

Assignment 2

Find global minimum point and value for function

$$f(x, y) = x^2 + y^2 + 10$$

→ Do manual calculations for 2 iterations.

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:-

$$\begin{aligned} \Delta x &= -\eta \frac{\partial f}{\partial x} = -2(-0.1) \\ &= 0.2. \end{aligned}$$

$$\begin{aligned} \Delta y &= -\eta \frac{\partial f}{\partial y} = -(0.1)(2) \\ &= -0.2. \end{aligned}$$

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:- $\text{if } (\text{iter} > \text{epochs})$

goto step 8

else

goto 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:-

$$x = x + \Delta x.$$

$$= -0.8 + 0.16 \Rightarrow -0.64.$$

$$y = y + \Delta y.$$

$$= 0.8 - 0.16 \Rightarrow 0.64.$$