18K41A04D2

Stocastic Gradient Descent Algorithm (Assignment-3)

Sample(i)	x_i^a	y_i^a
1	0.2	3.4
2	0.4	3.8

Step 1: m = 1, c = -1, η = 0.1, epochs = 2

Step 2: i = 1

Step 3: Sample 1

Step 4: $\frac{\partial E}{\partial} = \frac{1}{2}(y_i - mx_i - c)^2$

$\frac{\partial E}{\partial m} = -(y_1 - mx_1 - c)x_1 = -0.84$

$\frac{\partial E}{\partial c} = -(y_1 - mx_1 - c) = -4.2$

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

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

Step 6: $m = m + \Delta m = 1 + 0.084 = 1.084$

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

Step 7: sample = sample + 1 = 2

Step 8: go to step 4 [sample $\leq n_s$] $2 \leq 2$

Step 4: $\frac{\partial E}{\partial m} = -(y_2 - mx_2 - c)x_2 = -1.57856$

$\frac{\partial E}{\partial c} = -(y_2 - mx_2 - c) = -3.9464$

Step 5: $\Delta m = -\eta \frac{\partial E}{\partial m} = (-0.1)(-1.57856) = 0.157856$

$\Delta C = -\eta \frac{\partial E}{\partial c} = (-0.1)(-3.9464) = 0.39464$

Step 6: $m = m + \Delta m = 1.084 + 0.157856 = 1.241856$

$c = c + \Delta c = -0.58 + 0.39464 = -0.18536$

Step 7: sample = sample + 1 = 3

Step 8: goto next step [sample $\not\leq$ n_s, $3 \not\leq 2$]

Step 9: ites = ites + 1 = 1 (ites $\leq$ epochs), $1 < 2$

Step 10: if(ites = ites + 1 = 1) (ites < epochs), $1 < 2$

goto step 3

Step 3: sample = 1

Step 4: $\frac{\partial E}{\partial m} = -(y_1 - mx_1 - c)x_1 = -0.667397776$

$\frac{\partial E}{\partial c} = -(y_1 - mx_1 - c) = -3.3369888$

Step 5: $\Delta m = -\eta \cdot \frac{\partial E}{\partial m} = -(0.1)(-0.667397776) = 0.0667397$

$\Delta c = -\eta \cdot \frac{\partial E}{\partial c} = -(0.1)(-3.3369888) = 0.33369888$

Step 6: $m = m + \Delta m = (1.241856) + 0.0667397$

$= 1.3085957$

$c = c + \Delta c = (-0.18536) + (0.33369888) = 1.4833888$

Step 7: sample = sample + 1 = 2

Step 8: goto step 4 [sample $\leq n_s$, $2 \leq 2$]

Step 4: $\frac{\partial E}{\partial m} = -(y_2 - mx_2 - c)x_2 = -1.25128912$

$\frac{\partial E}{\partial c} = -(y_2 - mx_2 - c) = -3.12822881$

Step 5: $\Delta m = -\eta \frac{\partial \epsilon}{\partial m} = -(0.1)(-1.25128912) = 0.12512891$

$\Delta C = -\eta \frac{\partial \epsilon}{\partial c} = -(0.1)(-3.12822281) = 0.31282228$

Step 6: $m = m + \Delta m = 1.30859578 + 0.12512891 = 1.43372469$

$c = c + \Delta C = 0.14833888 + 0.31282228 = 0.46116116$

Step 7: sample = sample + 1 = 3

Step 8: goto step 4 (sample $\geq$ ns)

3 $\geq$ 2

Step 9: iter = iter + 1 = 2

Step 10: if (2 $\neq$ 2)

goto step 11

Step 11: m = 1.43372469

c = 0.46116116

MSE = 7.34037848.