Assignment 4



|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x1** | **x2** | **x0** | **w1** | **w2** | **w0** | **t** | **z(net)** | **y** | **t-y** | Dw1 | Dw2 | Dw0 |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | -1 | 0 | 0 | -0.4 |
| 0 | 1 | 1 | 1 | 1 | 0.6 | 0 | 1.6 | 1 | -1 | 0 | -0.4 | -0.4 |
| 1 | 0 | 1 | 1 | 0.6 | 0.2 | 0 | 1.2 | 1 | -1 | -0.4 | 0 | -0.4 |
| 1 | 1 | 1 | 0.6 | 0.6 | -0.2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0.6 | 0.6 | -0.2 | 0 | -0.2 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0.6 | 0.6 | -0.2 | 0 | 0.4 | 1 | -1 | 0 | -0.4 | -0.4 |
| 1 | 0 | 1 | 0.6 | 0.2 | -0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 0.6 | 0.2 | -0.6 | 1 | 0.2 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0.6 | 0.2 | -0.6 | 0 | -0.6 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0.6 | 0.2 | -0.6 | 0 | -0.4 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0.6 | 0.2 | -0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 0.6 | 0.2 | -0.6 | 1 | 0.2 | 1 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x1** | **x0** | **w1** | **w0** | **t** | **z(net)** | **y** | **t-y** | Dw1 | Dw0 |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0.1 |
| 1 | 1 | 0 | 0.1 | 0 | 0.1 | 1 | -1 | -0.1 | -0.1 |
| 0 | 1 | -0.1 | 0 | 1 | 0 | 0 | 1 | 0 | 0.1 |
| 1 | 1 | -0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | -0.1 | 0.1 | 1 | 0.1 | 1 | 0 | 0 | 0 |
| 1 | 1 | -0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |

1. [LINK](https://github.com/hgleos/CS4210-Machine-Learning/blob/main/Assignment%204/perceptron.py)

Diagram

Description automatically generated

Diagram

Description automatically generated

No, the input values were doubled, and the weights were unchanged so output just doubled.

1. [LINK](https://github.com/hgleos/CS4210-Machine-Learning/blob/main/Assignment%204/deep_learning.py)

Fitness(C­1) =

Fitness(C­2) =

Fitness(C­3) =

Fitness(C­4) =

1st generation (C­1=1001001, C­2=0100101, C­3=1011000, C­4=1101100):

Pr(C­1) = (4th)

Pr(C­4) = (3rd)

Pr(C­2) = (2nd)

Pr(C­3) = (1st)

C­3 = 101|1000 → C­5 = 110|1000

C­4 = 110|1100 → C­6 = 101|1100

Fitness(C­2) =

Fitness(C­3) =

Fitness(C­5) =

Fitness(C­6) =

2nd generation (C­2=0100101, C­3=1011000, C­5=1101000, C­6=1011100):

Pr(C­2) = (4th)

Pr(C­5) = (3rd)

Pr(C­6) = (2nd)

Pr(C­3) = (1st)

C­3 = 101|10|00 → C­7 = 101|11|00

C­6 = 101|11|00 → C­8 = 101|10|00

Mutation: C­8 = 1011000 → C­8 = 1011010

Fitness(C­3) =

Fitness(C­6) =

Fitness(C­7) =

Fitness(C­8) =

Final answer: C­8 = 1011010 has accuracy 1.0.