Assignment 5(A) BGD

Iteration - 1

x	y
75.1	577.8
74.3	577
88.7	570.9

Step 1 :- $n=0.01$, iter=1, $m=1$, $c=-1$, epochs = 2

Step 2 = $\frac{\partial E}{\partial m}\Big|_{m=1} = -\frac{1}{3}\Big(((577.8-1*(75.1)-(-1))*75.1)$

$+((577-1*(74.3)-(-1))*74.3)+$

$((570.9-1*(88.7)-(-1))*88.7))\Big)$

$= -\frac{1}{3}(37827.87+37424.91+42859.84)$

$= -39370.873$

$\frac{\partial E}{\partial c}\Big|_{c=-1} = \frac{-1}{3}\sum(y-mx_i^9-c)$

$= -\frac{1}{3}\Big[((577.8-1(75.1)-(-1))+(577-1*74.3$

$-(-1))+$

$+(570.9-1*(88.7)-(-1))\Big]$

$= -\frac{1}{3}(503.7+503.7+483.2)$

$= -496.86$

Step 3 :- $\Delta m = -n\frac{\partial E}{\partial m} = -(0.01)(-39470.873)$

$= 394.708$

$\Delta c = -n\frac{\partial E}{\partial c} = -(0.01)(-496.86)$

$= 4.968$

step 4 :- m = m + δm

= 1 + 393.708

= 394.708

C = C + δC

= -1 + (4.968)

= 3.968

step 5 :- iter = iter + 1

= 1 + 1

= 2

Iteration - 2

step 1 :- n = 0.01 m = 394.708, C = 3.968, iter = 2, epochs = 2

step 2 :-

$$\frac{\partial E}{\partial m}\Big|_{m=394.708}$$

$$= -\frac{1}{3}\Big(\big(1277.8 - \big((394.708) * 75.1\big) - 3.968\big) * 75.1) + \big((1787 - (394.708) * (24.3) - 3.968) * 24.3\big) + \big((1270 - (394.708) * (88.7) - 3.968) * 88.7\big)\Big)$$

$$= 53378 51.303$$

$$\frac{\partial E}{\partial c} = -\frac{1}{3}\Big[\big((577.8-((394.708)*75.1)-3.968\big)+$$
$$\big(577-((394.708)*(74.3))-3.968\big)$$
$$+\big(576.9-((394.708)*88.7)-3.968\big)\Big]$$

$$= -\frac{1}{3}\left[-29068.7388+(-28753.772)+(-34,443.667)\right]$$

$$= 30755.392$$

Step 3:- $\Delta m = -n\frac{\partial E}{\partial m} = -(0.01)*(5337851.303)$

$$= -53378.513$$

$$\Delta c = -n\frac{\partial E}{\partial c} = -(0.01)*(30755.392)$$

$$= -307.553$$

Step 4:-

$m = m + \Delta m$

$= 394.708 - 53378.513$

$= 394.708 - 53378.513$

$= -52983.805$

$c = c + \Delta c$

$= 3.968 + 307.553$

$= -303.585$