Assignment-11

18K41A0508

Let us consider a sample dataset have one input ($x_i$) and one output ($y_i$) and number of samples 4. Develop a SLR model using nestrov accelerated gradient (NAG) optimiser.

| 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 |

- Do manual calculations for 2 iterations with 1st 2 samples.

Step 1: [x, Y], m=1, c=-1, $\eta$=0.1, epoches = 2, $\gamma$ = 0.9,
$v_m = v_c = 0$, ns = 2

step 2: itr = 1

step 3: sample = 1

step 4: $g_m = \frac{\partial \epsilon}{\partial m} = -(y_i - (m + \gamma v_m) x_i - (c + \gamma v_c)) x_i$

$= -(3.4 - (1 + (0.9)0)0.2 - (-1 + (0.9)0)0.2$

$= -0.84$

$g_c = \frac{\partial \epsilon}{\partial c} = -(y_i - (m + \gamma v_m) x_i - (c + v_c))$

$= -(3.4 - (1 + 0.9) \times 0)0.2$

$= -(-1 + (0.9)0)$

$= -4.2$

step 5: $v_m = \gamma v_m - \eta g_m$

$= (0.9)0 - (-0.1) \times (-0.84)$

$= -0.084$

$v_c = \gamma v_c - \eta g_c$

$= (0.9)(0) - (-0.1)(-4.2)$

$= -0.42$

step 6 : $m+ = v_m$

$1 - 0.084 = 0.916$

$c+ = v_c = -1 - 0.42$

$= -1.42$

step 7 : sample + = 1

$1+1 = 2$

step 8 : if (sample > ns)

goto step 9

else

goto step 4

step 4 : $g_m = \frac{\partial \epsilon}{\partial m} = -(3.8 - (0.916 + (0.9 \times -0.089))$

$0.4 - (-1.42 + (0.98 - 0.034) \times 0.4)$

$= -1.983$

$g_c = \frac{\partial \epsilon}{\partial c} = -4.959$

step 5 : $v_m = \gamma v_m - \eta g_m$

$= (0.9 \times -0.084) - (-0.1 \times -1.983)$

$= -0.2739$

$v_c = (0.9 \times -0.42) - (-0.1 \times -4.959)$

$= 0.8739$

step 6 : $m+ = v_m$

$= 0.916 - 0.2739$

$= 0.6421$

$c+ = v_c$

$= -1.42 - 0.8739$

$= -2.2939$

step 7 : Sample + = 1

$1+1 = 3$

step 8 : if (sample > ns)

goto step -11

$2 > 2$

else

goto step - 3

step 3 : sample = 1

step 4 : $\frac{\partial \epsilon}{\partial m} = -(3.4 - (0.642 + (0.9 \times 0.273)) \times 0.2 - (-2.293 + (0.9 \times -0.273) \times 0.2)$

$g_m = -1.171$

$g_c = \frac{\partial \epsilon}{\partial c} = -5.859$

step 5 : $v_m = \gamma v_m - \eta g_m$

$= [(0.9) \times (-0.273)] - (-0.1 \times -1.81)$

$= -0.3627$

$v_c = v_c \gamma - \eta g_c$

$= (0.9)(-0.873) - (-0.1)(-5.859)$

$= -1.3707$

step 6 : $m_+ = v_m$

$= 0.6421 + (-0.3627)$

$= 0.2794$

$c_+ = v_c$

$= -2.2939 - 1.3707$

$= -3.6646$

step 7 : sample + = 1

$t+1 = 2$

step 8 : if (sample > ns)

goto slip 9

else

goto step 4

step 4 : $g_m = \frac{\partial \epsilon}{\partial m} = -(3.8 - (0.2794 + (0.9 \times -0.3627)) \times 0.4 - (-3.6646 + (0.9)$

$= -2.985$

$g_c = \frac{\partial \epsilon}{\partial c} = -7.4645$

step 5 : $v_m = [0.9 \times -0.3627] - [-0.1 \times -2.985]$

$= -0.6249$

$V_c = [0.9 \times -1.3707] - [-0.1 \times 7.4645]$

$= -1.9800$

step 6 : $m+ = V_m$

$= 0.8974 + (-0.6249)$

$= -0.3275)$

$c+ = V_c$

$= 3.6646 - 1.9800$

$= -4.6446$

step 7 : sample + = 1

2 + 1 = 3

step 8 : if (sample > ns)

goto step 9

else

goto step 4

step 9 : itr + = 1

2 + 1 = 3

step 10 : if (itr > epoches)

goto step 4

else

goto step 3

step 11 : print m, c

m = 0.3275

c = -4.6446