



**deeplearning.ai**

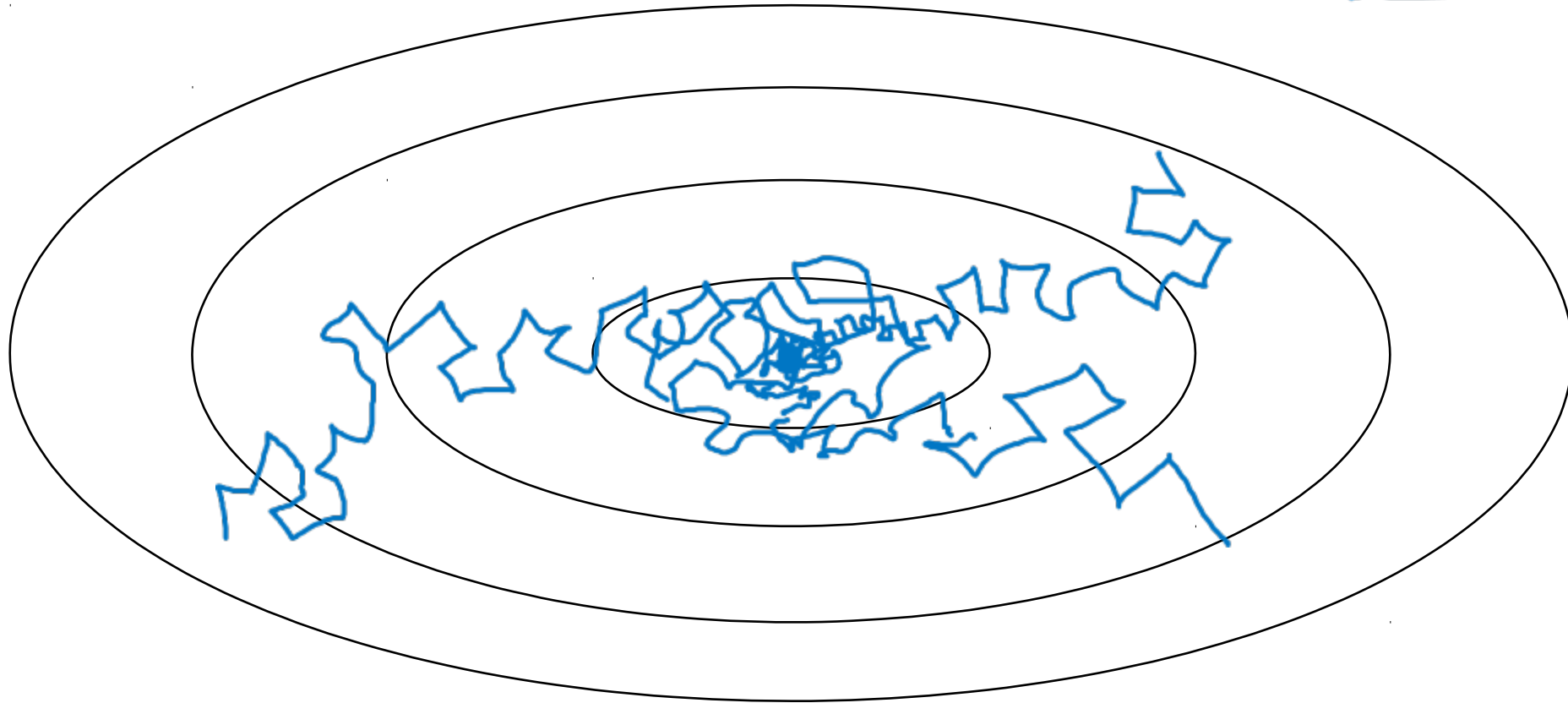
# Optimization Algorithms

---

## Learning rate decay

# Learning rate decay

Slowly reduce  $\alpha$



# Learning rate decay

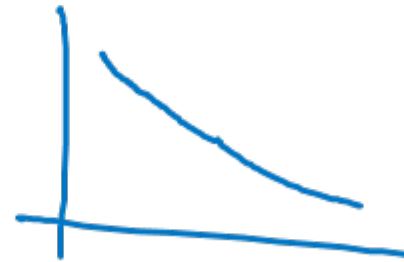
1 epoch = 1 pass through data.

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

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 {

$$\alpha = 0.95^{\text{epoch-num}} \cdot \alpha_0 \quad - \text{exponentially decay.}$$
$$\alpha = \frac{k}{\sqrt{\text{epoch-num}}} \cdot \alpha_0 \quad \text{or} \quad \frac{k}{\sqrt{t}} \cdot \alpha_0$$


discrete staircase

Manual decay.