Problem - 1

Perceptron ⇒ 0 or 1
output

1 if $(w.x + b) \geq 0$

0 else

$w \to c.w$

$b \to c.b$

$\therefore c > 0$

$w.x + b$ is positive if c is > 0
−ve if −ve

$w \to$ output stay same

Problem - 2

replace perceptron with sigmoid neuron

$$\sigma(z) = \frac{1}{1+e^{-z}} \qquad z = w.x + b$$

$> 0 \to 1$

$< 0 \to 0$

$c \to \infty$

$e^{-z} \to \infty$

$e^{-z} \to e^{-\infty} \Rightarrow 0$

$\sigma(z) = \frac{1}{1+0} = 1$ (

$c \to -\infty$

$z \to +\infty$

$e^{-z} \to e^{-(\infty)} = e^{\infty}$

$= \frac{1}{1+\infty} = \frac{1}{\infty} = 0$

$\therefore$ for extreme value of c the sigmoid neuron behaves like perceptron

If $z = w.x + b = 0 \Rightarrow \sigma(z) = \frac{1}{1+e^{0}} = \frac{1}{2} = 0.5$

0.5 means undetermined output

$\therefore$ perceptron cannot give 0.5

Hence sigmoid cannot behave like perceptron

17 December 2025 at 1:09 am