# Ex.No.04. Back propagation in single neuron

## Aim:

To write a python program to perform back propagation in single neuron.

## Equipment’s Required:

1. Hardware – PCs
2. Anaconda – Python 3.7 Installation / Moodle-Code Runner / Google Colab

## Concept:

NUMPY

NumPy is a library for the Python programming language, adding support for large, multidimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays.

SK LEARN

Scikit-learn is a free software machine learning library for the Python programming language. It features various classification, regression and clustering algorithms including support-vector machines.

MATPLOTLIB

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using generalpurpose GUI toolkits like Tkinter, wxPython, Qt, or GTK.

## Algorithm:

1. Start the program.
2. Import libraries required as per requirement.
3. Define neuron weight, eeta, i, y.
4. summarize observations by class label
5. summarize first few examples  use for loop for range.
6. stop the program.

## Program:

```
#back propagation in single neuron

#BACK PROPOGATION IN SINGLE WINDOW

import numpy as np

i=1.5 w_o=0.0 y=0.5

#eeta r=0.01 def

dc_dw(a,y,i):

dc_da=2*(a-y)

da_dw=i return

dc_da*da_dw

w=[w_o] a=[w_o*i]


for j in range(0,100):

  a.append(w[-1]*i)

  w.append(w[-1]-r*dc_dw(a[-1],y,i)) if(a[-1]-

y)**2<0.001:

    break

print(a)

print(" ")

print(w)
```

## Output:

[0.0, 0.0, 0.0225, 0.0439875, 0.06450806249999999, 0.08410519968749999, 0.10282046570156249, 0.12069354474499219, 0.13776233523146753, 0.1540630301460515, 0.1696301937894792, 0.18449683506895262, 0.19869447749084973, 0.2122532260037615, 0.22520183083359224,

0.23756774844608058, 0.24937719976600697, 0.26065522577653666,
0.2714257406165925, 0.28171158228884585, 0.29153456108584785, 0.3009155058369847,
0.30987430807432037, 0.31842996421097597,
0.32660061582148203, 0.33440358810951537, 0.3418554266445872,
0.3489719324455808, 0.3557681954855296, 0.36225862668868075,
0.36845698848769015, 0.3743764240057441, 0.3800294849254856,
0.3854281581038388, 0.390583890989166, 0.39550761589465355,
0.40020977317939416, 0.40470033338632144, 0.40898881838393697,
0.41308432155665975, 0.41699552708661014, 0.42073072836771264,
0.42429784559116557, 0.4277044425395631, 0.43095774262528275, 0.43406464420714497,
0.43703173521782346, 0.4398653071330214, 0.4425713683120355, 0.44515565673799384,
0.44762365218478417,
0.4499805878364689, 0.45223146138382775, 0.45438104562155546,
0.4564338985685854, 0.458394373132999, 0.4602666263420141,
0.46205462815662346, 0.4637621698895754, 0.4653928722445445,
0.46695019299354, 0.46843743430883067]

[0.0, 0.015, 0.029324999999999997, 0.043005375, 0.056070133125,
0.06854697713437499, 0.08046236316332812, 0.09184155682097836,
0.10270868676403433, 0.11308679585965278, 0.12299789004596841, 0.13246298499389983,
0.14150215066917435, 0.1501345538890615,
0.15837849896405373, 0.16625146651067133, 0.17377015051769112, 0.18095049374439504,
0.18780772152589725, 0.19435637405723188, 0.20061033722465646, 0.20658287204954692,
0.21228664280731732,
0.21773374388098804, 0.22293572540634357, 0.22790361776305812, 0.2326479549637205,
0.23717879699035307, 0.24150575112578718,
0.24563799232512676, 0.24958428267049607, 0.25335298995032374, 0.2569521054025592,
0.260389260659444, 0.26367174392976905,
0.26680651545292944, 0.26980022225754763, 0.27265921225595796,
0.27538954770443985, 0.2779970180577401, 0.28048715224514176,
0.2828652303941104, 0.2851362950263754, 0.2873051617501885,
0.28937642947143, 0.29135449014521564, 0.2932435380886809,
0.2950475788746903, 0.29677043782532925, 0.29841576812318943,
0.2999870585576459, 0.3014876409225518, 0.30292069708103697, 0.3042892657123903,
0.3055962487553327, 0.30684441756134273,
0.3080364187710823, 0.3091747799263836, 0.31026191482969634,
0.31130012866236, 0.3122916228725538, 0.3132384998432889]

## **Result:**

Thus, the python program performed back propagation in single neuron.