Assigment - 6

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Manual calculation

① Read data {x, y} $y = m_1x^2 + m_2x + c$

x	y
7.6	157
7.1	174

② data preprocessor using normalization

x	y
0.428	0.537
0.190	0.612

③ initalization $m_1 = 1$ $m_2 = 1$, $c = -1$, max iteration = 1000, eta = 0.1, epochs = 1

④ set iter = 1

⑤ set sample (i) = 1

⑥ $\frac{\partial E}{\partial m_1} = -1(y - m_1 * x * x - m_2 * x - c) * x * x$

$= -1(0.537 - 1 * (0.4)(0.4) - 1 * (0.4) + 1) * (0.4)(0.4)$

$= -0.1552$

$\frac{dE}{dm_2} = -1(y - m_1 * x * x - m_2 * x - c) * x$

$= -1(0.537 - 1 * (0.4)(0.4) - 1 * (0.4) + 1) * (0.4)$

$= -0.388$

$\frac{dE}{dc} = -1 * (y - m_1 * x * x - m_2 * x - c)$

$= -0.97$

(7) $\Delta m_1 = -\eta \frac{dE}{dm_1} = -0.1(-0.155) = 0.01$

$\Delta m_2 = -\eta \frac{dE}{dm_2} = -0.1(-0.388) = 0.038$

$\Delta C = -\eta \frac{dE}{dC} = -0.1(-0.97) = 0.097$

(8) $m_1 = m_1 + \Delta m_1 = 1 + 0.0155 = 1.0155$

$m_2 = m_2 + \Delta m_2 = 1 + 0.038 = 1.038$

$C = C + \Delta C = -1 + 0.097 = -0.903$

(9) sample (i) = b; +1

$i = 1 + 1 = 2$

(10) if (sample (i) $\leq$ ns)

if ($2 \leq 2$) T — step 5

sample = 2

(8) $\frac{dE}{dm_1} = -(0.612 - 1.0155 * 0.190 * 0.190 - 1.038 * 0.190 + 0.903) * 0.19$

$= -0.04624$

$\frac{dE}{dm_2} = -(0.612 - 1.015 * 0.190 * 0.190 - 1.038 * 0.190 + 0.903) * 0.1$

$= -0.24341$

$\frac{dE}{dC} = -(0.612 - 1.015 * 0.190 * 0.190 - 1.03 * 0.190 + 0.903)$

$= -1.291$

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(7) $\Delta m_1 = -\eta \frac{dE}{dm_1} = -0.1(-0.0462) = 4.62 \times 10^{-3}$

$\Delta m_2 = -\eta \frac{dE}{dm_2} = -0.1(-0.243) = 0.0243$

$\Delta C = -\eta \frac{dE}{dC} = -0.1(-1.281) = 0.1281$

(8) $m_1 = m_1 + \Delta m_1 = 1.01555 + 4.62 \times 10^{-3} = 1.020$

$m_2 = m_2 + \Delta m_2 = 1.038 + 0.024 = 1.054$

$C = C_3 + \Delta C = -0.903 + 0.1281 = -0.775$

(9) sample (i) = i + 1

i = 2 + 1 = 3

(10) if (sample (i) ≤ n)

if (3 ≤ 2) F → next step.

(11) itr = iter + 1

= 2 + 1 = 2

(12) if (ito ≤ epochs)

if (2 ≤ 1) — F → next step

(13) stop

print m and C

m = 1.020 , 1.054

C = -0.775