



deeplearning.ai

Batch Normalization

Batch Norm at test time

Batch Norm at test time

whatever ways to estimate: pretty robust

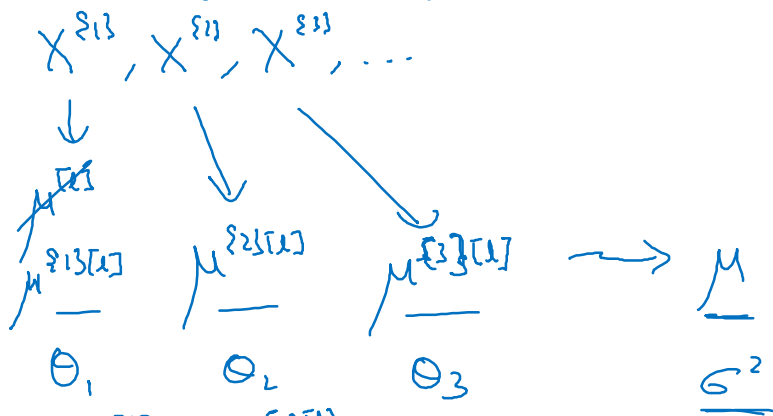
$$\mu = \frac{1}{m} \sum_i z^{(i)}$$

$$\sigma^2 = \frac{1}{m} \sum_i (z^{(i)} - \mu)^2$$

$$z_{\text{norm}}^{(i)} = \frac{z^{(i)} - \mu}{\sqrt{\sigma^2 + \epsilon}}$$

$$\tilde{z}^{(i)} = \gamma \underline{z_{\text{norm}}^{(i)}} + \beta$$

μ, σ^2 : estimate using exponentially weighted average (across mini-batches).



$$z_{\text{norm}} = \frac{z - \mu}{\sqrt{\sigma^2 + \epsilon}} \quad \tilde{z} = \gamma z_{\text{norm}} + \beta$$