NNDL Assignment-2

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Find the global minimum point and value for the function.

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

- Do manual calculations for two iterations.
- Find the optimal solution using python programming.

Step-1: $x=-1$ $y=+1$ $\eta=0.1$ epoches $=2$

step-2: itr=1

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

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

step-4: $dx = \eta \frac{df}{dx} = -2(-0.1)$

$= 0.2$

$\Delta y = -\eta \frac{df}{dy} = -(0.1)(2) = -0.2$

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

$y = y + \Delta x = 1 - 0.2 = 0.8$

step-6: itr = itr + 1

$= 1 + 1 = 2$

step-7: if (itr > epochs)

goto step-5

else

goto step-3

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

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

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: $x = x + \Delta x$

$= -0.8 + 0.16$

$= -0.64$

$y = y + \Delta y$

$= 0.8 - 0.16$

$= 0.64$

Step-6: itr = itr + 1

$= 2 + 1 = 3$

Step-7: if(itr > epochs)

$3 > 2$

goto step-8

else

goto step-3

Step-8: $x = -0.64$

$y = 0.64$

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

$= (-0.64)^2 + (0.64)^2 + 10$

$= 0.4 + 0.4 + 10$

$= 10.8$