

Assignment-15

(18KLIADSF4)

Steps

1) $[x, y], \eta = 0.1, \gamma = 0.9, \text{epochs} = 1, m = 1, C = -1, b = 10$

$$E_m = E_c = 0$$

2) $\text{ptr} = 1$

3) $\text{sample} = 1$

4) $g_m = -(3.4 - (1)(0.2) + 1)(0.2) = -0.84$

$$g_c = -4.2$$

5) $E_m = (0.9)(0) + (0.1)(-0.84)^2 = 0.0705$

$$E_c = (0.9)(0) + (0.1)(-4.2)^2 = 1.764$$

6) $\Delta m = \frac{-0.1}{\sqrt{0.07 + 10^{-8}}} (-0.84) = 0.317$

$$\Delta c = \frac{-0.1}{\sqrt{1.76 + 10^{-8}}} (-4.2) = 0.322$$

7) $m = m + \Delta m = 1 + (0.317) = 0.686$

$$C = C + \Delta C = -1 - 0.322 = -1.322$$

8) $\text{sample} = \text{sample} + 1 = 1 + 1 = 2$

9) if $(\text{sample} > n_s) \Rightarrow 2 > 2$
goto step 4

10) $g_m = -(3.8 - (0.686) \times (0.4) + 1.322) \times (0.4)$
 $= -1.93904$

$$g_c = -4.8476$$

$$11) E_m = 0.9 \times (0.0705) + (0.1) \times (-1.93904)^2$$

$$= 0.4394$$

$$E_c = 0.9 \times (1.764) + (0.1) \times (-4.8476)^2$$

$$= 3.9375$$

$$12) \Delta m = \frac{-0.1}{\sqrt{0.4394 + 10^{-8}}} \times (-1.93904) = 0.2925$$

$$\Delta c = \frac{-0.1}{\sqrt{3.9375 + 10^{-8}}} \times (-4.8476) = 0.2442$$

$$13) m = m + \Delta m = 0.9785$$

$$c = c + \Delta c = -1.0778$$

$$14) \text{sample} < \text{sample} + 1 = 2 + 1 = 3 > \text{no of samples}$$

$$15) \text{iter} < 1 + 1 = 2 < \text{epochs}$$

$$16) \text{sample} = 1$$

$$17) g_m = -(3.4 - (0.9785 \times 0.2) + 1.0778) \times 0.2$$

$$= -0.85642$$

$$g_c = -4.2821$$

$$18) E_m = (0.9) \times (0.4394) + (0.1) \times (-0.85642)^2$$

$$= 0.46957$$

$$E_c = (0.9 \times 3.9375) + (0.1) \times (-4.2821)^2$$

$$= 5.3773$$

19)

$$\Delta u = -0.1$$

$$\frac{-0.1}{\sqrt{0.46957 + 10^{-8}}} \times (0.85642) = 0.05868$$

$$\Delta C = -0.1$$

$$\frac{-0.1}{\sqrt{5.3773 + 10^{-8}}} \times (-4.2821) = 0.18466$$

20)

$$u = u + \Delta u = 0.9785 + 0.0586 = 1.0371$$

$$C = C + \Delta C = -1.0778 + 0.18466 = -0.89314$$

21)

$$\text{sample} = \text{sample} + 1$$

22)

$$q_u = -(3.8 - (1.0371 \times 0.4) + 0.89314) \times 0.4$$

$$= -1.71132$$

$$q_c = -4.2783$$

$$23) E_u = (0.9) \times (0.46957) + (0.1) \times (-1.71132)^2$$

$$= 0.71547$$

$$E_c = (0.9) \times (5.3773) + (0.1) \times (-4.2783)^2$$

$$= 6.6699$$

24)

$$\Delta u = \frac{-0.1}{\sqrt{0.71547 + 10^{-8}}} \times (-1.71132) = 0.20231$$

$$\Delta C = \frac{-0.1}{\sqrt{6.6699 + 10^{-8}}} \times (-4.2783) = 0.16565$$

25)

$$u = u + \Delta u = 1.0371 + 0.20231 = 1.23941$$

$$C = C + \Delta C = -0.89314 + 0.16565 = -0.72749$$

26)

$$\text{sample} = 2 + 1 = 3 \text{ no of samples}$$

27) $\text{iter} = \text{iter} + 1 = 3 > \text{no of epochs}$

28) $\text{print}(w, b) \Rightarrow (1.23941, -0.72749)$

29) Mean Squared Error

$$\text{mse} = \frac{1}{2 \times 2} \left[(3.4 - (1.23941 \times 0.2 + 0.72749))^2 + \right.$$

$$\left. (3.8 - (1.23941 \times 0.4 + 0.72749))^2 \right]$$

$$= \frac{1}{4} [15.05135 + 16.25481]$$

$$\text{mse} = 7.82654$$