                89.0
1.0
1050           133.0             132.0                11.0
0.0
```

```
511            166.0            165.0                10.0
0.0
277            128.0            129.0                 3.0
0.0

[1700 rows x 21 columns]
```

```python
from sklearn.linear_model import Lasso
from sklearn.model_selection import train_test_split # Import train_test_split function
from sklearn import metrics #Import scikit-learn metrics module for accuracy calculation

model = Lasso()
model.fit(x_train, y_train)
y_pred = model.predict(x_test)
ypred_binary = (y_pred > 0.5).astype('uint8')

#confusion matrix
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score

cm = confusion_matrix(y_test, ypred_binary)

sns.heatmap(cm, annot=True)
print(accuracy_score(y_test, ypred_binary))
```

```
0.92018779342723
```



```
from sklearn.metrics import classification_report
print(classification_report(y_test, ypred_binary))
```

```
              precision    recall  f1-score   support

         0.0       0.92      1.00      0.96       391
         1.0       1.00      0.03      0.06        35

    accuracy                           0.92       426
   macro avg       0.96      0.51      0.51       426
weighted avg       0.93      0.92      0.88       426
```

```
from sklearn.metrics import  roc_auc_score
uc_roc = roc_auc_score(y_test, ypred_binary, multi_class='ovr')
uc_roc
```

```
0.5142857142857142
```