Lecture 7

Prove that, if the Perceptron algorithm is initialized with the null vector, then the coefficient η does not affect learning.

Training Set as input $\Rightarrow$ $S = \{(x,t)\}$, $x \in \mathbb{R}^{n+1}$, $t \in \{-1,+1\}$. $\eta > 0$

↳ for example (x_0, t_0)

The question asks us to initialize weights with the null vector.

↳ Zero values

we know that if $o = \text{sign}(w \cdot x) \neq t$

$$\Downarrow$$

$$w \leftarrow w + \eta(t-o)x$$

$t \in \{-1, 1\} \Rightarrow t_0 \in \{-1, 1\} \neq 0$

$w \rightsquigarrow$ a null vector $\Rightarrow$ $Sign(0) = 0$

$\Rightarrow Sign(w, x_0) \neq t_0$

$\Downarrow$

$w \leftarrow w + \eta (t_0 - o) x_0$

o

$w \leftarrow \eta (t_0) x_0$

$w \leftarrow \eta t_0 x_0$

Then η does not

affect learning because weights can not be updated!