

Assignment-5 BGD

Iteration-1

x	y
75.1	577.8
74.3	577
88.7	570.9

step 1: $\eta = 0.01$, $\text{iter} = 1$, $m = 1$, $c = -1$, $\text{epochs} = 2$

step 2: $\frac{\partial E}{\partial m} \Big|_{m=1} = -\frac{1}{3} \left((577.8 - 1 + (75.1) - (-1)) * 75.1 \right.$
 $\left. + ((577 - 1 * (74.3) - (-1)) * 74.3) + \right.$
 $\left. ((570.9 - 1 * (88.7) - (-1)) * 88.7) \right)$

$$= -\frac{1}{3} [37827.87 + 37424.91 + 42859.84]$$

$$= -39370.873$$

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

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

$$\left. + (570.9 - 1 * (88.7) - (-1)) \right]$$

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

$$= -496.86$$

step 3: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)(-39370.873)$

$$= 394.708$$

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

$$= 4.968$$

Step 4: $m = m + \Delta m$

$$m = 1 + 393.708$$

$$= 394.708$$

$$c = c + \Delta c$$

$$= -1 + (4.968)$$

$$(1.28 * (3.968))$$

Step 5: $iter = iter + 1$

$$= 1 + 1$$

$$= 2$$

Iteration-2

Step 1: $\eta = 0.01, m = 394.708, c = 3.968, iter = 2, epochs = 2$

Step 2: $\frac{\partial E}{\partial m}$

$$m = 394.708$$

$$= -\frac{1}{3} \left[(577.8 - ((394.708) * 75.1) - 3.968) * 75.1 + \right.$$

$$+ ((577 - (394.708) * (74.3) - 3.968) * 74.3)$$

$$+ ((570 - (394.708) * (88.7) - (3.968) * 88.7)]$$

$$= 5337851.303$$

$$\frac{\partial E}{\partial c} = -\frac{1}{3} \left[(577.8 - ((394.708) * 75.1) - 3.968) + \right.$$

$$+ (577 - ((394.708) * (74.3)) - 3.968) +$$

$$(570.7 - ((394.708) * 88.7) - 3.968)]$$

$$= -\frac{1}{3}[-29068.7388 + (-28753.772) + (-34443.667)]$$

$$= 30755.392$$

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

$$= -53378.513$$

$$\Delta C = -\eta \frac{\partial E}{\partial C} = -(0.01) * (30755.392)$$

$$= -307.553$$

Step 4: $m = m + \Delta m$

$$= 394.708 - 53378.513$$

$$= 394.708 - 53378.513$$

$$= -52983.805$$

$$C = C + \Delta C$$

$$= 3.968 + 307.553$$

$$= 303.585$$