

Name : Febrian Nugroho  
NIM :2301930551

## Answer of Assignment II Adaptive Linear Neuron

Dataset:

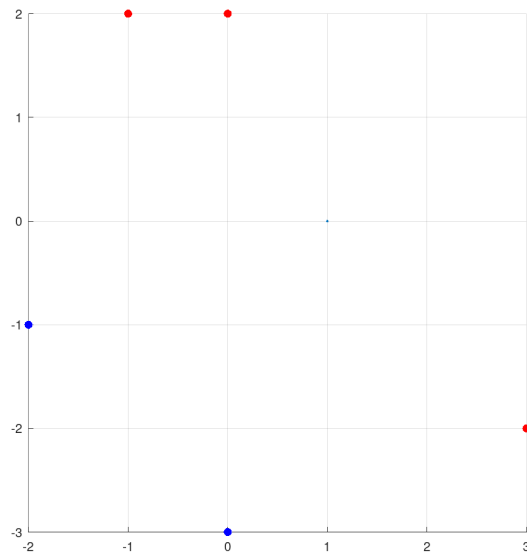
1.  $\left\{ x_1 = \begin{bmatrix} -1 \\ 2 \end{bmatrix}, t_1 = 1 \right\}$
2.  $\left\{ x_2 = \begin{bmatrix} 0 \\ 2 \end{bmatrix}, t_2 = 1 \right\}$
3.  $\left\{ x_3 = \begin{bmatrix} 3 \\ -2 \end{bmatrix}, t_3 = 1 \right\}$
4.  $\left\{ x_4 = \begin{bmatrix} -2 \\ -1 \end{bmatrix}, t_4 = -1 \right\}$
5.  $\left\{ x_5 = \begin{bmatrix} 0 \\ -3 \end{bmatrix}, t_5 = -1 \right\}$

Initial Weight and Bias:

$$w = \begin{bmatrix} 3.0 & 1.0 \end{bmatrix}$$

$$b = 1.0$$

$$\alpha = 0.05$$



## Algorithm

for each iteration,

1. calculate output:

$$a_j = \sum w_{ij}p + b, \text{ where}$$

$a_j$  = Output,  $w$  = Weight,  $p$  = Input, and  $b$  = Bias

2. compute loss function / error:

$$E(k) = (t_k - a_k)^2, \text{ where}$$

$E(k)$  = Least Square Error ,

$t_k$  = Desired target input,

$a_k$  = Output

3. Update weights:

$$w_{new} = w_{old} + \Delta w, \text{ where}$$

Training

1th Iteration:

$$\begin{aligned} a_1 &= w.x + b \\ &= [3.0 \quad 1.0] \cdot \begin{bmatrix} -1 \\ 2 \end{bmatrix} + 10 \end{aligned} \tag{1}$$

$$a_1 = 9$$

$$\begin{aligned} w_{new} &= w_{old} + w_{\Delta}, \text{ dengan} \\ w_{\Delta} &= 2\alpha ex \\ , \text{ dan} \end{aligned} \tag{2}$$

$$e = t - a$$

$$\begin{aligned} w_{new} &= w_{old} + (2\alpha ex) \\ w_{new} &= [3.0 \quad 1.0] + (2 * 0.05*) \end{aligned} \tag{3}$$