

# Assignment 1 Report

## 通訊二 110503504 林巧翎

### 1. 編譯結果

```
linchiaoling@linchiaoling-virtual-machine:~/110503504_assignment_2$ make
gcc -Wall -g -pedantic -std=c99 -c -o train.o train.c
gcc -Wall -g -pedantic -std=c99 -c -o ann.o ann.c
gcc -Wall -g -pedantic -std=c99 -c -o layer.o layer.c
gcc train.o ann.o layer.o -lm -o train
```

### 2. 執行結果

```
linchiaoling@linchiaoling-virtual-machine:~/110503504_assignment_2$ ./train
Big data machine learning.

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PART I - Creating a layer.

Trying to layer_create.
Running layer_init.
Here are some of the properties:
  num_outputs: 2
  num_inputs: 0
  outputs[0]: 0.000000
  outputs[1]: 0.000000

Creating second layer.
Running layer_init on second layer.
Here are some of the properties:
  num_outputs: 1
  num_inputs: 2
  weights[0]: -0.466530
  weights[1]: -0.170036
  biases[0]: 0.000000
  outputs[0]: 0.000000

Computing second layer outputs:
Here is the new output:
  outputs[0]: 0.500000

Freeing both layers.

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PART II - Creating a neural network.
2 inputs, 2 hidden neurons and 1 output.

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Initialising network with random weights...
The current state of the hidden layer:
weights[0][0]: 0.190636
weights[0][1]: -0.077513
weights[1][0]: -0.293735
weights[1][1]: -0.249872
biases[0]: 0.000000
biases[1]: 0.000000
outputs[0]: 0.000000
outputs[1]: 0.000000
Current random outputs of the network:
[0, 0] -> 0.562199
[0, 1] -> 0.554171
[1, 0] -> 0.562062
[1, 1] -> 0.554057

Training the network...
The current state of the hidden layer:
weights[0][0]: -12.419653
weights[0][1]: -23.432250
weights[1][0]: -12.561441
weights[1][1]: -23.574103
biases[0]: 3.415144
biases[1]: 14.394006
outputs[0]: 0.000000
outputs[1]: 0.000000

After training magic happened the outputs are:
[0, 0] -> 0.000145
[0, 1] -> 0.604772
[1, 0] -> 0.604736
[1, 1] -> 0.605006
```

### 3. 分析

由最終訓練出來的結果可以發現，距離我們預期的 **XOR** 的輸出結果，仍有一段距離， $[1,1]$  的輸出應該要接近 0，才是更精準的結果，或許可以嘗試訓練更多層、給更多 nodes，就有可能輸出更精準的結果。

```
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[0, 1] -> 0.604772  
[1, 0] -> 0.604736  
[1, 1] -> 0.605006
```