1. **Single layer Perceptron AND**

import numpy as np

x=np.array([[1,1],[1,-1],[-1,1],[-1,-1]])

t=np.array([[1],[1],[1],[-1]])

w=np.array([[0],[0]])

b=0

theta=float(input("Enter new theta:"))

alpha=float(input("Enter new alpha:"))

yin=np.zeros(shape=(4,1))

y=np.zeros(shape=(4,1))

i=0

found=0

while(found==0):

yin=x[i][0]\*w[0]+x[i][1]\*w[1]

yin = yin+b

if(yin>theta):

y[i] = 1

elif(yin<=theta and yin>=-theta):

y[i]=0

else:

y[i]=-1

if (y[i]==t[i]):

print("NO UPDATION REQUIRED")

print(y[i])

if(i<3):

i=i+1

else:

i=0

else:

print("MODEL IS NOT TRAINED")

print("The value of output is")

print(y)

w[0]=w[0]+alpha\*x[i][0]\*t[i]

w[1]=w[1]+alpha\*x[i][1]\*t[i]

b = b+alpha\*t[i]

if(i<3):

i=i+1

else:

i=0

if(y==t).all():

found=1

print("The final weight matrix is:")

print(w)

print("The final output is:")

print(y)

Enter new theta:0.2

Enter new alpha:1

MODEL IS NOT TRAINED

The value of output is

[[0.]

[0.]

[0.]

[0.]]

NO UPDATION REQUIRED

[1.]

NO UPDATION REQUIRED

[1.]

NO UPDATION REQUIRED

[-1.]

NO UPDATION REQUIRED

[1.]

The final weight matrix is:

[[1]

[1]]

The final output is:

[[ 1.]

[ 1.]

[ 1.]

[-1.]]

1. **Single Layer Perceptron using OR**

import numpy as np

x=np.array([[1,1],[1,-1],[-1,1],[-1,-1]])

t=np.array([[1],[1],[1],[-1]])

w=np.array([[0],[0]])

b=0

theta=float(input("enter new theta"))

alpha=float(input("enter new alpha"))

yin=np.zeros(shape=(4,1))

y=np.zeros(shape=(4,1))

i=0

found=0

while(found==0):

yin=x[i][0]\*w[0]+x[i][1]\*w[1]

yin = yin+b

if(yin>theta):

y[i] = 1

elif(yin<=theta and yin>=-theta):

y[i]=0

else:

y[i]=-1

if (y[i]==t[i]):

print("NO UPDATION REQUIRED")

print(y[i])

if(i<3):

i=i+1

else:

i=0

else:

print("MODEL IS NOT TRAINED")

print("The value of output is")

print(y)

w[0]=w[0]+alpha\*x[i][0]\*t[i]

w[1]=w[1]+alpha\*x[i][1]\*t[i]

b = b+alpha\*t[i]

if(i<3):

i=i+1

else:

i=0

if(y==t).all():

found=1

print("The final weight matrix is ")

print(w)

print("The final output is:")

print(y)

enter new theta0.2

enter new alpha1

MODEL IS NOT TRAINED

The value of output is

[[0.]

[0.]

[0.]

[0.]]

NO UPDATION REQUIRED

[1.]

NO UPDATION REQUIRED

[1.]

NO UPDATION REQUIRED

[-1.]

NO UPDATION REQUIRED

[1.]

The final weight matrix is

[[1]

[1]]

The final output is:

[[ 1.]

[ 1.]

[ 1.]

[-1.]]

1. **Single Layer Perceptron using AND NOT**

import numpy as np

x=np.array([[1,1],[1,-1],[-1,1],[-1,-1]])

t=np.array([[-1],[1],[-1],[-1]])

w=np.array([[0],[0]])

b=0

theta=float(input("Enter new theta:"))

alpha=float(input("Enter new alpha:"))

yin=np.zeros(shape=(4,1))

y=np.zeros(shape=(4,1))

i=0

found=0

while(found==0):

yin=x[i][0]\*w[0]+x[i][1]\*w[1]

yin = yin+b

if(yin>theta):

y[i] = 1

elif(yin<=theta and yin>=-theta):

y[i]=0

else:

y[i]=-1

if (y[i]==t[i]):

print("NO UPDATION REQUIRED")

print(y[i])

if(i<3):

i=i+1

else:

i=0

else:

print("MODEL IS NOT TRAINED")

print("The value of output is")

print(y)

w[0]=w[0]+alpha\*x[i][0]\*t[i]

w[1]=w[1]+alpha\*x[i][1]\*t[i]

b = b+alpha\*t[i]

if(i<3):

i=i+1

else:

i=0

if(y==t).all():

found=1

print("The final weight matrix is ")

print(w)

print("The final output is:")

print(y)

Enter new theta:0.2

Enter new alpha:1

MODEL IS NOT TRAINED

The value of output is

[[0.]

[0.]

[0.]

[0.]]

MODEL IS NOT TRAINED

The value of output is

[[ 0.]

[-1.]

[ 0.]

[ 0.]]

NO UPDATION REQUIRED

[-1.]

MODEL IS NOT TRAINED

The value of output is

[[ 0.]

[-1.]

[-1.]

[ 1.]]

NO UPDATION REQUIRED

[-1.]

NO UPDATION REQUIRED

[1.]

NO UPDATION REQUIRED

[-1.]

NO UPDATION REQUIRED

[-1.]

The final weight matrix is

[[ 1]

[-1]]

The final output is:

[[-1.]

[ 1.]

[-1.]

[-1.]]