In [1]:
```
import math

i1=0.05
i2=0.1
w1=0.15
w2=0.20
b1=0.35
w3=0.25
w4=0.30
w5=0.4
w6=0.45
w7=0.5
w8=0.55

b2=0.6
o1=0.01
o2=0.99


h1=w1*i1+w2*i2+b1*1
print("h1=",h1)
h2=w3*i1+w4*i2+b1*1
print("h2= ",h2)
```

```
h1= 0.3775
h2=  0.39249999999999996
```

In [2]:
```
outh1=1/(1+math.exp(-h1))
print("outh1= ",outh1)
outh2=1/(1+math.exp(-h2))
print("outh2=",outh2)
```

```
outh1=  0.5932699921071872
outh2= 0.596884378259767
```

In [3]:
```
neto1=w5*outh1+w6*outh2+b2*1
print("neto1=",neto1)
outo1=1/(1+math.exp(-neto1))
print("outo1=",outo1)
neto2=w8*outh2+outh1*w7+b2*1
print("neto2=",neto2)
outo2=1/(1+math.exp(-neto2))
print("outo2=",outo2)
```

```
neto1= 1.10590596705977
outo1= 0.7513650695523157
neto2= 1.2249214040964653
outo2= 0.7729284653214625
```

In [4]:
```
Error1=(o1-outo1)**2/2
print("totalerror1=",Error1)
Error2=(o2-outo2)**2/2
print("totalerror2=",Error2)

Etotal=(Error1+Error2)
print("Etotal=",Etotal)
```

```
totalerror1= 0.274811083176155
totalerror2= 0.023560025583847746
Etotal= 0.2983711087600027
```

BACKWARD PROPAGATION

In [5]:
```
#FIND THE VALUE OF W5:-
# dEtotal/dw5=dEtotal/douto1*dout1/neto1*dneto1/dw5
# do1=dEtotal/douto1*dout1/neto1*dneto1/dw5
print("****dEtotal/douto1****** ")
Etotalouto1=-(o1-outo1)
print("Etotalouto1=",Etotalouto1)
#douto1/dneto1=netw5
print("*****dout1/neto1********")
outo1neto1=outo1*(1-outo1)
print("outo1neto1 =",outo1neto1)
print("**********neto1w5**********")
neto1w5=1*outh1
print("neto1w5 =",neto1w5)
print("*****dneto1/dw5*****")
Etotalw5=Etotalouto1*outo1neto1*neto1w5
print("Etotal  =",Etotalw5)

#n=learning rate (eta)
n=0.5
finalw5=w5-(n*Etotalw5)
print("finalw5=",finalw5)
```

```
****dEtotal/douto1******
Etotalouto1= 0.7413650695523157
*****dout1/neto1********
outo1neto1 = 0.18681560180895948
**********neto1w5**********
neto1w5 = 0.5932699921071872
*****dneto1/dw5*****
Etotal  = 0.08216704056423078
finalw5= 0.35891647971788465
```

In [6]:

```
#FIND THE VALUE OF W6:-
# dEtotal/dw6=dEtotal/douto1*dout1/neto1*dneto1/dw6
# do1=dEtotal/douto1*dout1/neto1*dneto1/dw6
#FIND THE VALUE OF W5:-
# dEtotal/dw5=dEtotal/douto1*dout1/neto1*dneto1/dw5
# do1=dEtotal/douto1*dout1/neto1*dneto1/dw5
print("****dEtotal/douto1****** ")
Etotalouto1=-(o1-outo1)
print("Etotalouto1=",Etotalouto1)
#douto1/dneto1=netw5
print("*****dout1/neto1********")
outo1neto1=outo1*(1-outo1)
print("outo1neto1 =",outo1neto1)
neto1w6=1*outh2
print("neto1w6 =",neto1w6)
print("*****dneto1/dw6*****")
Etotalw6=Etotalouto1*outo1neto1*neto1w6
print("Etotal  =",Etotalw6)

#n=learning rate (eta)
n=0.5
finalw6=w6-(n*Etotalw5)
print("finalw6=",finalw6)

# print("****dEtotal/douto2****** ")
# Etotalouto2=-(o2-outo2)
# print("Etotalouto2=",Etotalouto2)
# #douto1/dneto1=netw5
# print("*****dout2/neto2********")
# outo1neto2=outo2*(1-outo2)
# print("outo1neto2 =",outo1neto2)
# neto2w6=1*outh2
# print("neto1w6 =",neto2w6)
# print("*****dneto2/dw6*****")
# Etotalw6=Etotalouto2*outo1neto2*neto2w6
# print("Etotal  =",Etotalw6)

# #n=learning rate (eta)
# n=0.5
# finalw6=w6-(n*Etotalw6)
# print("finalw6=",finalw6)
```

```
****dEtotal/douto1******
Etotalouto1= 0.7413650695523157
*****dout1/neto1********
outo1neto1 = 0.18681560180895948
neto1w6 = 0.596884378259767
*****dneto1/dw6*****
Etotal  = 0.08266762784753326
finalw6= 0.40891647971788464
```

In [ ]:

In [7]:
```
#FIND THE VALUE OF W7:-
# dEtotal/dw6=dEtotal/douto1*dout1/neto1*dneto1/dw7
# do1=dEtotal/douto1*dout1/neto1*dneto1/dw7
print("****dEtotal/douto1****** ")
Etotalouto2=-(o2-outo2)
print("Etotalouto1=",Etotalouto2)
#douto1/dneto1=netw7
print("*****dout1/neto2********")
outo2neto2=outo2*(1-outo2)
print("outo1neto1 =",outo2neto2)
neto2w7=1*outh1
print("neto1w7 =",neto2w7)
print("*****dneto1/dw7*****")
Etotalw7=Etotalouto2*outo2neto2*neto2w7
print("Etotal  =",Etotalw7)

#n=learning rate (eta)
n=0.5
finalw7=w7-n*Etotalw7
print("finalw7=",finalw7)
```

```
****dEtotal/douto1******
Etotalouto1= -0.21707153467853746
*****dout1/neto2********
outo1neto1 = 0.17551005281727122
neto1w7 = 0.5932699921071872
*****dneto1/dw7*****
Etotal  = -0.022602540477475067
finalw7= 0.5113012702387375
```

In [ ]:

In [8]:
```
#Update the weight-8
#To decrease the error, we then subtract this value from the current weight.

print("****dEtotal/douto2****** ")
Etotalouto2=-(o2-outo2)
print("Etotalouto2=",Etotalouto2)
#douto1/dneto1=netw8

print("*****dout2/neto2********")
outo1neto2=outo2*(1-outo2)
print("outo1neto2 =",outo1neto2)
neto2w8=1*outh2
print("neto1w8 =",neto2w8)
print("*****dneto2/dw6*****")
Etotalw8=Etotalouto2*outo1neto2*neto2w8
print("Etotal  =",Etotalw8)

#n=learning rate (eta)
n=0.5
finalw8=w8-(n*Etotalw8)
print("finalw8=",finalw8)
```

```
****dEtotal/douto2******
Etotalouto2= -0.21707153467853746
*****dout2/neto2********
outo1neto2 = 0.17551005281727122
neto1w8 = 0.596884378259767
*****dneto2/dw6*****
Etotal  = -0.02274024221597822
finalw8= 0.5613701211079891
```

In [9]:
```
#find the value of w1:-
print("**********first dE1/dY1**********")
Etotal1=-(o1-outo1)*outo1neto1
print("E1 =",Etotal1)
print("**********dy2final/dy2*********")
E2final=outo2*(1-outo2)
print("y2final =",E2final)
print("*******E1/y1*********")
print("*********this section is taken by error2 and out2**********")
E2w7o2=-(o2-outo2)*E2final
print("from error E2 side =",E2w7o2)
print("feeding the value in h1 by the output side ")
w5Etotal1=Etotal1*w5
print("input of h1 =",w5Etotal1)
print("this value is taken by w7 and E2w7o2")
E2=E2w7o2*w7
print("from E2 =",E2)
print("adding the value w7 and w5")
totalE1=E2+w5Etotal1
print("total =",totalE1)
print("******h1 final*****")
final=outh1*(1-outh1)
print("H1 final =",final)
print("**** final Error of w1*****")
Errorw1=totalE1*final*i1
print("Errorw1 =",Errorw1)
print("**********final new value of w1***********")
finalw1=w1-(n*Errorw1)
print("finalw1 =",finalw1)
```

```
**********first dE1/dY1**********
E1 = 0.13849856162855698
**********dy2final/dy2*********
y2final = 0.17551005281727122
*******E1/y1*********
*********this section is taken by error2 and out2**********
from error E2 side = -0.03809823651655623
feeding the value in h1 by the output side
input of h1 = 0.05539942465142279
this value is taken by w7 and E2w7o2
from E2 = -0.019049118258278114
adding the value w7 and w5
```

```
total = 0.03635030639314468
******h1 final*****
H1 final = 0.24130070857232525
**** final Error of w1*****
Errorw1 = 0.00043856773447434685
**********final new value of w1***********
finalw1 = 0.1497807161327628
```

In [14]:
```
#find the value of w3:-
print("**********first dE1/dY1**********")
Etotal1=-(o1-outo1)*outo1neto1
print("E1 =",Etotal1)
print("**********dy2final/dy2*********")
E2final=outo2*(1-outo2)
print("y2final =",E2final)
print("*******E1/y1*********")
print("*********this section is taken by error2 and out2**********")
E2w7o2=-(o2-outo2)*E2final
print("from error E2 side =",E2w7o2)
print("feeding the value in h1 by the output side ")
w5Etotal1=Etotal1*w5
print("input of h1 =",w5Etotal1)
print("this value is taken by w7 and E2w7o2")
E2=E2w7o2*w7
print("from E2 =",E2)
print("adding the value w7 and w5")
totalE1=E2+w5Etotal1
print("total =",totalE1)
print("******h1 final*****")
final=outh1*(1-outh1)
print("H1 final =",final)
print("**** final Error of w3*****")
Errorw2=totalE1*final*i1
print("Errorw3 =",Errorw2)
print("**********final new value of w3***********")
finalw3=w3-(n*Errorw2)
print("finalw3 =",finalw3)
```

```
**********first dE1/dY1**********
E1 = 0.13849856162855698
**********dy2final/dy2*********
y2final = 0.17551005281727122
*******E1/y1*********
*********this section is taken by error2 and out2**********
from error E2 side = -0.03809823651655623
feeding the value in h1 by the output side
input of h1 = 0.05539942465142279
this value is taken by w7 and E2w7o2
from E2 = -0.019049118258278114
adding the value w7 and w5
total = 0.03635030639314468
```

```
******h1 final*****
H1 final = 0.24130070857232525
**** final Error of w3*****
Errorw3 = 0.00043856773447434685
**********final new value of w3**********
finalw3 = 0.24978071613276281
```

In [11]:
```
#find the value of w4:-
print("**********first dE1/dY1**********")
Etotal1=-(o1-outo1)*outo1neto1
print("E1 =",Etotal1)
print("**********dy2final/dy2*********")
E2final=outo2*(1-outo2)
print("y2final =",E2final)
print("*******E1/y1*********")
print("*********this section is taken by error2 and out2**********")
E2w7o2=-(o2-outo2)*E2final
print("from error E2 side =",E2w7o2)
print("feeding the value in h1 by the output side ")
w5Etotal1=Etotal1*w5
print("input of h1 =",w5Etotal1)
print("this value is taken by w7 and E2w7o2")
E2=E2w7o2*w7
print("from E2 =",E2)
print("adding the value w7 and w5")
totalE1=E2+w5Etotal1
print("total =",totalE1)
print("******h1 final*****")
final=outh1*(1-outh1)
print("H1 final =",final)
print("**** final Error of w4*****")
Errorw4=totalE1*final*i1
print("Errorw1 =",Errorw4)
print("**********final new value of w4***********")
finalw4=w4-(n*Errorw2)
print("finalw2 =",finalw2)
```

```
**********first dE1/dY1**********
E1 = 0.13849856162855698
**********dy2final/dy2*********
y2final = 0.17551005281727122
*******E1/y1*********
*********this section is taken by error2 and out2**********
from error E2 side = -0.03809823651655623
feeding the value in h1 by the output side
input of h1 = 0.05539942465142279
this value is taken by w7 and E2w7o2
from E2 = -0.019049118258278114
adding the value w7 and w5
total = 0.03635030639314468
```

```
******h1 final*****
H1 final = 0.24130070857232525
**** final Error of w1*****
Errorw1 = 0.00043856773447434685
**********final new value of w1**********
finalw2 = 0.2997807161327628
```

In [ ]:

In [ ]: