⟨Multiplier⟩

$m_i = \omega_{ji} \times x_i$

$\frac{\partial L}{\partial x_i} = \frac{\partial m_i}{\partial x_i} \times \frac{\partial S_i}{\partial m_i} \times \frac{\partial z_i}{\partial S_i} \times \frac{\partial C_j}{\partial z_i}$

$\times \frac{\partial m_j}{\partial C_j} \times \frac{\partial S_k}{\partial m_j} \times \frac{\partial L}{\partial S_k}$

$= \frac{\partial m_i}{\partial x_i} \times (3z_i(1-z_i) \omega_{kj} \sigma_k)$

$= 3\omega_{ji} z_j (1-z_j) \omega_{kj} \sigma_k$

⟨Sigmoid⟩

$z_j = \sigma(S_i)$

$\frac{\partial L}{\partial S_i} = \frac{\partial z_i}{\partial S_i} \times \frac{\partial C_j}{\partial z_i} \times \frac{\partial m_j}{\partial C_j} \times \frac{\partial S_k}{\partial m_j} \times \frac{\partial L}{\partial S_k}$

$= \frac{\partial \sigma(S_i)}{\partial S_i} \times 3\omega_{kj} \sigma_k$

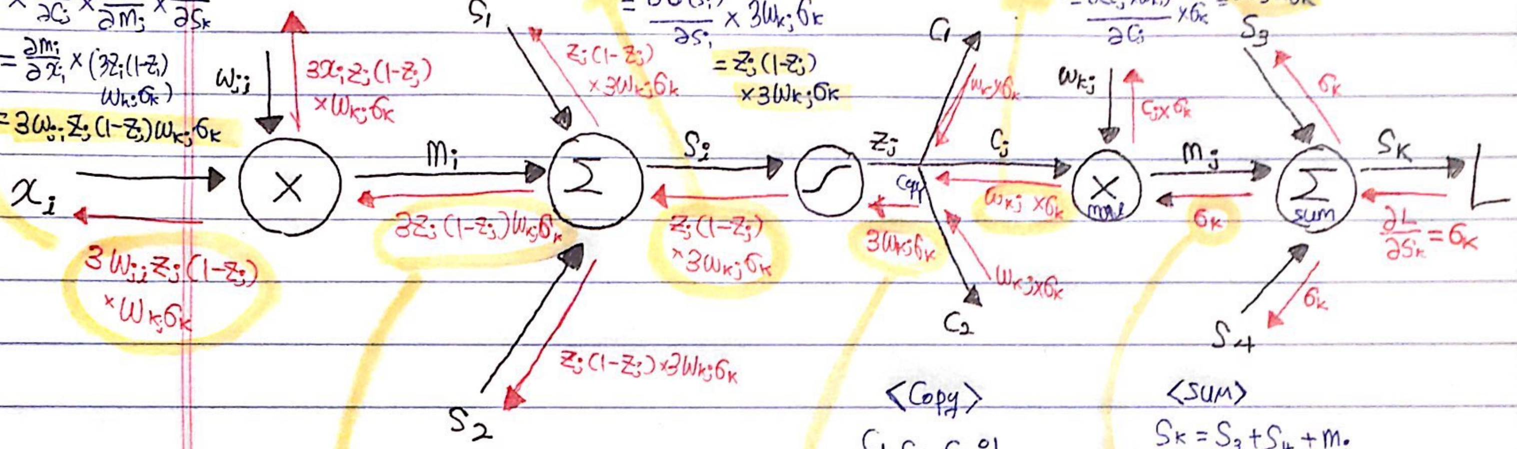
$= z_j(1-z_j) \times 3\omega_{kj} \sigma_k$

⟨multiplier⟩

$m_j = C_j \times \omega_{kj}$

$\frac{\partial L}{\partial C_j} = \frac{\partial m_j}{\partial C_j} \times \frac{\partial S_k}{\partial m_j} \times \frac{\partial L}{\partial S_k}$

$= \frac{\partial (C_j \times \omega_{kj})}{\partial C_j} \times \sigma_k = \omega_{kj} \times \sigma_k$



x_i
×
ω_{ji}
$3x_i z_j(1-z_j) \times \omega_{kj} \sigma_k$
$3\omega_{ji} z_j(1-z_j) \times \omega_{kj} \sigma_k$
m_i
$3z_j(1-z_j)\omega_{kj}\sigma_k$
S_1
$z_j(1-z_j) \times 3\omega_{kj}\sigma_k$
Σ
S_2
$z_j(1-z_j) \times 3\omega_{kj}\sigma_k$
S_i
$z_j(1-z_j) \times 3\omega_{kj}\sigma_k$
z_j
copy
$3\omega_{kj}\sigma_k$
C_1
$\omega_{kj} \times \sigma_k$
C_j
$\omega_{kj} \times \sigma_k$
C_2
$\omega_{kj} \times \sigma_k$
ω_{kj}
$C_j \times \sigma_k$
×
mul
m_j
σ_k
S_3
σ_k
Σ
sum
S_4
σ_k
S_k
L
$\frac{\partial L}{\partial S_k} = \sigma_k$

⟨SUM⟩

$S_i = S_1 + S_2 + m_i$

$\frac{\partial L}{\partial m_i} = \frac{\partial S_i}{\partial m_i} \times \frac{\partial z_i}{\partial S_i} \times \frac{\partial C_j}{\partial z_i} \times \frac{\partial m_j}{\partial C_j} \times \frac{\partial S_k}{\partial m_j} \times \frac{\partial L}{\partial S_k}$

$= \frac{\partial (S_1 + S_2 + m_i)}{\partial m_i} \times (3z_j(1-z_j)\omega_{kj}\sigma_k)$

$= 3z_j(1-z_j)\omega_{kj}\sigma_k$

⟨Copy⟩

C_1, C_j, C_2의

미분이 모두

$\omega_{kj} \times \sigma_k$로 같다고

가정.

$\frac{\partial L}{\partial z_j} = \frac{\partial C_j}{\partial z_j} \times \frac{\partial m_j}{\partial C_j} \times \frac{\partial S_k}{\partial m_j} \times \frac{\partial L}{\partial S_k}$

$= \frac{\partial C_j}{\partial z_j} \times \omega_{kj} \times \sigma_k$

$= \omega_k \times \sigma_k + \omega_k \times \sigma_k + \omega_k \times \sigma_k$

$= 3\omega_k \sigma_k$

⟨SUM⟩

$S_k = S_3 + S_4 + m_j$

$\frac{\partial L}{\partial m_j} = \frac{\partial S_k}{\partial m_j} \times \frac{\partial L}{\partial S_k}$

$= \frac{\partial (S_3 + S_4 + m_j)}{\partial m_j} \times \sigma_k$

$= \sigma_k$

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