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Iteration 4

Current values

$m_3 = 1.34$

$b_3 = 1.916$

$n = 2$

$\alpha = 0.1$

Predictions

$\hat{y}_1 = mx + b$

$= (1.34)(1) + 1.916$

$= 3.256$

$\hat{y}_2 = mx + b$

$= (1.34)(3) + 1.916$

$= 5.936$

Errors

$e_1 = \hat{y} - y_i$

$= 3.256 - 3 = 0.256$

$e_2 = \hat{y}_2 - y_i = 5.936 - 6$

$= -0.064$

Gradient

$\frac{\partial J}{\partial m} = \frac{2}{n} \sum x_i x_i = \frac{2}{n} \sum (mx_i + b - y_i) x_i$

and $\frac{\partial J}{\partial b} = \frac{2}{n} u = \frac{2}{n} \sum (mx_i + b - y_i)$

$\frac{\partial J}{\partial m} = \frac{2}{n} [(e_i x_i) + (e_2 x_2)]$

$= \frac{2}{2} [(0.256)(1) + (0.064)(3)]$

$= 0.256 + (-0.192) = 0.064$

$\frac{\partial J}{\partial b} = \frac{2}{n} (e_1 + e_2)$

$= \frac{2}{2} [0.256 + (-0.064)]$

$= 0.256 - 0.064$

$= 0.192$

Updated values

$m_{new} = m_1 - \alpha \frac{\partial J}{\partial m}$

$= 1.34 - (0.1)(0.064)$

$= 1.34 - 0.0064$

$= 1.3336$

$b_{new} = b_1 - \alpha \frac{\partial J}{\partial b}$

$= 1.916 - (0.1)(0.192)$

$= 1.916 - 0.0192$

$= 1.8968$

New value

$m_4 = 1.334$

$b_4 = 1.897$