Assignment-3

Let us consider sample dataset have one i/p (x;a) & one output (y;a) and no of samples. Develop a sample regression model using stochastic gradient descent optimisee.

Sample (i)	x;a	y;a	manual calc.
1	0.2	3.4	2 iterations
2	0.4	3.8	2 samples.
3	0.6	4.2	
4	0.8	4.6	

Steps

1. x, y , m = 1 , c = -1 , η = 0.1 ; epoch = 2 ; n_s = 2

2. itr = 1

3. sample = 1

4. $\frac{\partial E}{\partial m} = -(3.4 - 1(0.2) - (-1))\ 0.2 = -0.84$

   $\frac{\partial E}{\partial c} = -(3.4 - 1(0.2) - (-1)) = -4.2$

5. $\Delta m = -\eta \frac{\partial E}{\partial m} = -0.1(-0.84) = 0.084$

   $\Delta c = -\eta \frac{\partial E}{\partial c} = -0.1(-4.2) = 0.42$

6. $m = m + \Delta m = 1 + 0.084 = 1.084$

   $c = c + \Delta m = -1 + 0.42 = -0.58$

7. sample = sample + 1 = 1 + 1 = 2

8. if (sample > n_s) 2 > 2 (false)

   next step — step-4

   else

   step - 4

4. $\frac{\partial E}{\partial m} = -(3.8 - 1.084(0.4) + 0.58)\,0.4$

$= -1.5785$

$\frac{\partial E}{\partial c} = -(3.8 - 1.084(0.4) + 0.58)$

$= -3.9464$

5. $\Delta m = -(0.1)(-1.5785) = 0.1578$

$\Delta c = -(0.1)(-3.9464) = 0.3946$

6. $m = m + \Delta m = 1.084 + 0.1578 = 1.2418$

$c = c + \Delta m = -0.58 + 0.3946 = -0.1854$

7. sample = sample + 1 = 2 + 1 = 3

8. if (sample > ns) 3 > 2 (true)
   next step next step
   else
   step-4

9. iter = iter + 1 = 1 + 1 = 2

10. if (iter > epochs) 2 > 2
    next step false
    else step-3
    step-3

S-3. sample = 1

4. $\frac{\partial E}{\partial m} = -(3.4 - 1.2(0.2) + 0.18)\,0.2$

$= -0.668$

$\frac{\partial E}{\partial c} = -(3.4 - 1.2(0.2) + 0.18)$

$= -3.34$

5. $\Delta m = -(0.1)(-0.668)$

$= 0.0668$

$\Delta c = -(0.1)(-3.34)$

$= 0.33$

6. $m = m + \Delta m = 1.24 + 0.0668 = 1.3$

$c = c + \Delta c = 0.18 + 0.33 = 0.15$

7. sample = sample + 1 = 1 + 1 = 2

8. if (sample > n1) 2 > 2 false

next step

else step-4

step-4

I-4 $\frac{\partial E}{\partial m} = -(3.8 - (1.3)(0.4) - 0.15)0.4$

$= -1.25$

$\frac{\partial E}{\partial c} = -(3.8 - (1.3)(0.4) - 0.15)$

$= -3.13$

I-5 $\Delta m = -(0.1)(-1.25) = 0.12$

$\Delta c = -(0.1)(-3.13) = 0.31$

6. $m = m + \Delta m = 1.3 + 0.12 = 1.42$

$c = c + \Delta c = 0.15 + 0.31 = 0.46$

7. sample = sample + 1 = 2 + 1 = 3

8. if (sample > n1) 3 > 2

next step true

else next step

step-4

9. iter = iter + 1 = 2 + 1 = 3

10. if (iter > epochs) 3 > 2
next step true
else next step
c - 3

11. m = 1.42 c = 0.46.