NNDL - Assignment-1

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Branch : CSE

* Find the global minimum Point and value for the function $f(x) = x^4 + 3x^2 + 10$

$\Rightarrow$ Manual Calculations for two iterations

$$f(x) = x^4 + 3x^2 + 10$$

STEP 1 : Initialize variables

$x = 1$, $n = 0.1$, epoches $= 2$, itr $= 1$

STEP 2 : First order derivative of $f(x)$ at $x=1$

$$\frac{\partial f}{\partial x}(x^4 + 3x^2 + 10) = 4x^3 + 6x$$

$$\text{at } x=1 \quad = 4(1)^3 + 6(1)$$

$$= 10$$

STEP 3 : Calculate change in x (Δx)

$$\Delta x = -n\frac{df}{dx}$$

$$\Delta x = -(0.1)(10)$$

$$\Delta x = -1$$

STEP 4 : Update variable x

$$x = x + \Delta x$$

$$x = 1 + (-1)$$

$$x = 0$$

STEP 5 : Increment iterations

$$Itr = itr + 1$$

STEP 6 : if (itr > epoch) then go to step 7

else, go to step 2

Here, 2 > 2 flax.

so, goto step 2

STEP 2 : calculate first order derivative of

$f(m)$ at $x = 0$

$$\frac{\partial f}{\partial x} \quad \text{at } x = 0 \quad = \quad 4x^3 + 6x = 0$$

STEP 3 : Calculate change in x (Δx)

$$\Delta x = -\eta \frac{\partial f}{\partial x}$$

$$\Delta x = -(0.1)(0) = 0$$

STEP 4 : update variable x

$$x = x + \Delta x$$

$$= 0 + (0)$$

$$x = 0$$

STEP 5 : Increment iterations

$$itr = itr + 1$$

STEP 6 : if (itr > epoch) goto step 7

else, goto step 2

Here, itr = 3 > 2 True then goto step 7

STEP 7 : Print variable x

$$x = 0$$

at $x = 0$
we find minimum value of
function $f(x)$ that minimum value
$f(x)$ at $x = 0$ is 10

— X —