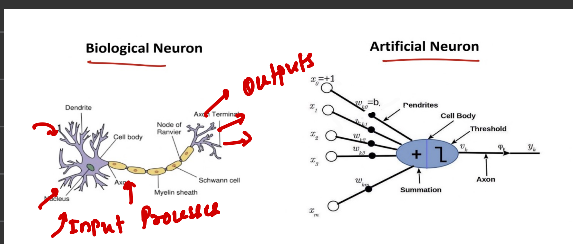
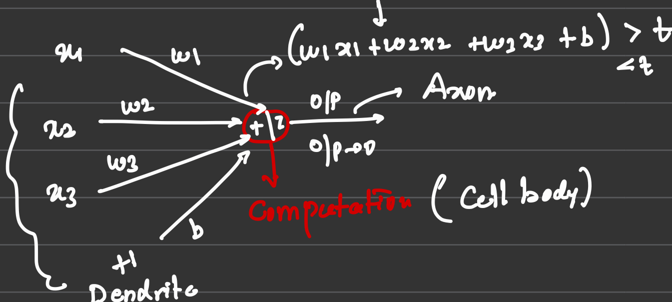
Perceptron

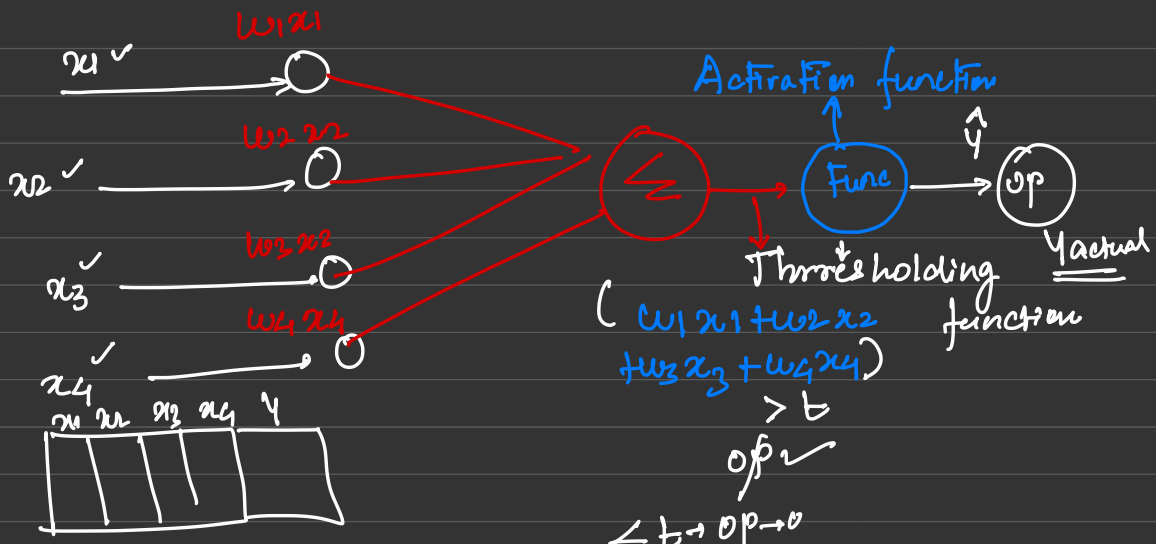
Biological Neuron

Artificial Neuron

owner rich
Businesses
estimate







$$loss = f(y, \hat{y})$$

We need to find the best set of weights which bring our $\hat{y}$ closer to y

↳ find the best set of weights which minimise the loss

Weight update Rule for a neuron

$$w_{new} = w_{old} - \alpha \times \partial h / \partial o$$

When our loss = mse

$$w_{new} = w_{old} + \alpha\,(target - predicted) \times input\ value$$

$$w_{new} = w_{old} + \alpha\,(y - \hat{y}) \times x$$

AND GATE

Objective: learn a perceptron weights such that it can function like AND Gate

A	B	O/P	$\hat{y}$
0	0	0	0
1	0	0	0
0	1	0	0
1	1	1	1

$w_1, w_2 = 0.6$, 1.2

$(w_1 A + w_2 B) > 1$

Case 1) $A \to 0, B \to 0$

$1.2 \times 0 + 0.6 \times 0 \to 0 < 1$

$\to 0$

Case 2) $A \to 1, B \to 0$

$\hat{y}$ $1.2 \times 1 + 0.6 \times 0 = 1.2 > 1$

$\to 1$

$y_{actual} \to 0$.

Case 3) $A \to 0, B \to 1$

$1.2 \times 0 + 1 \times 0.6$

$= 0.6 < 1$

$= 0$ ✓

Case 4) $A \to 1, B \to 1$

$1.2 \times 1 + 0.6 \times 1 = 1.8 > 1$

1

$w_{1new} = 1.2 + 0.5 (0-1) \times 1 \times A$

$= 1.2 - 0.5$

$= 0.7$

$w_{2new} = 0.6 + 0.5 (0-1) \times 0 \times B$

$= 0.6$

New weights

$w_{1new} = 0.7$

$w_{2new} = 0.6$

$(w_1 \times A + w_2 \times B) > 1$

Case 1) $A \to 0, B \to 0$

$0.7 \times 0 + 0.6 \times 0 = 0$ ✓

Case (2) $A \to 1, B \to 0$

$0.7 \times 1 + 0.6 \times 0 = 0.7 < 1$

$= 0$ ✓

Case (3) $A \to 0, B \to 1$

$0.7 \times 0 + 0.6 \times 1 = 0.6 < 1$

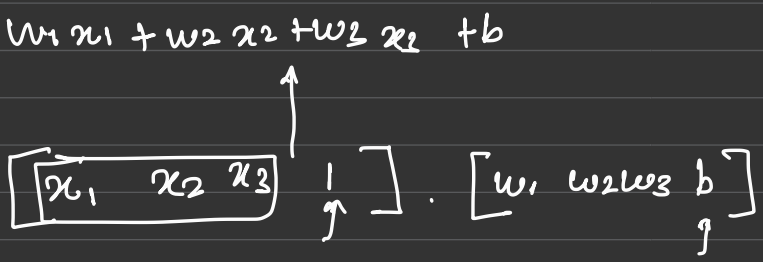
$= 0$ ✓

Case 4) $A \to 1, B \to 1$

$0.7 \times 1 + 0.6 \times 1$

$= 1.3 > 1$

$\to 1$ ✓


$w_1 x_1 + w_2 x_2 + w_3 x_3 + b$
x_1 x_2 x_3 1
w_1 w_2 w_3 b