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

Simple using linear regression model using momentum 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.

$[X, Y] m=1, c= -1, \eta=0.1$, epoches = 2, $\vartheta = 0.9$, $v_m = v_c = 0$,

ns=2

· itr =1

sample = 1

$$g_m = \frac{\partial E}{\partial m} = -(y_i - mx_i - c) x_i$$

$$-(3.4 - (1)(0.2) + 1)0.2$$

$$g_c = \frac{\partial E}{\partial c} = -(y_i - mx_i - c)$$

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

$$= -4.2$$

$$v_m = \vartheta v_m - \eta g_m$$

$$(0.9) 0 - (-0.1)(-0.84)$$

$$= -0.084$$

$$v_c = v_c = \eta g_c$$

$$0.9 \times 0 - (-0.1)(-4.2) = -0.42$$

6. $m = m + \vartheta_m$

$\quad 1 + (-0.84)$

$\quad = -0.916$

$c = c + \vartheta_c$

$\quad = -1 - 0.42$

$\quad = -1.42$

7. $sample + = 1$

$\quad = 2$

8. if $(sample > n_0)$

$\quad\quad step 9$

$\quad 2 > 2$

$\quad\quad step 4$

4. $g_m = \dfrac{\partial E}{\partial m} = -(3.8 - 10.91)(0.4) + 1.12)(0.4)$

$\quad\quad = -1.941$

$g_c = \dfrac{\partial E}{\partial c} = -4.853$

5. $\vartheta_m = \gamma\vartheta_m - \eta g_m$

$\quad (0.9)(-0.084) - [-0.1 \times -1.941]$

$\quad = \quad -0.2697$

$\vartheta_c = \gamma\vartheta_c - \eta g_c$

$\quad (0.9)(-0.42) - [-0.1 \times -4.853]$

$\quad = -0.863$

6. $m = m + \vartheta_m$

$\quad 0.916 + (-0.2697)$

$\quad 0.6463$

$c = c + \vartheta_c$

$\quad -1.42 - 0.863$

$\quad = -2.283$

7. $sample + 1 = sample$

$\quad\quad = 2 + 1 = 3 //$

2. If (sample > ns)
        step 9

    else   step 4

9. itr = itr+1
       = 1+1 = 2 //

10. if (itr > epoches)
        step 4
    else
        step 3

3. sample = 1

4. $g_m = \dfrac{\partial E}{\partial m}$ = $-(3.4 - (0.646)(0.2) + 2.283)(0.2)$

        = -1.110

    $g_c = \dfrac{\partial E}{\partial c}$ = $-(3.4 - (0.646)(0.2) + 2.283$

        = -5.553

5. $\partial_m = \lambda \partial_m - \eta g_m$

   • $(0.9)(-0.2697) - [-0.1 \times -1.110]$

    = -0.353

   $\partial_c = \lambda \partial_c - \eta g_c$

    $(0.9)(-0.863) - [-0.1 \times -5.53]$

    = -1.332

6. $m = m + \partial_m$

   $0.6463 + (-0.353)$

    = 0.293

   $c = c + \partial_c$

    $-2.283 - 1.332$

    = -3.615

7. sample = sample + 1
    1 + 1 = 2

8. if (sample > ns)

      step-9

   else

      step-4

4. $g_m = -(3.8 - (0.293)(0.4) + 3.615)(-0.4)$

     $= -2.919$

   $g_c = -(3.8 - (0.293)(0.4) + 3.615$

     $= -7.297$

5. $v_m = (0.9)(-0.353) - [-0.1 \times -2.919]$

     $= -6.6096$

  $v_c = (0.9)(-1.332) - [-0.1 \times -7.29]$

     $= -1.928$

6. $m+ = v_m$

  $0.293 - 0.609 = -0.316$

  $c+ = v_c$

  $-3.615 - 1.928 = -5.543$

7. sample+ =1

  $2+1=3$

8. if (sample > ns)

     step 9

   else

     step 4

9. itr+ =1

  $2+1=3$

10. if (itr > epoches)

     step-11

   else

     step-3

11. print m,c

   $m = -0.316, \quad c = -5.543$