



deeplearning.ai

Batch Normalization

Batch Norm at test time

BN은 한 미니배치에 대해 동작하는데 테스트 타임에는 한 `example`만 처리할 수도 있다. 이때 어떻게 처리할까?

Batch Norm at test time

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

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

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

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

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

$X^{\{1\}}, X^{\{2\}}, X^{\{3\}}, \dots$

\downarrow
 ~~$\mu^{[L]}$~~

$\mu^{\{1\}[L]}$

$\mu^{\{2\}[L]}$

$\mu^{\{3\}[L]}$

$\rightarrow \mu$
 $\rightarrow \sigma^2$

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