#Assignment 1

通訊四 108503303 馬寧

1. 編譯結果

```
Enter input to test:
PS D:\文件\大四上\資料結構\Neural_Network> cd D:\文件\大四上\資料結構\Neural_Network\assignment_1\src
PS D:\文件\大四上\資料結構\Neural_Network\assignment_1\src> gcc -o main main.c neuron.c layer.c
PS D:\文件\大四上\資料結構\Neural_Network\assignment_1\src> ./main
```

2. 執行結果

Test_1

先輸入神經網路(Neural Network, NN)的層數(layer)及每層神經元個數(neuron)

```
Enter the number of Layers in Neural Network(at least 3 layers):
3
Enter number of neurons in layer[1]:
2
Enter number of neurons in layer[2]:
2
Enter number of neurons in layer[3]:
1

Created Layer: 1
Number of Neurons in Layer 1: 2
Neuron 1 in Layer 1 created
Neuron 2 in Layer 1 created

Created Layer: 2
Number of Neurons in Layer 2: 2
Neuron 1 in Layer 2 created
Neuron 2 in Layer 2 created

Created Layer: 3
Number of Neurons in Layer 3: 1
Neuron 1 in Layer 3 created


Initializing weights...
0:w[0][0]: 0.682913
1:w[0][0]: 0.027223
0:w[0][1]: 0.190313
1:w[0][1]: 0.413312
0:w[1][0]: 0.206641
0:w[1][1]: 0.780663

Neural Network Created Successfully...
```

待 NN 架構建立完畢即可輸入訓練值個數、訓練值(須符合第一層 layer 個數)及預期訓練
結果

開始訓練資料(代入隨機產生的權重(Weight)至函式運算,經由運算後得出之結果與我們所
輸入的預期結果會產生誤差,再使用誤差值由後面的神經元至前面的神經元進行修正)

資料訓練完成後，可開始輸入欲測試的值，並得出結果

Test_2

資料訓練完成後，可開始輸入欲測試的值，並得出結果

```
Initializing weights...
0:w[0][0]: 0.770928
1:w[0][0]: 0.664785
2:w[0][0]: 0.576525
3:w[0][0]: 0.847957
0:w[0][1]: 0.153722
1:w[0][1]: 0.955931
2:w[0][1]: 0.651936
3:w[0][1]: 0.972320
0:w[1][0]: 0.137089
1:w[1][0]: 0.711844
2:w[1][0]: 0.939787
3:w[1][0]: 0.420454
0:w[1][1]: 0.775292
1:w[1][1]: 0.074435
2:w[1][1]: 0.301462
3:w[1][1]: 0.644795
0:w[1][2]: 0.121738
1:w[1][2]: 0.406537
2:w[1][2]: 0.465407
3:w[1][2]: 0.347484
0:w[1][3]: 0.181158
1:w[1][3]: 0.276376
2:w[1][3]: 0.410352
3:w[1][3]: 0.253059
0:w[2][0]: 0.560839
0:w[2][1]: 0.726981
0:w[2][2]: 0.432844
0:w[2][3]: 0.481552

Neural Network Created Successfully...

Enter the learning rate (Usually 0.15):
0.15

Enter the number of training examples:
4
```

```
Enter the number of training examples:
4

Enter the Inputs for training example[0]:
0 0

Enter the Inputs for training example[1]:
0 1

Enter the Inputs for training example[2]:
1 0

Enter the Inputs for training example[3]:
1 1

Enter the Desired Outputs (Labels) for training example[0]:
0

Enter the Desired Outputs (Labels) for training example[1]:
1

Enter the Desired Outputs (Labels) for training example[2]:
1

Enter the Desired Outputs (Labels) for training example[3]:
0
```

```
Enter input to test:
0 0
Output: 0

Enter input to test:
0 1
Output: 1

Enter input to test:
1 0
Output: 1

Enter input to test:
1 1
Output: 0

Enter input to test:
```
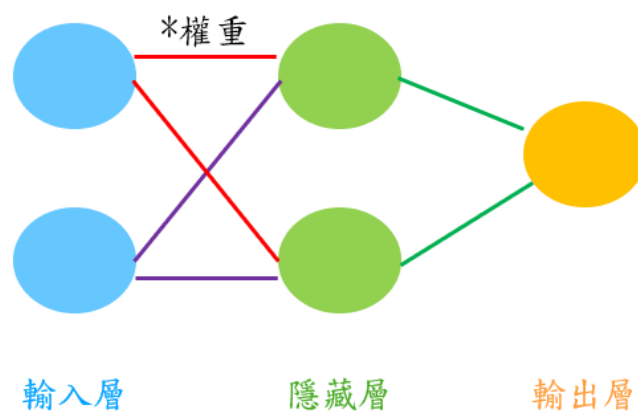
3. 分析

以 Test_1 為例

為輸入層(input layer)*1+隱藏層(hidden layer)*1+輸出層(output layer)*1 之神經網路

輸入層之神經元個數為 2、隱藏層之神經元個數為 2、輸出層之神經元個數為 1

每個輸入層的神經元訓練值輸入後與隨機產生之權重相乘,並於隱藏層中將得到的值相加,經反覆運算及修正後得出最終結果

4 個訓練值:

輸入層　　　隱藏層　　　輸出層

*權重

輸入層　　　隱藏層　　　輸出層

*權重

輸入層　　　隱藏層　　　輸出層

*權重

輸入層　　　隱藏層　　　輸出層

*權重