In [2]:
```
import pandas as pd
import numpy as np
import tensorflow as tf
```

In [3]:
```
a=pd.read_csv("C:\All Datasets\Heart_Dis.csv")
a
```

Out[3]:

| | age | sex | cp | trestbps | chol | fbs | restecg | thalach | exang | oldpeak | slope | ca | thal | target |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 52 | 1 | 0 | 125 | 212 | 0 | 1 | 168 | 0 | 1.0 | 2.0 | 2 | 3 | 0 |
| **1** | 53 | 1 | 0 | 140 | 203 | 1 | 0 | 155 | 1 | 3.1 | 2.0 | 0 | 3 | 0 |
| **2** | 70 | 1 | 0 | 145 | 174 | 0 | 1 | 125 | 1 | 2.6 | 2.0 | 0 | 3 | 0 |
| **3** | 61 | 1 | 0 | 148 | 203 | 0 | 1 | 161 | 0 | 0.0 | 2.0 | 1 | 3 | 0 |
| **4** | 62 | 0 | 0 | 138 | 294 | 1 | 1 | 106 | 0 | 1.9 | 2.0 | 3 | 2 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **1020** | 59 | 1 | 1 | 140 | 221 | 0 | 1 | 164 | 1 | 0.0 | 2.0 | 0 | 2 | 1 |
| **1021** | 60 | 1 | 0 | 125 | 258 | 0 | 0 | 141 | 1 | 2.8 | 2.0 | 1 | 3 | 0 |
| **1022** | 47 | 1 | 0 | 110 | 275 | 0 | 0 | 118 | 1 | 1.0 | 2.0 | 1 | 2 | 0 |
| **1023** | 50 | 0 | 0 | 110 | 254 | 0 | 0 | 159 | 0 | 0.0 | 2.0 | 0 | 2 | 1 |
| **1024** | 54 | 1 | 0 | 120 | 188 | 0 | 1 | 113 | 0 | 1.4 | 2.0 | 1 | 3 | 0 |

1025 rows × 14 columns

In [8]:
```
a["cp"]=a["cp"].replace("ab",0)
```

In [9]:
```
a["target"].value_counts()
```

Out[9]:
```
1    526
0    499
Name: target, dtype: int64
```

In [10]:
```
x=a.iloc[:,:-1].values
y=a.iloc[:,-1].values
```

In [11]:
```
from imblearn.over_sampling import SMOTE
x1=SMOTE()
X,Y=x1.fit_resample(x,y)
```

In [12]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(X,Y,random_state=20,test_size=0.2)
```

In [13]:
```
ann = tf.keras.models.Sequential()
```

In [14]:
```
ann.add(tf.keras.layers.Dense(units=6, activation='relu'))
```

In [15]:
```
ann.add(tf.keras.layers.Dense(units=6, activation='relu'))
```

In [16]:
```
ann.add(tf.keras.layers.Dense(units=1, activation='sigmoid'))
```

In [21]:
```
ann.compile(optimizer = 'Adam', loss = 'binary_crossentropy', metrics = ['accurac
```

In [22]:
```
ann.fit(x_train, y_train, batch_size = 32, epochs = 50)
```

```
Epoch 1/50
27/27 [==============================] - 1s 4ms/step - loss: 0.8700 - accurac
y: 0.5101
Epoch 2/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6913 - accurac
y: 0.5244
Epoch 3/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6925 - accurac
y: 0.5065
Epoch 4/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6906 - accurac
y: 0.5042
Epoch 5/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6915 - accurac
y: 0.4935
Epoch 6/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6930 - accurac
y: 0.5089
Epoch 7/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6957 - accurac
y: 0.4792
Epoch 8/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6940 - accurac
y: 0.5101
Epoch 9/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6918 - accurac
y: 0.5042
Epoch 10/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6925 - accurac
y: 0.5125
Epoch 11/50
27/27 [==============================] - 0s 4ms/step - loss: 0.6905 - accurac
y: 0.5018
Epoch 12/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6999 - accurac
y: 0.5089
Epoch 13/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6930 - accurac
y: 0.4935
Epoch 14/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6914 - accurac
y: 0.4887
Epoch 15/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6897 - accurac
y: 0.5351
Epoch 16/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6908 - accurac
y: 0.5101
Epoch 17/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6876 - accurac
y: 0.5054
Epoch 18/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6884 - accurac
y: 0.5208
```

```
Epoch 19/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6852 - accurac
y: 0.5054
Epoch 20/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6876 - accurac
y: 0.5172
Epoch 21/50
27/27 [==============================] - 0s 4ms/step - loss: 0.6833 - accurac
y: 0.5505
Epoch 22/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6762 - accurac
y: 0.5600
Epoch 23/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6758 - accurac
y: 0.5600
Epoch 24/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6729 - accurac
y: 0.5707
Epoch 25/50
27/27 [==============================] - 0s 4ms/step - loss: 0.6683 - accurac
y: 0.5874
Epoch 26/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6666 - accurac
y: 0.5933
Epoch 27/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6656 - accurac
y: 0.5957
Epoch 28/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6593 - accurac
y: 0.6088
Epoch 29/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6538 - accurac
y: 0.6147
Epoch 30/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6589 - accurac
y: 0.6183
Epoch 31/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6503 - accurac
y: 0.6302
Epoch 32/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6447 - accurac
y: 0.6516
Epoch 33/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6362 - accurac
y: 0.6385
Epoch 34/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6248 - accurac
y: 0.6457
Epoch 35/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6252 - accurac
y: 0.6528
Epoch 36/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6217 - accurac
y: 0.6433
Epoch 37/50
27/27 [==============================] - 0s 3ms/step - loss: 0.6048 - accurac
y: 0.6623
```

```
Epoch 38/50
27/27 [==============================] - 0s 4ms/step - loss: 0.5993 - accurac
y: 0.6552
Epoch 39/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5995 - accurac
y: 0.6671
Epoch 40/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5847 - accurac
y: 0.6861
Epoch 41/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5820 - accurac
y: 0.6825
Epoch 42/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5782 - accurac
y: 0.7004
Epoch 43/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5753 - accurac
y: 0.7087
Epoch 44/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5682 - accurac
y: 0.6944
Epoch 45/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5654 - accurac
y: 0.7075
Epoch 46/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5655 - accurac
y: 0.7027
Epoch 47/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5561 - accurac
y: 0.7182
Epoch 48/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5552 - accurac
y: 0.7170
Epoch 49/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5490 - accurac
y: 0.7206
Epoch 50/50
27/27 [==============================] - 0s 3ms/step - loss: 0.5476 - accurac
y: 0.7241
```

Out[22]: <keras.callbacks.History at 0x27a3717bbb0>

In [ ]: