Build an Artificial Neural Network by implementing the backpropagation algorithm and test the same using appropriate data sets.

Aim:-

To build an artificial neural network by implementing the backpropagation algorithm and test the same using appropriate data sets.

Program:-

```
import numpy as np
X = np.array(([2,9],[1,5],[3,6]), dtype=float)
y = np.array(([92],[86],[89]), dtype=float)
X = X/np.amax(X, axis=0)
y = y/100
def sigmoid(x):
    return 1/(1+np.exp(-x))
def derivatives_sigmoid(x):
    return x*(1-x)
epoch=7000
lr=0.1
inputlayer_neurons=2
hiddenlayer_neurons=3
output_neurons=1
wh=np.random.uniform(size=(inputlayer_neurons,hiddenlayer_neurons))
bh=np.random.uniform(size=(1,hiddenlayer_neurons))
wout=np.random.uniform(size=(hiddenlayer_neurons,output_neurons))
bout=np.random.uniform(size=(1,output_neurons))
```

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```
for i in range(epoch):
    hinpl=np.dot(X,wh)
    hinp=hinpl+bh
    hlayer_act=sigmoid(hinp)
    outinpl=np.dot(hlayer_act,wout)
    outinp=outinpl+bout
    output=sigmoid(outinp)
    EO=y-output
    outgrad=derivatives_sigmoid(output)
    d_output=EO*outgrad
    EH=d-output.dot(wout.T)
    hiddengrad=derivatives_sigmoid(hlayer_act)
    d_hiddenlayer=EH*hiddengrad
    wout+=hlayer_act.T.dot(d_output)*lr
    wh+=X.T.dot(d_hiddenlayer)*lr
print("Input:\n"+str(X))
print("Actual Output:\n"+str(y))
print("Predicted Output:\n",output)
```

Result:-

Thus the program to build an artificial neural network by implementing the backpropagation algorithm and test the same using appropriate data set has been executed successfully.

Output:-

Input:

```
[[0.66666667 1. ]
 [0.33333333 0.55555556]
 [1.         0.66666667]]
```

Actual Output:

```
[[0.92]
 [0.86]
 [0.89]]
```

Predicted Output:

```
[[0.89559591]
 [0.88142069 ]
 [0.8928407 ]]
```