Assignment-2

Manual Calculations

STEP-1: $f(x,y) = x^2 + y^2 + 10$

calculating derivatives.

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

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

STEP-2: Initialising parameters.

$x = 1$

$y = -1$

$\eta = 0.1$

iters = 1

epochs = 2

STEP-3: $\left.\frac{\partial f}{\partial x}\right|_{x=1} = 2(1) = 2$

$$\left.\frac{\partial f}{\partial y}\right|_{y=-1} = 2(-1) = -2$$

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

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

Step 5: $x = x + \Delta x$

$= 1 + (-0.8) = 0.8$

$y = y + \Delta y$

$= -1 + (0.2) = -0.8$

Step 6: iters = iters+1 = 1+1 = 2 ≤ epochs goto step 7

Step 7: $\frac{\partial f}{\partial x}\Big|_{x=0.8} = 2(0.8) = 1.6$

$\frac{\partial f}{\partial y}\Big|_{y=-0.8} = 2(-0.8) = -1.6$

Step 8: $\Delta x = -\eta \frac{\partial f}{\partial x} = -(0.1)(1.6) = -0.16$

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

Step-9: $x = x + \Delta x$

$= 0.8 - 0.16 = 0.64$

$y = y + \Delta y$

$= -0.8 + 0.16 = -0.64$

Step-10: iters = iters+1 = 2+1 = 5 > epochs

goto step 11

$f(x,y) = (0.16)^2 + (-0.16)^2 + 10$

$= 10.0512$

Global Point: (0.64, -0.64)

Global value: 10.0572