x_j : is either taking x_1 or x_2

Dataset :

x_1	x_2	y
1	0	0
2	1	0
3	1	0
4	2	1
5	3	1

$\theta_1 = 0, \theta_2 = 0$

$\alpha = 0.1$

$$h(\theta)x = \frac{1}{1+e^{-z}}$$

$$z = \theta^T x$$

$$\frac{\partial}{\partial \theta_j} l(\theta) = \sum_{i=1} (y^{(i)} - h_\theta(x^{(i)}))\, x_j^{(i)}$$

$$(y^1 - h_\theta(x^{(1)}))\, x_j^1$$

$$h(\theta)x = \frac{1}{1+e^{-z}}$$

$$z = \theta^T x$$

$\theta^T = [0 \;\; 0]$

$\theta^T x_1 = [0 \;\; 0][1 \;\; 0]$ vector.

$= x_1\theta_1 + x_2\theta_2 = 1\times 0 + 0\times 0$

$= 0$

~~$h(\theta)x$~~

$$h_\theta(x) = \frac{1}{1+e^{-0}} = \frac{1}{1+1} = \frac{1}{2}$$

$$\left(y^1 - \frac{1}{2}\right) x_1^1 = \left(0 - \frac{1}{2}\right) 1 = \boxed{\frac{-1}{2}}$$

$(y^2 - \frac{1}{2}) x_j^2 = (0 - \frac{1}{2}) 2 = -\frac{1}{2} \times 2 = \boxed{-1}$

$(y^3 - \frac{1}{2}) x_j^3 = (0 - \frac{1}{2}) 3 = -\frac{1}{2} \times 3 = \boxed{-\frac{3}{2}}$

$(y^4 - \frac{1}{2}) x_1^4 = (1 - \frac{1}{2}) 4 = \frac{1}{2} \times 4 = \boxed{2}$

$(y^5 - \frac{1}{2}) x_1^5 = (1 - \frac{1}{2}) 5 = \frac{1}{2} \times 5 = \boxed{\frac{5}{2}}$

$$\sum_{i=1}^{5} (y^i - \frac{1}{2}) x_j^i = -\frac{1}{2} - 1 - \frac{3}{2} + 2 + \frac{5}{2}$$

$$= -\frac{1}{2} - \frac{3}{2} + \frac{5}{2} - 1 + 2$$

$$= \frac{1}{2} - 1 + 2 = \frac{1}{2} + 1$$

$$= \frac{1+2}{2} = \frac{3}{2}$$

$$\boxed{\frac{\partial}{\partial \theta_j} = 1.5}$$

$$\theta_1 := \theta_1 + \alpha \frac{\partial}{\partial \theta_1}$$

$$:= 0 + 0.1 \times 1.5$$

$$\boxed{\theta_1 = 0.15}$$

for iteration 02

$j = 2$

$(y^1 - \frac{1}{2}) x_2^1 = (0 - \frac{1}{2}) 0 = 0$

$(y^2 - \frac{1}{2}) x_2^2 = (0 - \frac{1}{2}) 1 = -\frac{1}{2}$

$(y^3 - \frac{1}{2}) x_2^3 = (0 - \frac{1}{2}) 1 = -\frac{1}{2}$

$(y^4 - \frac{1}{2}) x_2^4 = (1 - \frac{1}{2}) 2 = +1$

$(y^5 - \frac{1}{2}) x_2^5 = (1 - \frac{1}{2}) 3 = +\frac{3}{2}$

$\partial / \partial \theta_2 \, l(\theta) = 0 - \frac{1}{2} - \frac{1}{2} + 1 + \frac{3}{2}$

$= -\frac{1}{2} - \frac{1}{2} + \frac{3}{2} + 1 = \frac{1}{2} + 1$

$\frac{1}{2} + 1 = \frac{3}{2} = 1.5$

$\theta_2 := \theta_2 + \alpha \frac{\partial l}{\partial \theta_2}$

$:= 0 + 0.1 \times 1.5 = \theta_2 = 0.15$

$\boxed{\theta_2 = 0.15}$