STEP 01

Randomly assigned weights

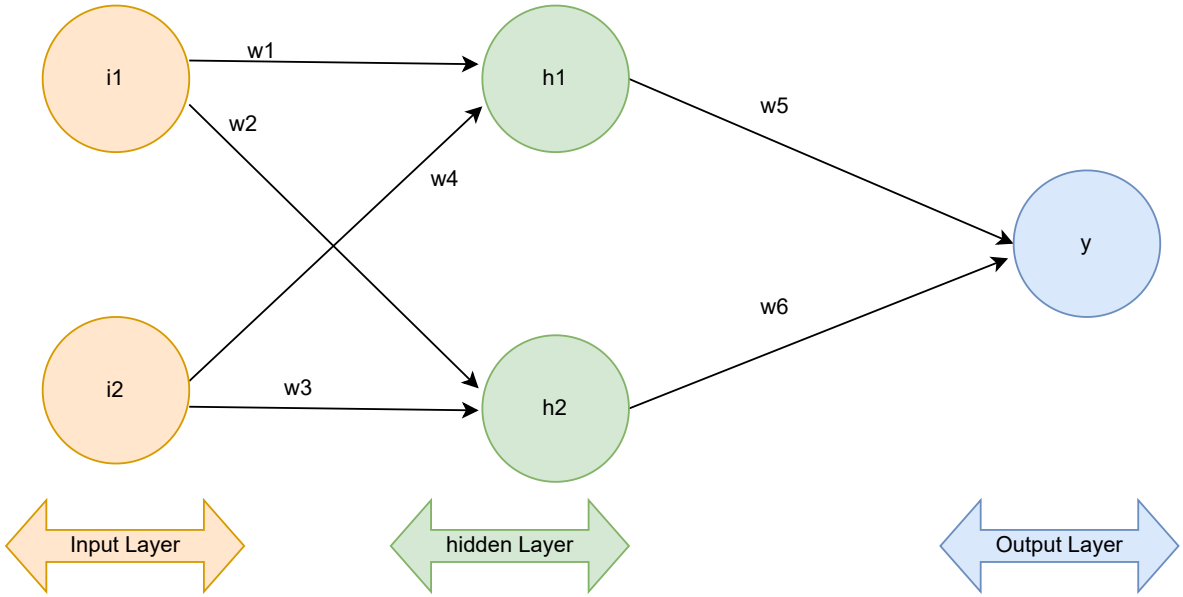
Weights	
w1	0.1
w2	0.5
w3	0.7
w4	0.3
w5	0.2
w6	0.5

Input	
i1	2
i2	3

Hidden layer	
h1	
h2	

Output Actual	
y	2

Output Predicted	
y	



NEURON NETWORK

STEP 02 | Forward Pass

Weights	
w1	0.1
w2	0.5
w3	0.7
w4	0.3
w5	0.2
w6	0.5

Input	
i1	2
i2	3

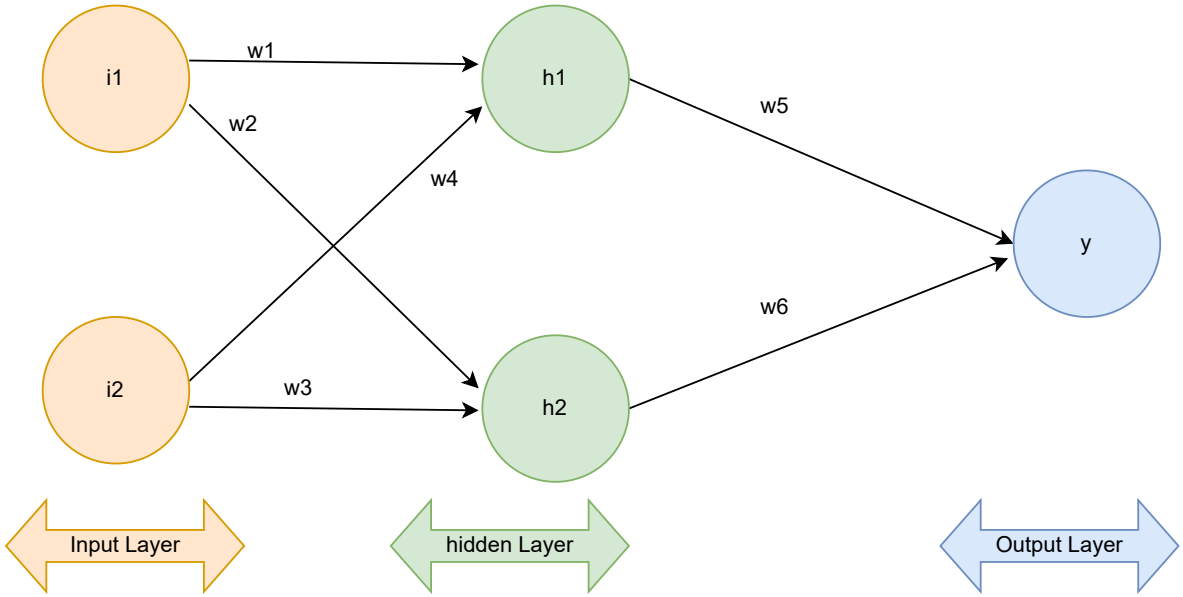
Hidden layer	
h1	1.1
h2	3.1

Output Actual	
y	2

Output Predicted	
y	1.77

$$h1 = x1*w1 + x2*w4$$
$$h2 = x1*w2 + x2*w3$$
$$y = h1*w5 + h2*w6$$

$$h1 = 2*0.1 + 3*0.3 = 1.1$$
$$h2 = 2*0.5 + 3*0.7 = 3.1$$
$$y = h1*0.2 + h2*0.5 = 1.77$$



NEURON NETWORK

STEP 03 | Error Calculation

Weights	
w1	0.1
w2	0.5
w3	0.7
w4	0.3
w5	0.2
w6	0.5

Input	
i1	2
i2	3

Hidden layer	
h1	1.1
h2	3.1

Output Actual	
y	2

Output Predicted	
y	1.77

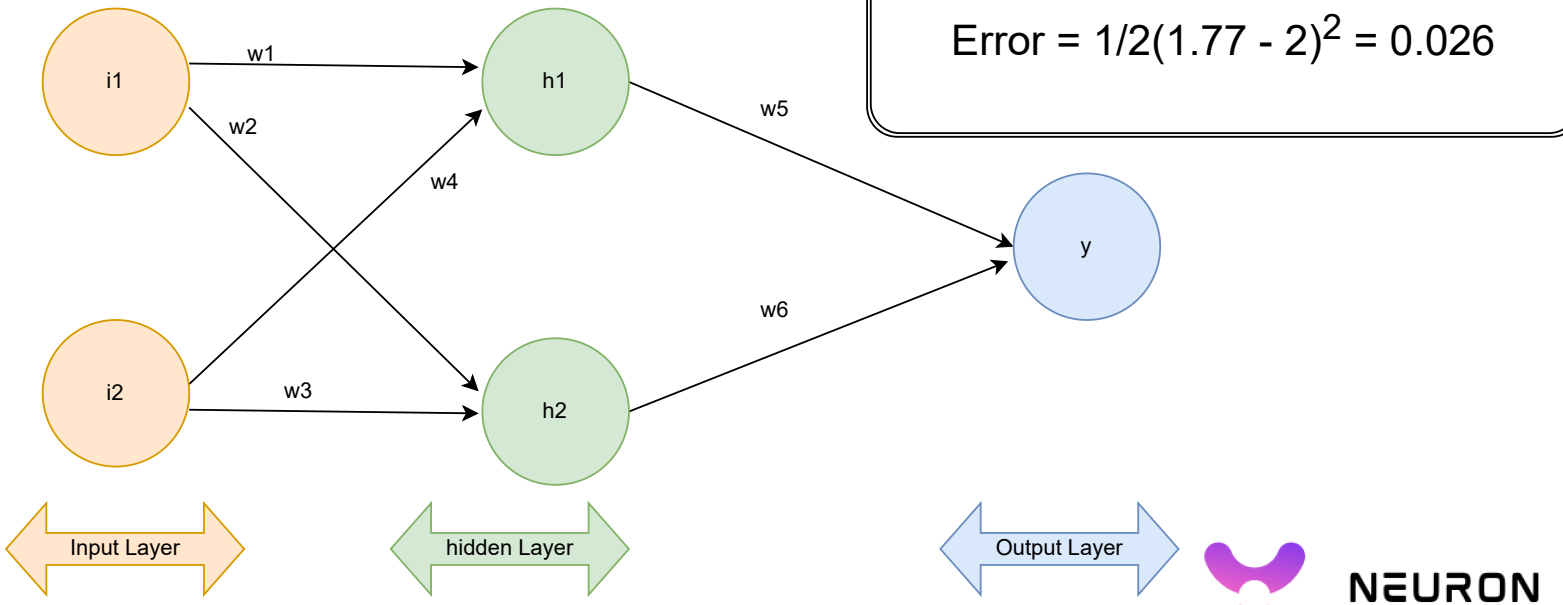
Error = 0 , if prediction = actual

$$\text{Error} = \frac{1}{2}(\text{prediction} - \text{actual})^2$$

Error is always positive because of the square

$\frac{1}{2}$ is added to ease the calculation of the derivative

$$\text{Error} = 1/2(1.77 - 2)^2 = 0.026$$



NEURON
NETWORK

STEP 04 | BackProp | Weight Adjustment

Weights	
w1	0.09999428
w2	0.49400858
w3	0.69999428
w4	0.29997582
w5	0.199714
w6	0.499194

Input	
i1	2
i2	3

Hidden layer	
h1	1.1
h2	3.1

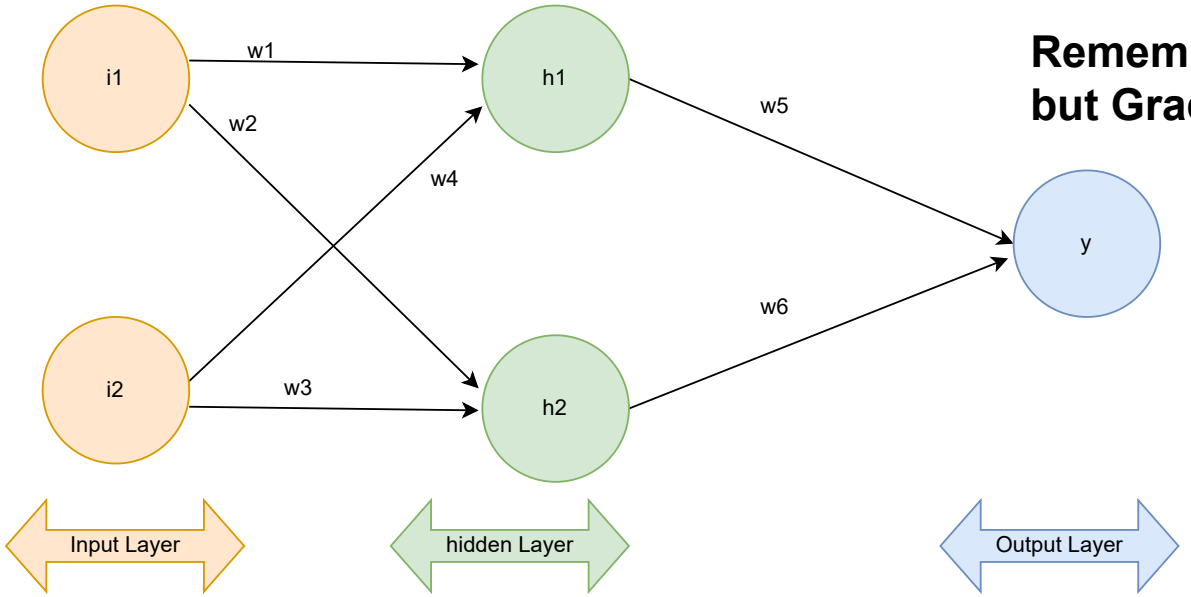
Output Actual	
y	2

Output Predicted	
y	1.77

$$= \text{Error} = 1/2(1.77 - 2)^2 = 0.026$$

Updated weights

$$^*w_6 = w_6 - a\,(h_2 \,.\, \Delta)$$
$$^*w_5 = w_5 - a\,(h_1 \,.\, \Delta)$$
$$^*w_4 = w_4 - a\,(i_2 \,.\, \Delta w_6)$$
$$^*w_3 = w_3 - a\,(i_1 \,.\, \Delta w_6)$$
$$^*w_2 = w_2 - a\,(i_2 \,.\, \Delta w_5)$$
$$^*w_1 = w_1 - a\,(i_1 \,.\, \Delta w_5)$$



Remember BackProp is nothing but Gradient Descent with Chain Rule

a = learning rate = 0.01

NEURON NETWORK

STEP 05 | Forward Pass Again

Weights	
w1	0.09999428
w2	0.49400858
w3	0.69999428
w4	0.29997582
w5	0.199714
w6	0.499194

Input	
i1	2
i2	3

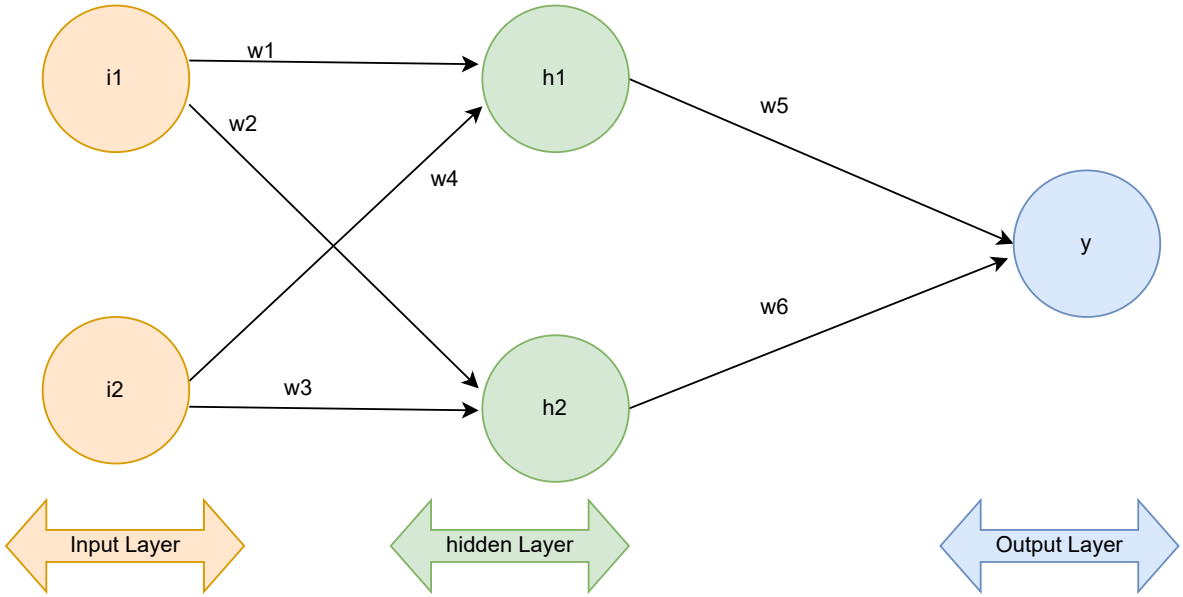
Hidden layer	
h1	1.09991602
h2	3.088

Output Actual	
y	2

Output Predicted	
y	1.85

$$\triangle = \text{Error} = 1/2(1.85 - 2)^2 = 0.01125$$

Notice that the error has reduced in this iteration.
Perform several such steps to converge



NEURON NETWORK