let us consider sample dataset have one input $(x_i a)$ and one output $(y_i a)$ and no of samples. Develop a sample regression model using stocastic gradient descent optimizer.

sample (i)	x_i^a	y_i^a
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6.

step1 :- $x, y, m = 1, c = -1, \eta = 0.1$, epochs $= 2$, ns = 2.

step 2 :- its = 1

step3 :- sample = 1

step4 :- $\dfrac{\partial E}{\partial m} = (-8.4 - (1)(0.2) - (-1))0.2$
       $= 0.84$

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

step5 :- $\Delta m = -(0.1)(-0.84) = 0.084$

$\Delta c = -(0.1)(-4.2) = 0.42$

step 6 :- $m = m + \Delta m$

$$= 1 + 0.084 = 1.084$$

$$c = c + \Delta c$$

$$= -1 + 0.42 = -0.58$$

step 7 :- sample $t = 1 = 1 + 1 = 2$

step 8 :- if (sample > ns) $\rightarrow 2 > 2$

    goto step 9

    else : goto step 4

step 4 :- $\dfrac{\partial E}{\partial m} = -(3.8 - (1.084)(0.4) + 0.58)04$

$$= -1.5785$$

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

$$= -3.9464$$

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

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

step 7 :- sample $t = 1 = 2 + 1 = 3$

step 6 :- $m = m + \Delta m = 1.084 + 0.1578 = 1.2418$

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

step 8 :- if (sample > ns) $\rightarrow 3 > 2$

    goto step 9

    else

      goto step 4

<u>step 9</u> : $H_2 = H_2 + 1 = 1 + 1 = 2$

<u>step 10</u> : if (H_2 > epochs) $2 > 2$
     goto step 11
     else
     goto step 3

<u>step 3</u> : sample = 1

<u>step 4</u> : $\dfrac{\partial E}{\partial m} = -(3.4 - (1.2)(0.2) + 0.18) 0.2$

     $= -(3.34) 0.2$

     $= -0.668$

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

     $= -3.34$

<u>step 5</u> : $\Delta m = -(0.1)(-0.668) = 0.0668$

<u>step 6</u> : $m = m + \Delta m = 1.24 + 0.066 = 1.3$

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

<u>step 7</u> : sample += 1

     $\Rightarrow 1 + 1 = 2$

<u>step 8</u> : if (sample > ns) ; $2 > 2$
     goto step 9
     else
     goto step 4

<u>step 4</u> : $\dfrac{\partial E}{\partial m} = -(3.8 - (1.3)(0.4) - 0.15) 0.4$

     $= -1.25$

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

$$= -3.13 //$$

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

$AC = -(0.1)(-3.13) = 0.31$

Step 6: $m = m + \Delta m = 1.3 + 0.12 = 1.42$

$C = C + AC = 0.15 + 0.31 = 0.46$

Step 7: Sample = sample + 1

$$= 2 + 1 = 3$$

Step 8: if (sample > ns) : 372

goto step 9

else

goto step 4

Step 9: itr = itr + 1 = 2 + 1 = 3

Step 10: if (itr > epochs) :

372

goto step 11

else; goto step 3

Step 11: point m & c

m = 1.42, C = 0.46.