

Assignment - 2

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→ find the global minimum point and value for the function $f(x, y) = x^2 + y^2 + 10$

step 1: $x = -1, y = +1, \eta = 0.1, \text{epochs} = 2$

step 2: $\text{iter} = 1$

step 3: $\frac{\partial f}{\partial x} = 2x = -2$

$\frac{\partial f}{\partial y} = 2y = 2$

step 4: $\Delta x = -\eta \frac{\partial f}{\partial x}$
 $= -(0.1)(-2)$
 $= 0.2$

$$\Delta y = -\eta \frac{\partial f}{\partial y}$$
$$= -(0.1)(2)$$
$$= -0.2$$

step 5: $x = x + \Delta x = -1 + 0.2 = -0.8$
 $y = y + \Delta y = 1 - 0.2 = 0.8$

step 6: $\text{iter} = \text{iter} + 1 = 1 + 1$
 $= 2$

step 7: if (iter > epochs)
go to step 8.

else go to step 3

step 3: $\frac{\partial f}{\partial x} = 2x = 2(-0.8) = -1.6$

$$\frac{\partial f}{\partial y} = 2y = 2(0.8) = 1.6$$

step 4: $\Delta x = -\eta \frac{\partial f}{\partial x}$
 $= -(0.1)(-1.6) = 0.16$

$$\Delta y = -\eta \frac{\partial f}{\partial y}$$
$$= -(0.1)(1.6) = -0.16$$

step 5: $x = x + \Delta x$
 $= -0.8 + 0.16 \Rightarrow -0.64$

$$y = y + \Delta y$$
$$= 0.8 - 0.16 \Rightarrow 0.64$$

step 6: $iter = iter + 1 = 2 + 1 = 3$

step 7: if (iter > epochs)
3 > 2

go to step 5

else: go to step 3

step 8: $x = -0.64$
 $y = 0.64$

$$\begin{aligned}
 f(x, y) &= x^2 + y^2 + 10 \\
 &= (0.64)^2 + (0.64)^2 + 10 \\
 &= 0.4 + 0.4 + 10 \\
 &= \underline{\underline{10.8}}
 \end{aligned}$$