

Assignment 1

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

step 1 - random value should be considered
 $x = 3$

$$\text{epochs} = 2$$

$$\text{learning rate} = ~~0.01~~ 0.01$$

step 2 - calculate gradient at
random initialised point

$$\begin{aligned}\frac{\partial f}{\partial x} &= 4x^3 + 6x^2 \\ &= 4(3)^3 + 6(3)^2 \\ &= 4(27) + 6(9) \\ &= 162\end{aligned}$$

step 3 - find change in variable

$$\begin{aligned}\Delta x &= -\eta \frac{\partial f}{\partial x} \\ &= -0.01 \times 162 \\ &= -1.62\end{aligned}$$

step 4 - update the value

$$\begin{aligned}x &= x + \Delta x \\ x &= 3 - 1.62 \\ &= 1.38\end{aligned}$$

step 5: increment iteration

$$1+1=2$$

step 6: check whether we get maximum iterations or not

$$2 > 2 \quad (\text{iter} > \text{opcount})$$

false

Go to step 2

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

$$x = 1.38$$

$$= 4(1.38)^3 + 6(1.38)^2$$

$$= 21.9$$

step 3

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

$$= -0.01 \times 21.9$$

$$= -0.219$$

step 4 - $x = x + \Delta x$

$$x = 1.38 - 0.219$$

$$= 1.161$$

step 5 - increment iteration

$$2+1=3$$

step 6 - $3 > 2$ True

$$x = 1.61$$

$$f(x) = (1.61)^4 + 3(1.61)^2 + 10$$

$$= 24.49$$