



deeplearning.ai

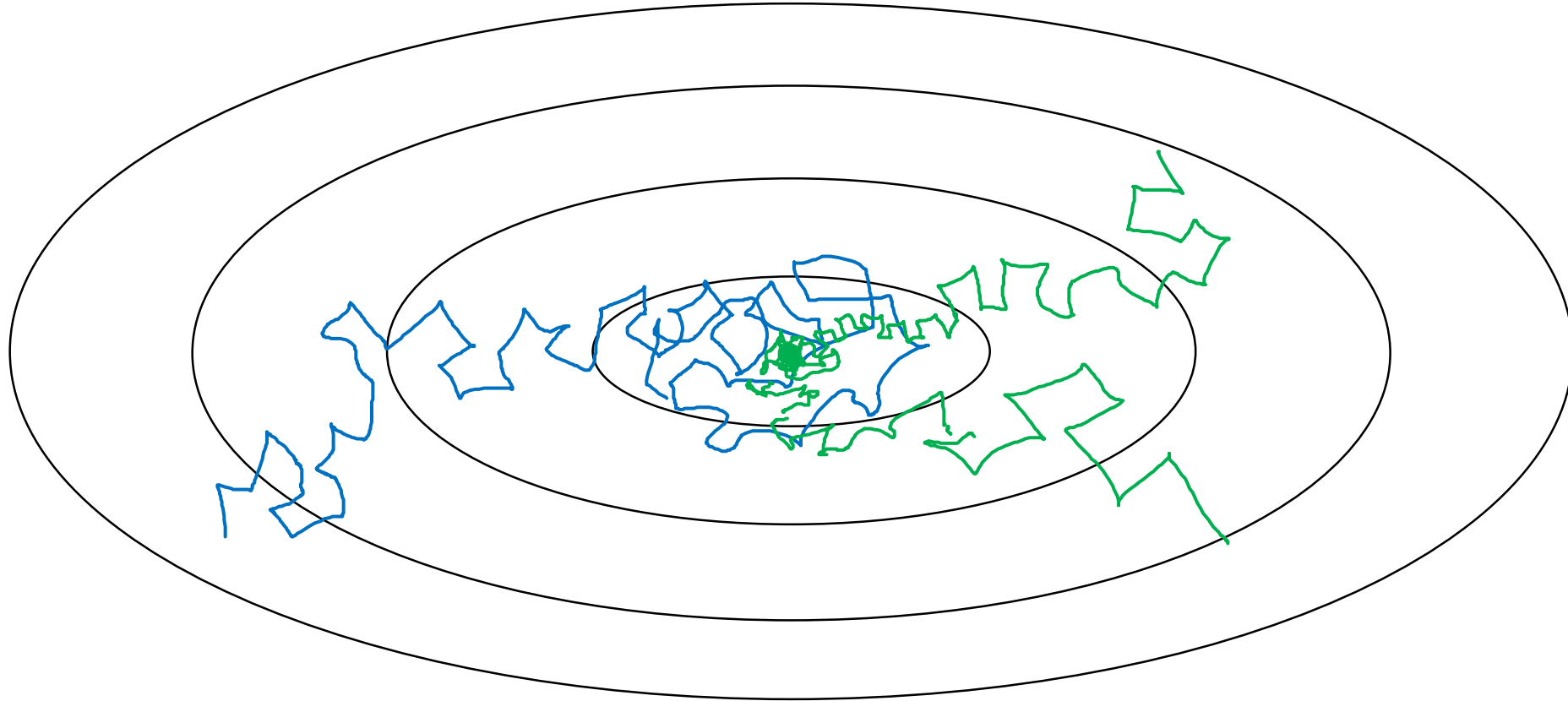
# Optimization Algorithms

---

## Learning rate decay

# Learning rate decay

Slowly reduce  $\alpha$

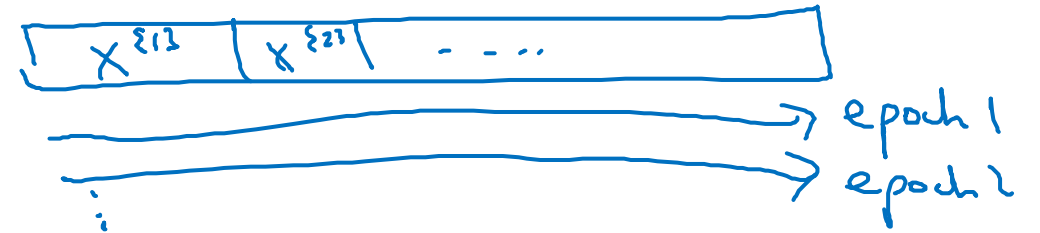


# Learning rate decay

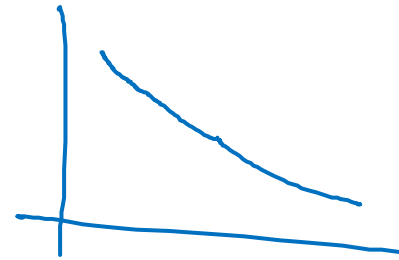
1 epoch = 1 pass through data.

$$\alpha = \frac{1}{1 + \text{decay-rate} * \text{epoch-num}} \alpha_0$$

Epoch	$\alpha$
1	0.1
2	0.67
3	0.5
4	0.4
$\vdots$	$\vdots$



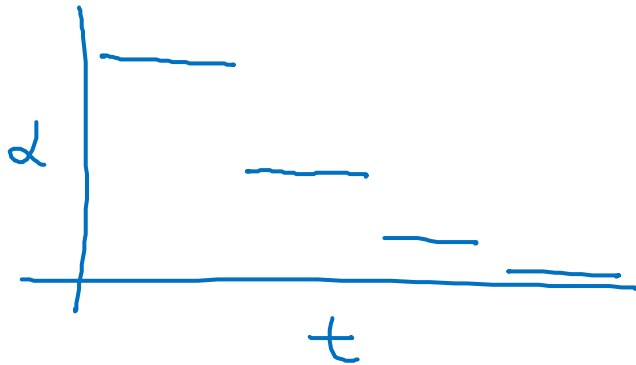
$$\alpha_0 = 0.2$$
$$\text{decay-rate} = 1$$



# Other learning rate decay methods

formula {  $\alpha = 0.95^{\text{epoch-num}} \cdot \alpha_0$  — exponentially decay.

$\alpha = \frac{k}{\sqrt{\text{epoch-num}}} \cdot \alpha_0$  or  $\frac{k}{\sqrt{t}} \cdot \alpha_0$



discrete staircase

Manual decay.