Homework 10/24

4B315021 詹家緯

main.py

```
def heb_net(x, target, alpha, init):
    i = 0
    w = list()
    w.append(list(init))
    while True:
        print("#{}".format(i + 1), end=", ")
        net = wx(w[i], x[i % len(x)])  # net value
        if (len(init) < 6):
            print("P_{} = {}, w = {}".format((i % len(x)) + 1, x[i % len(x)],
w[i]), end=", ")
        else:
            print("P_{}".format((i % len(x)) + 1), end=", ")
        print("net = {}".format(net), end=", ")
        print("f(net) = {}, target = {}".format(f_net(net), target[i % len(x)]))
        if f_net(net) == target[i % len(x)]:  # y = t ?
            w.append(list(w[i]))
            if (len(init) < 6):
                print("Result: do nothing.   {}".format(w[i + 1]))
            else:
                print("Result: do nothing.")
        else:
            w_new_list = list(
                w_new(w[i], alpha, target[i % len(x)], f_net(net), x[i % len(x)])
            )
            w.append(w_new_list)
            print("Result: weight change {}".format(w[i + 1]))
        if i >= len(x):
            check = 0
            for j in range(len(x)):
                if w[i + 1] == w[i - j]:
                    check += 1
            if check >= len(x):
                print("##")
                print(
                    "倒數{}次計算結果等值，最終結果：weight = {}".format(len(x), w[i])
                )
                print()
                break
            if i >= 100 - 1:
                print("## 執行100次")
                break
        i += 1
```

```
def w_new(w_old, alpha, t, y, x):
    # w_new = w_old + alpha * (t - y) * x
    x_cal = [alpha * (t - y) * 1]
    result = []
    for i in x:
        x_cal.append(alpha * (t - y) * i)
    for i in range(len(x_cal)):
        result.append(w_old[i] + x_cal[i])
    return result


def f_net(wx):
    if wx > 0:
        return 1
    else:
        return 0


def wx(w, x):
    result = w[0]
    for i in range(len(x)):
        result += w[i + 1] * x[i]
    return result
```

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	x_1	x_2	target
P_1	1	2	1
P_2	1	1	1
P_3	-1	0	1
P_4	3	3	0
P_5	3	2	0
P_6	4	3	0

prob_1.py

```
from main import heb_net

def main():
    x = [[1, 2], [1, 1], [-1, 0], [3, 3], [3, 2], [4, 3]]
    target = [1, 1, 1, 0, 0, 0]
```

```
    alpha = 1
    init = [1, -1, -1]  # initial value
    heb_net(x, target, alpha, init)


if __name__ == "__main__":
    main()
```

Output

```
#1, P_1 = [1, 2], w = [1, -1, -1], net = -2, f(net) = 0, target = 1
Result: weight change [2, 0, 1]
#2, P_2 = [1, 1], w = [2, 0, 1], net = 3, f(net) = 1, target = 1
Result: do nothing.   [2, 0, 1]
#3, P_3 = [-1, 0], w = [2, 0, 1], net = 2, f(net) = 1, target = 1
Result: do nothing.   [2, 0, 1]
#4, P_4 = [3, 3], w = [2, 0, 1], net = 5, f(net) = 1, target = 0
Result: weight change [1, -3, -2]
#5, P_5 = [3, 2], w = [1, -3, -2], net = -12, f(net) = 0, target = 0
Result: do nothing.   [1, -3, -2]
#6, P_6 = [4, 3], w = [1, -3, -2], net = -17, f(net) = 0, target = 0
Result: do nothing.   [1, -3, -2]
#7, P_1 = [1, 2], w = [1, -3, -2], net = -6, f(net) = 0, target = 1
Result: weight change [2, -2, 0]
#8, P_2 = [1, 1], w = [2, -2, 0], net = 0, f(net) = 0, target = 1
Result: weight change [3, -1, 1]
#9, P_3 = [-1, 0], w = [3, -1, 1], net = 4, f(net) = 1, target = 1
Result: do nothing.   [3, -1, 1]
#10, P_4 = [3, 3], w = [3, -1, 1], net = 3, f(net) = 1, target = 0
Result: weight change [2, -4, -2]
#11, P_5 = [3, 2], w = [2, -4, -2], net = -14, f(net) = 0, target = 0
Result: do nothing.   [2, -4, -2]
#12, P_6 = [4, 3], w = [2, -4, -2], net = -20, f(net) = 0, target = 0
Result: do nothing.   [2, -4, -2]
#13, P_1 = [1, 2], w = [2, -4, -2], net = -6, f(net) = 0, target = 1
Result: weight change [3, -3, 0]
#14, P_2 = [1, 1], w = [3, -3, 0], net = 0, f(net) = 0, target = 1
Result: weight change [4, -2, 1]
#15, P_3 = [-1, 0], w = [4, -2, 1], net = 6, f(net) = 1, target = 1
Result: do nothing.   [4, -2, 1]
#16, P_4 = [3, 3], w = [4, -2, 1], net = 1, f(net) = 1, target = 0
Result: weight change [3, -5, -2]
#17, P_5 = [3, 2], w = [3, -5, -2], net = -16, f(net) = 0, target = 0
Result: do nothing.   [3, -5, -2]
#18, P_6 = [4, 3], w = [3, -5, -2], net = -23, f(net) = 0, target = 0
Result: do nothing.   [3, -5, -2]
#19, P_1 = [1, 2], w = [3, -5, -2], net = -6, f(net) = 0, target = 1
Result: weight change [4, -4, 0]
#20, P_2 = [1, 1], w = [4, -4, 0], net = 0, f(net) = 0, target = 1
Result: weight change [5, -3, 1]
#21, P_3 = [-1, 0], w = [5, -3, 1], net = 8, f(net) = 1, target = 1
Result: do nothing.   [5, -3, 1]
```

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#22, P_4 = [3, 3], w = [5, -3, 1], net = -1, f(net) = 0, target = 0
Result: do nothing.   [5, -3, 1]
#23, P_5 = [3, 2], w = [5, -3, 1], net = -2, f(net) = 0, target = 0
Result: do nothing.   [5, -3, 1]
#24, P_6 = [4, 3], w = [5, -3, 1], net = -4, f(net) = 0, target = 0
Result: do nothing.   [5, -3, 1]
#25, P_1 = [1, 2], w = [5, -3, 1], net = 4, f(net) = 1, target = 1
Result: do nothing.   [5, -3, 1]
#26, P_2 = [1, 1], w = [5, -3, 1], net = 3, f(net) = 1, target = 1
Result: do nothing.   [5, -3, 1]
##
倒數6次計算結果等值，最終結果：weight = [5, -3, 1]
```

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prob_2.py

```
rom main import heb_net

def main():
    x = [[
            1,1,1,1,1,1,1,
            0,1,0,0,0,0,1,
            0,1,0,0,0,0,0,
            0,1,0,1,0,0,0,
            0,1,1,1,0,0,0,
            0,1,0,1,0,0,0,
            0,1,0,0,0,0,0,
            0,1,0,0,0,0,1,
            1,1,1,1,1,1,1
        ], [
            1,1,1,1,1,1,1,
            1,0,0,0,0,0,0,
            1,0,0,0,0,0,0,
            1,0,0,0,0,0,0,
            1,1,1,1,1,0,0,
            1,0,0,0,0,0,0,
            1,0,0,0,0,0,0,
            1,0,0,0,0,0,0,
            1,1,1,1,1,1,1
        ], [
            1,1,1,1,1,1,1,
            0,1,0,0,0,0,1,
            0,1,0,0,0,0,0,
            0,1,0,1,0,0,0,
            0,1,1,1,1,0,0,
            0,1,0,1,0,0,0,
            0,1,0,0,0,0,0,
            0,1,0,0,0,0,1,
            1,1,1,1,1,1,1
```

```
        ], [
            1,1,1,1,1,1,1,
            1,0,0,0,0,0,0,
            1,0,0,0,0,0,0,
            1,0,0,0,0,0,0,
            1,1,1,1,1,0,0,
            1,0,0,0,0,0,0,
            1,0,1,0,0,0,0,
            1,0,1,0,0,0,0,
            1,1,1,1,1,1,1
        ]]
    target = [1, 1, 0, 0]
    alpha = 1
    init = [
        1,1,1,1,1,1,1,1,
        1,-1,-1,-1,-1,-1,-1,
        1,-1,-1,-1,-1,-1,-1,
        1,-1,-1,-1,-1,-1,-1,
        1,1,1,1,1,-1,-1,
        1,-1,-1,-1,-1,-1,-1,
        1,-1,-1,-1,-1,-1,-1,
        1,-1,-1,-1,-1,-1,-1,
        1,1,1,1,1,1,1
        ]  # initial value
    heb_net(x, target, alpha, init)


if __name__ == "__main__":
    main()
```

Output

```
#1, P_1, net = 8, f(net) = 1, target = 1
Result: do nothing.
#2, P_2, net = 26, f(net) = 1, target = 1
Result: do nothing.
#3, P_3, net = 9, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, 0, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -1, -1, -1, -1, -1, 1, -2, -1, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#4, P_4, net = 5, f(net) = 1, target = 0
Result: weight change [-1, -1, -1, -1, -1, -1, -1, -1, 0, -2, -1, -1, -1, -1, -2,
0, -2, -1, -1, -1, -1, -1, 0, -2, -1, -2, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0,
-2, -1, -2, -1, -1, -1, 0, -2, -2, -1, -1, -1, -1, 0, -2, -2, -1, -1, -1, -2, -1,
-1, -1, -1, -1, -1, -1]
#5, P_1, net = -38, f(net) = 0, target = 1
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -1, -1, -1, 0, -1, -1,
-1, -1, -1, -1, 0, -1, -2, -1, -1, -1, -1, 0, -1, -2, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#6, P_2, net = -1, f(net) = 0, target = 1
```

```
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, 0, -1, -1, 1, -1, -1,
-1, -1, -1, -1, 1, -1, -2, -1, -1, -1, -1, 1, -1, -2, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#7, P_3, net = 8, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -1, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -2, -1, -1, -1, -1, 1, -2, -2, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#8, P_4, net = 2, f(net) = 1, target = 0
Result: weight change [-1, -1, -1, -1, -1, -1, -1, -1, 0, -2, -1, -1, -1, -1, -2,
0, -2, -1, -1, -1, -1, -1, 0, -2, -1, -2, -1, -1, -1, 0, -1, -1, -1, -2, -1, -1, 0,
-2, -1, -2, -1, -1, -1, 0, -2, -3, -1, -1, -1, -1, 0, -2, -3, -1, -1, -1, -2, -1,
-1, -1, -1, -1, -1, -1]
#9, P_1, net = -38, f(net) = 0, target = 1
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -2, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -3, -1, -1, -1, -1, 0, -1, -3, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#10, P_2, net = -2, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -1, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#11, P_3, net = 7, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -2, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -3, -1, -1, -1, -1, 1, -2, -3, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#12, P_4, net = -1, f(net) = 0, target = 0
Result: do nothing.
#13, P_1, net = -20, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -2, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#14, P_2, net = 23, f(net) = 1, target = 1
Result: do nothing.
#15, P_3, net = 6, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -3, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -3, -1, -1, -1, -1, 1, -2, -3, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#16, P_4, net = -2, f(net) = 0, target = 0
Result: do nothing.
#17, P_1, net = -20, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -3, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#18, P_2, net = 22, f(net) = 1, target = 1
Result: do nothing.
#19, P_3, net = 5, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -4, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -3, -1, -1, -1, -1, 1, -2, -3, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
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#20, P_4, net = -3, f(net) = 0, target = 0
Result: do nothing.
#21, P_1, net = -20, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -4, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#22, P_2, net = 21, f(net) = 1, target = 1
Result: do nothing.
#23, P_3, net = 4, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -5, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -3, -1, -1, -1, -1, 1, -2, -3, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#24, P_4, net = -4, f(net) = 0, target = 0
Result: do nothing.
#25, P_1, net = -20, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -5, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#26, P_2, net = 20, f(net) = 1, target = 1
Result: do nothing.
#27, P_3, net = 3, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -6, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -3, -1, -1, -1, -1, 1, -2, -3, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#28, P_4, net = -5, f(net) = 0, target = 0
Result: do nothing.
#29, P_1, net = -20, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -6, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#30, P_2, net = 19, f(net) = 1, target = 1
Result: do nothing.
#31, P_3, net = 2, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -7, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -3, -1, -1, -1, -1, 1, -2, -3, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#32, P_4, net = -6, f(net) = 0, target = 0
Result: do nothing.
#33, P_1, net = -20, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -7, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#34, P_2, net = 18, f(net) = 1, target = 1
Result: do nothing.
#35, P_3, net = 1, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 1, -2, -1, -1, -1, -1, -2, 1, -2,
-1, -1, -1, -1, -1, 1, -2, -1, -2, -1, -1, -1, 1, 0, 0, 0, -8, -1, -1, 1, -2, -1,
-2, -1, -1, -1, 1, -2, -3, -1, -1, -1, -1, 1, -2, -3, -1, -1, -1, -2, 0, 0, 0, 0,
0, 0, 0]
#36, P_4, net = -7, f(net) = 0, target = 0
```

```
Result: do nothing.
#37, P_1, net = -20, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -8, -1, -1, 1, -1, -1,
-1, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, -1, -3, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#38, P_2, net = 17, f(net) = 1, target = 1
Result: do nothing.
#39, P_3, net = 0, f(net) = 0, target = 0
Result: do nothing.
#40, P_4, net = 11, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -9, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#41, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -9, -1, -1, 0, 0, -1, 0, -1,
-1, -1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#42, P_2, net = 9, f(net) = 1, target = 1
Result: do nothing.
#43, P_3, net = 9, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -10, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#44, P_4, net = -18, f(net) = 0, target = 0
Result: do nothing.
#45, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -10, -1, -1, 0, 0, -1, 0, -1,
-1, -1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#46, P_2, net = 8, f(net) = 1, target = 1
Result: do nothing.
#47, P_3, net = 8, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -11, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#48, P_4, net = -19, f(net) = 0, target = 0
Result: do nothing.
#49, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -11, -1, -1, 0, 0, -1, 0, -1,
-1, -1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#50, P_2, net = 7, f(net) = 1, target = 1
Result: do nothing.
#51, P_3, net = 7, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -12, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#52, P_4, net = -20, f(net) = 0, target = 0
Result: do nothing.
#53, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -12, -1, -1, 0, 0, -1, 0, -1,
```

```
-1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#54, P_2, net = 6, f(net) = 1, target = 1
Result: do nothing.
#55, P_3, net = 6, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -13, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#56, P_4, net = -21, f(net) = 0, target = 0
Result: do nothing.
#57, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -13, -1, -1, 0, 0, -1, 0, -1,
-1, -1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#58, P_2, net = 5, f(net) = 1, target = 1
Result: do nothing.
#59, P_3, net = 5, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -14, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#60, P_4, net = -22, f(net) = 0, target = 0
Result: do nothing.
#61, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -14, -1, -1, 0, 0, -1, 0, -1,
-1, -1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#62, P_2, net = 4, f(net) = 1, target = 1
Result: do nothing.
#63, P_3, net = 4, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -15, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#64, P_4, net = -23, f(net) = 0, target = 0
Result: do nothing.
#65, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -15, -1, -1, 0, 0, -1, 0, -1,
-1, -1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#66, P_2, net = 3, f(net) = 1, target = 1
Result: do nothing.
#67, P_3, net = 3, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -16, -1, -1, 0, -1, -1,
-1, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#68, P_4, net = -24, f(net) = 0, target = 0
Result: do nothing.
#69, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -16, -1, -1, 0, 0, -1, 0, -1,
-1, -1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#70, P_2, net = 2, f(net) = 1, target = 1
Result: do nothing.
#71, P_3, net = 2, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
```

```
-1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -17, -1, -1, 0, -1, -1,
-1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#72, P_4, net = -25, f(net) = 0, target = 0
Result: do nothing.
#73, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -17, -1, -1, 0, 0, -1, 0, -1,
-1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#74, P_2, net = 1, f(net) = 1, target = 1
Result: do nothing.
#75, P_3, net = 1, f(net) = 1, target = 0
Result: weight change [0, 0, 0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, -1, 0, -1,
-1, -1, -1, -1, -1, 0, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, -18, -1, -1, 0, -1, -1,
-1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, -1, -4, -1, -1, -1, -1, 0, 0, 0, 0,
0, 0, 0]
#76, P_4, net = -26, f(net) = 0, target = 0
Result: do nothing.
#77, P_1, net = -10, f(net) = 0, target = 1
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 0, 0, -1, -1, -1, -1, 0, 0, 0, -1,
-1, -1, -1, -1, 0, 0, -1, 0, -1, -1, -1, 0, 1, 1, 1, -18, -1, -1, 0, 0, -1, 0, -1,
-1, -1, 0, 0, -4, -1, -1, -1, -1, 0, 0, -4, -1, -1, -1, 0, 1, 1, 1, 1, 1, 1, 1]
#78, P_2, net = 0, f(net) = 0, target = 1
Result: weight change [2, 2, 2, 2, 2, 2, 2, 2, 1, 0, -1, -1, -1, -1, 0, 1, 0, -1,
-1, -1, -1, -1, 1, 0, -1, 0, -1, -1, -1, 1, 2, 2, 2, -17, -1, -1, 1, 0, -1, 0, -1,
-1, -1, 1, 0, -4, -1, -1, -1, -1, 1, 0, -4, -1, -1, -1, 0, 2, 2, 2, 2, 2, 2, 2]
#79, P_3, net = 19, f(net) = 1, target = 0
Result: weight change [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, 1, -1,
-1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -18, -1, -1, 1, -1, -1,
-1, -1, -1, -1, 1, -1, -4, -1, -1, -1, -1, 1, -1, -4, -1, -1, -1, -1, 1, 1, 1, 1,
1, 1, 1]
#80, P_4, net = -1, f(net) = 0, target = 0
Result: do nothing.
#81, P_1, net = 8, f(net) = 1, target = 1
Result: do nothing.
#82, P_2, net = 7, f(net) = 1, target = 1
Result: do nothing.
#83, P_3, net = -10, f(net) = 0, target = 0
Result: do nothing.
##
```
倒數4次計算結果等值，最終結果：
```
weight = [1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1,
-1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1, -18, -1,
-1, 1, -1, -1, -1, -1, -1, -1, 1, -1, -4, -1, -1, -1, -1, 1, -1, -4, -1, -1, -1,
-1, 1, 1, 1, 1, 1, 1, 1]
```