Assignment-1

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Manual Calculations for two iterations with first two Samples using BGD optimizer

Sample (i)	x	y
1	0.2	3.4
2	0.4	3.8

$$E = \frac{1}{2n_s} \sum_{i=1}^{n_s} (y_i - mx_i - c)^2$$

$$E = \frac{1}{2n_s} \sum_{i=1}^{n_s} (y_i^a - y_i)^2$$

Step-1: Read Dataset- $\eta = 0.1$, epochs = 2, $m = 1$, $c = -1$,

Step-2: ito = 1

Step 3: $\frac{\partial E}{\partial m} = \frac{-1}{n_s} \sum_{i=1}^{n_s} (y_i - mx_i - c)x_i$

$$= \frac{-1}{2}\left[(3.4 - 1(0.2) + 1)0.2 + (3.8 - 1\cdot(0.4) + 1)0.4\right]$$

$$= -1.3$$

$$\frac{\partial E}{\partial c} = \frac{-1}{2}\left[(3.4 - 1(0.2) + 1) + (3.8 - 1(0.4) + 1)\right]$$

$$= -4.3$$

Step-4: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(-1.3) = 0.13$

$$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.1)(-4.3) = 0.43$$

Step-5: $m = m + \Delta m = 1 + 0.13 = 1.13$

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

Step-6: ito = ito + 1 = 1 + 1 = 2

Step-7: if (ito > epochs) (2 > 2) (λ)

goto step-3

Step-3: $\frac{dE}{dm} = \frac{-1}{2}[(3.4-(1.13)(0.2)+0.57)0.2+$

$(3.8-(1.13)(0.4)+0.37)0.4]$

$= \frac{-1}{2}[3.744*0.2 + 3.918*0.4]$

$= -1.158$

$\frac{dE}{dc} = \frac{-1}{2}(3.4-(1.13)(0.2)+0.57)+(3.8-(1.13)(0.4)+0.3$

$= -3.831$

Step 4: $\Delta m = -\eta \frac{dE}{dm} = -(0.1)(-1.158) = 0.1158$

$\Delta c = -\eta \frac{dE}{dm} = -(0.1)(-3.831) = 0.3831$

Step-5: $m = m + \Delta m = 1.13 + 0.1158 = 1.2458$

$c = c + \Delta c = -0.57 + 0.3831 = -0.1869$

Step-6: $itr = itr+1 = 2+1 = 3$

Step-7: if $(3>2)$

go to step-8

Step-8: $m = 1.2458$, $c = -0.1869$