-01

Assignment 9:

momenton Gradient Descent

manual calculation

step 1: Read [x, y], m=1 x=-1, η=0.1, γ=0.9, epochs=2,

$v_m = 0$, $v_c = 0$

step 2: iter = 1

step 3: sample = 1

step 4: $\epsilon = \frac{1}{2}(y_i - mx_i - c)^2$

$\frac{\partial \epsilon}{\partial m} = -(3.4 - (1)(0.2+1))(0.2) = -(4.2)(0.2) = -0.84$

$\frac{\partial \epsilon}{\partial c} = -(4.2) = -4.2$

step 5: $v_m = \gamma v_m = \eta \frac{\partial \epsilon}{\partial m} = (0.9)(0) - (0.1)(-0.84) = 0.084$

$v_c = (0.9)(0) - (0.1)(4.2) = 0.42$

step 6: m = 1 + 0.084 = 1.084 / c = -1 + 0.42 = -0.58

step 7: sample = 1+1 = 2

step 8: if sample > n : 2 > 2 → false

go to step 4

step 9: $\frac{\partial \epsilon}{\partial m} = -(3.8 - (1.084 \times 0.4) + 0.58) \times 0.4$

$= 1.57856$

step 10: $V_m = (0.9)(0.042) - (0.1)(1.57858) = 0.08225$

$V_c = (0.9)(0.042) - (0.1)(-3.09464) = 0.77267$

step 11: $m = 1.084 + 0.08225 = 1.16625$

$c = -0.058 + 0.77264 = 0.19264$

step 12: sample = 2+1 = 3

step 13: if sample > ns = 3 > 2 = true

go to step 14

step 14: iter = 1+1 = 2

step 15: if iter > epoch = 1 > 2 = false

go to step 3

step 3: sample = 1

step 4: $\epsilon = \frac{1}{2}(y - mx - c)^2$

$$\frac{\partial \epsilon}{\partial m} = -(3.4 - (1.6625 \times 0.2) - 0.19264) \times 0.2$$

$$= -(2.09741) \times 0.2 = -0.59482$$

$$\frac{\partial \epsilon}{\partial c} = -2.09741$$

step 5: $V_m = (0.9) \times (0.08225) - (0.1) \times (0.59482) = 0.133502$

$V_c = 0.992787$

step 6: $m = 1.6625 + 0.133502 = 1.796002$

$c = 1.85427$

step 7: sample = 1+1 = 2

step 8: if sample > ns = 2 > 2 = false

go to step 4

step 4: $\frac{\partial \epsilon}{\partial m} = 0.8376$

$\frac{\partial \epsilon}{\partial c} = -2.09467$

step 5: $V_m = (0.9)(0.133502) - (0.1)(0.83786) = 0.203944$

$V_c = (0.9)(0.992787) - (0.1)(-2.09467) = 1.10292$

step 6: $m = 1.503697$

$c = 2.883397$

step 7: iter = 2+1 = 3

step 8: if iter > epochs = 3 > 2 = false

step 9: print (m x)

1.5036977, 2.288392

step 10: mse = $\frac{(2.5891364) + (2.889827)}{2}$

$= \frac{5.04 + 9.0122}{2}$

mse = 2.7375061