



deeplearning.ai

Optimization Algorithms

Adam optimization algorithm

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$$V_{dw} = 0, S_{dw} = 0, V_{db} = 0, S_{db} = 0$$

On iteration t :

Compute dw, db using current mini-batch

$$V_{dw} = \beta_1 V_{dw} + (1 - \beta_1) dw, \quad V_{db} = \beta_1 V_{db} + (1 - \beta_1) db \quad \leftarrow \text{"momentum"} \beta_1$$

$$S_{dw} = \beta_2 S_{dw} + (1 - \beta_2) dw^2, \quad S_{db} = \beta_2 S_{db} + (1 - \beta_2) db^2 \quad \leftarrow \text{"RMSprop"} \beta_2$$

`yhat = np.array([.9, 0.2, 0.1, .4, .9])`

$$V_{dw}^{\text{corrected}} = V_{dw} / (1 - \beta_1^t), \quad V_{db}^{\text{corrected}} = V_{db} / (1 - \beta_1^t)$$

$$S_{dw}^{\text{corrected}} = S_{dw} / (1 - \beta_2^t), \quad S_{db}^{\text{corrected}} = S_{db} / (1 - \beta_2^t)$$

$$W := W - \alpha \frac{V_{dw}^{\text{corrected}}}{\sqrt{S_{dw}^{\text{corrected}} + \epsilon}}$$

$$b := b - \alpha \frac{V_{db}^{\text{corrected}}}{\sqrt{S_{db}^{\text{corrected}} + \epsilon}}$$

Hyperparameters choice:

→ α : needs to be tune

→ β_1 : 0.9 → (dw)

→ β_2 : 0.999 → (dw^2)

→ ϵ : 10^{-8}

Adam : Adaptive moment estimation



Adam Coates