



deeplearning.ai

Optimization Algorithms

Exponentially weighted averages

Temperature in London

$$\theta_1 = 40^\circ\text{F} \quad 4^\circ\text{C} \leftarrow$$

$$\theta_2 = 49^\circ\text{F} \quad 9^\circ\text{C}$$

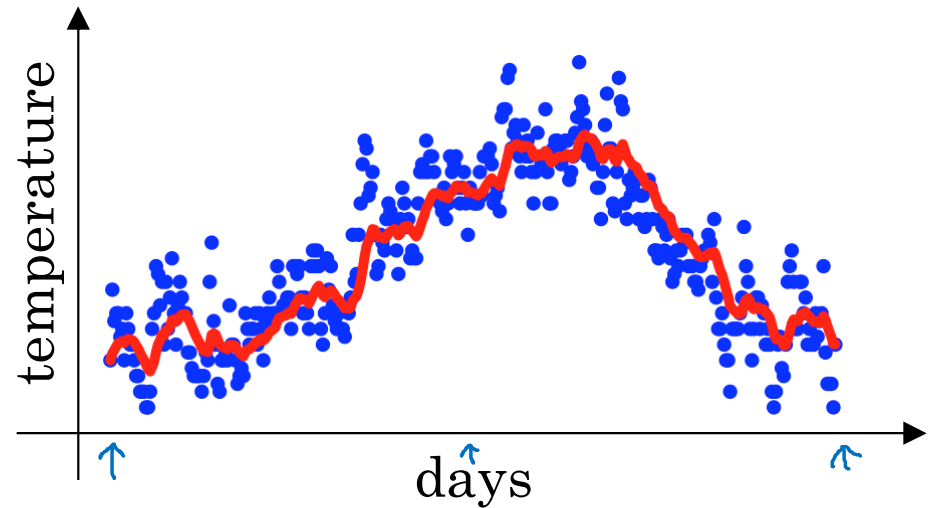
$$\theta_3 = 45^\circ\text{F} \quad \vdots$$

\vdots

$$\theta_{180} = 60^\circ\text{F} \quad 15^\circ\text{C}$$

$$\theta_{181} = 56^\circ\text{F} \quad \vdots$$

\vdots



$$V_0 = 0$$

$$V_1 = 0.9 V_0 + 0.1 \theta_1$$

$$V_2 = 0.9 V_1 + 0.1 \theta_2$$

$$V_3 = 0.9 V_2 + 0.1 \theta_3$$

\vdots

$$V_t = 0.9 V_{t-1} + 0.1 \theta_t$$

Exponentially weighted averages ^{moving}

$$V_t = \beta V_{t-1} + (1-\beta) \theta_t \leftarrow$$

$\beta = 0.9$: ≈ 10 days' temperat.

$\beta = 0.98$: ≈ 50 days

$\beta = 0.5$: ≈ 2 days

V_t is approximately
average over
 $\rightarrow \approx \frac{1}{1-\beta}$ days'
temperature.

$$\frac{1}{1-0.98} = 50$$

