Assignment - 15.

RMS prop optimizing technique.

Sample(i)	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

→ Manual calculations.

Step1 :- (x, y), $\eta = 0.1$, $ep = 2$, $m = 1$, $c = -1$, $\gamma = 0.9$, $\varepsilon = 10^{-8}$, $E_m = E_c = 0$, epochs = 1, $n_s = 2$

Stepe : iter = 1 Step3 : sample = 1.

Step4 :- $g_m = -(3.4 - 1(0.2) + 1)(0.2)$

$= -0.84$

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

$= -4.2$

Step5: $E_m = \gamma E_m + (1-\gamma)(g_m)^2$

$E_c = \gamma E_c + (1-\gamma)(g_c)^2$

$E_m = (0.9)(0) + (1-0.9)(-0.84)^2$

$= (0.1)(0.84)^2$

$= 0.07$

$E_1 = (0.9)(0) + (0.1)(-4.2)$

$= 1.764$

Slope,

$b_m = \frac{-\eta}{\sqrt{\varepsilon_m + \varepsilon}} (g_m)$

$b_c = \frac{-\eta}{\sqrt{\varepsilon_m + \varepsilon}} (g_c)$

$D_m = \frac{-0.1}{\sqrt{0.07 + 1^2}} (-0.84)$

$= \frac{0.084}{0.264}$

$= 0.318$

$D_c = \frac{-0.1}{\sqrt{1.764 + 1^2}} (-4.2)$

$= \frac{0.42}{1.328}$

$= 0.316$

Step7 :- $m = m + \Delta m$

$m = \Delta + 0.3\Delta 8$

$= 1.3\Delta 8$

$c = c + \Delta c$

$c = -1 + 0.3\Delta 6$

$= -0.684.$

Step8 : sample = 2

Step9 :- if $(s > ns)$ go to next step

else go to step4.

Step4 : $g_m = -(3.8 - (1.3\Delta 8)(0.4)$

$+ 0.684)(0.4)$

$= -(4.484 - 0.527)0.4$

$= -(3957)\,0.4$

$= -1.582$

$g_c = -(38 - (1.3\Delta 8)(0.4)$

$+ 0.684)$

$= -3.957.$

steps - $E_m = (0.9)(0.07) + (0.1)(-1.58)^2$

$= 0.063 + 0.25$

$= 0.313$

$E_c = (0.9)(1.764) + (0.1)(-3.957)$

$= 1.587 + 1.565$

$= 3.152$

steps:- $\Delta m = \frac{-0.1}{\sqrt{0.313 + 10^{-8}}} (-1.582)$

$= \frac{0.1582}{0.5594}$

$= 0.282$

$\Delta c = \frac{(-0.1)}{\sqrt{3.1521 + 10^{-8}}} (-3.957)$

$= \frac{0.3957}{1.7753}$

$= 0.222$

step7 : $m = 1.338 + 0.282$

$= 1.6$

$c = -0.684 + 0.222$

$= -0.462$

step8 : sample = 3

step9 : if ($s > n$) go to next step

step10 : it = 2

step11 : if (it > epoch) go to next step

else go to step3.

step3 : sample = 1.

step4 : $g_m = -(3.4 - (1.6)(0.2)$

$+ 0.462)(0.2)$

$= -(3.862 - 0.32)(0.2)$

$= -(3.542)(0.2)$

$= -0.7$

$g_c = -(3.4 - (1.6)(0.2)$

$+ 0.462)(0.2)$

$= -3.54^2$

Step5:- $E_m = (0.9)(0.333) + (0.1)(-0.7)^2$

$= 0.2997 + 0.049$

$= 0.33$

$E_c = (0.9)(3.152) + (0.1)(-3.542)^2$

$= 2.836 + 1.254$

$= 4.09$

Step6 :- $\Delta m = \frac{-(0.1)}{\sqrt{0.33 + 10^{-8}}}(-0.7)$

$= \frac{0.07}{0.574}$

$= 0.121$

$\Delta C = \frac{-(0.1)}{\sqrt{4.09 + 10^{-8}}}(-3.542)$

$= \frac{0.3542}{2.022}$

$= 0.1751$

step 7 :- $m = 1.6 + 0.121$

$= 1.721$

$c = \cancel{-0.462 + 0}$

$= -0.462 + 0.1751$

$= -0.286$

step8 :- sample = 2

step9 :- if (s > ns) go to next step

else go to step 4

step4 :- $g_m = -(3.8 - (1.721)(0.4) + 0.286)(0.4)$

$= -(4.086 - 0.688)(0.4)$

$= -(3.398)(0.4)$

$= -1.359$

$g_c = -(3.8 - (1.721)(0.4) + 0.286)$

$= -(3.398)$

Step 5:- $E_m = (0.9)(0.33) + (0.1)(-1.359)^2$

$= 0.297 + 0.184$

$= 0.481$

$E_c = (0.9)(4.09) + (0.1)(-3.398)$

$= 3.681 + 1.254$

$= 4.835$

Step 6:- $\Delta m = \frac{\pm (0.1)}{\sqrt{0.481 + 10^{-8}}} (-1.359)$

$= \frac{0.135}{0.693}$

$= 0.194$

$\Delta c = \frac{-0.1}{\sqrt{4.835 + 10^{-8}}} (-3.398)$

$= \frac{0.3398}{2.1988}$

$= 0.154$

step 7 :- $m = 1.721 + 0.194$

$m = 1.915$

$c = -0.286 + 0.154$

$c = -0.132$

Steps :- sample = 3

Step 9 ; if (3 > ns) go to next step

~~else go to ste~~

Step 10 ; it = 3

Step 11 ; if (it > epochs) go to next step.

$\therefore m = 1.915$ ✓

$c = -0.132$ ✓