

## Assignment - 5

Develop a SLR model using MBGD

Step 1:  $[x, y]$ ,  $m = 1$ ,  $c = -1$ ,  $\eta = 0.1$ , epochs = 2,  $bs = 2$

Step 2:  $nb = \frac{ns}{bs} = \frac{4}{2} = 2$

Step 3: iter = 1

Step 4: batch 1

$$\begin{aligned}\text{Step 5: } \frac{\partial \epsilon}{\partial m} &= \frac{-1}{bs} \sum_{i=1}^{bs} (y_i - mx_i - c) x_i \\ &= -\frac{1}{2} [(3.4 - (1)(0.2) + 1)0.2] + [3.8 - 0.4 + 1]0.4 \\ &= -1.34\end{aligned}$$

$$\frac{\partial \epsilon}{\partial c} = -4.3$$

Step 6:  $\Delta m = -(0.1)(-1.34) = 0.134$

$$\Delta c = -(0.1)(-4.3) = 0.43$$

Step 7:  $m = m + \Delta m = 1 + 0.134 = 1.134$

$$c = c + \Delta c = -1 + 0.43 = -0.57$$

Step 8: batch + 1

$$1 + 1 = 2$$

Step 9: if (batch > nb): go to step 10

$$2 > 2$$

else: go to step 5

$$\text{step 6: } \Delta m = -0.17(-2.932) = 0.2932$$

$$\Delta c = 0.41762$$

$$\begin{aligned} \text{step 7: } m+ &= \Delta m = 1.134 + 0.2932 \\ &= 1.4272 \end{aligned}$$

$$\begin{aligned} c+ &= \Delta c = -0.57 + 0.4176 \\ &= -0.1523 \end{aligned}$$

$$\text{step 8: Batch} + 1 \Rightarrow 2 + 1 = 3$$

$$\text{step 9: if (batch} > \text{nb): go to step 10}$$

$$3 > 2$$

$$\text{else: go to step 5}$$

$$\begin{aligned} \text{step 10: iter} &= \text{iter} + 1 \\ &= 1 + 1 = 2 \end{aligned}$$

$$\begin{aligned} \text{step 11: if (iter} > \text{epochs): go to step 12} \\ 2 > 2 \end{aligned}$$

$$\text{else: go to step 4}$$

$$\text{step 4: step Batch} = 1$$

$$\begin{aligned} \text{step 5: } \frac{\partial E}{\partial m} &= \frac{1}{2} [(4.2) - (1.5274)(0.6) - \\ &\quad 0.1879)(0.6) + \end{aligned}$$

$$(4.6 - (1.5274)(0.8) - 0.1879)(0.8)]$$

$$= -2.21$$

$$\frac{\partial E}{\partial c} = -3.151$$

step 6:  $\Delta m = -0.1 \times -2.21 = 0.221$

$$\Delta c = -0.1 \times -3.151 = 0.3151$$

step 7:  $m = 1.5274 + 0.221 = 1.748$

$$c = 0.1777 + 0.3151 = 0.4928$$

step 9:  $iter = 1 \Rightarrow 2 + 1 = 3$

step 10: if (iter > epochs): go to step 12  
 $3 > 2$

else: go to step 4

step 12: print m, c

$$m = 1.748, c = 0.4928$$