ASSIGNMENT - 4

→1 Read dataset $x_i^9 = 7.6$; $y_i^9 = 157$

$n_s = 2$ $x_i^9 = 7.1$; $y_i^9 = 174$

$\eta = 0.1$, epochs = 1 , $m = 1$

→2 iteration set to 1

→3 sample $i = 1$

→4 Cal. $y = mx_i^9 + c$

$y_1 = 1(7.6) - 1 = 6.6$

→5 Cal. error

$$\xi = \frac{1}{2}(y_i^9 - mx_i^9 + c)^2$$

$$= \frac{1}{2}(157 - 117.6) - 1)^2$$

$$= \frac{1}{2} \times 1522 \quad 11011.28$$

→6 Cal. gradients of error

$$\frac{d\epsilon}{\partial m} = -(y_i^9 - mx_i^9 - c)\, x_i^9$$

$$= -((157 - 117.6) - 1)\, 7.6$$

$$= -1127.84$$

$$\frac{d\epsilon}{\partial m} = -(y_i^9 - mx_i^9 - c)$$

$$= -148.4$$

→7 Cal. step length δm & δc

$\Delta m = -\eta \frac{\partial \epsilon}{\partial m} = -0.1(-1127.84) = 112.981$

$\Delta c = -\eta \frac{\partial \epsilon}{\partial c} = 14.84$

→ 8 update m & c

$m = m + \Delta m = 113.78$

$c = c + \Delta c = 13.84$

→ 9 sample $i = i+1 = 2$

$i < n_s = 2 < 2$, false

back again do →④

- $y = mx_i^9 + c$

$= 113.78(7.1) + 13.84$

$y_2 = 821.878$

- $\mathcal{E} = \frac{1}{2}[174 - (113.78)(7.1) + 13.84]^2$

$= -309.999$

- $\frac{\partial \epsilon}{\partial m} = -(y_i^9 - mx_i^9 - c)x_i^9$

$= -(174 - 113.78(7.1) - 13.84)7.1$

$\frac{\partial \epsilon}{\partial m} = 4598.5132$

$\frac{\partial \epsilon}{\partial c} = -(y_i^9 - mx_i^9 - c)$

$= -(174 - 113.78(7.1) - 13.84)$

$= 647.678.$

- Cal. step length

$$\Delta m = -\eta \frac{\partial E}{\partial m} = -0.1\,(4598 \cdot 513)$$

$$= -459.8513$$

$$\Delta c = -\eta \frac{\partial E}{\partial c} = -0.1\,(647.6798)$$

$$= -64.7698$$

- update m & c

$$m = m + \Delta m = 113.78 - 459.85$$

$$= -346.07$$

$$c = c + \Delta c = 13.84 - 64.769$$

$$= -50.929$$

- $i = i + 1 = 3$

if $(i < ns) = 3 < 2$

next ...

-10) iter = iter + 1 = 1 + 1 = 2

if (iter > epochs)

$2 > 1$ ✓ : next

-11 Cal. MSE error $= \frac{1}{ns} \sum_{i=1}^{ns} (y_i^p - y_i)^2$

$$= \frac{1}{2}(y_i^n - y_1)^2 + \frac{1}{2}(y_2^p - y_2)^2$$

$$= \frac{1}{2}(157 - 6.6)^2 + \frac{1}{2}(174 - 821.67)^2$$

$= 220428.29$, RMSE $= 470.15$