

$$\begin{matrix} 0 & 0.1432 \\ 1 & -0.0515 \end{matrix}$$

Part 3: Calculating Gradients for Hidden Layer Weights

$$\frac{\partial E}{\partial w_1} = (\sum_c \delta_c w_i) \underbrace{\text{out}_{b_1}}_{①} \underbrace{(1 - \text{out}_{a_1})}_{②} \underbrace{\text{out}_{a_1}}_{③}$$

w₁

①

$$0.1432 \times .05 = 0.0072$$

$$-0.0515 \times .40 = -0.0206$$

②

$$0.7020 \times (1 - 0.7020) = 0.2092$$

$$\sim 0.0134$$

$$③ a_1 = 0.15$$

$$④ -0.0134 \times 0.2092 \times 0.15 = -0.000420492$$

w₂

$$① (0.1432 \times .33) + (-0.0515 \times .07) = 0.0437$$

$$② 0.5841 \times (1 - 0.5841) = 0.2429$$

$$③ a_1 = 0.15$$

$$0.0437 \times 0.2429 \times 0.15 = 0.00159$$

w₃

$$① (0.1432 \times .05) + (-0.0515 \times .40) = -0.0134$$

$$② (0.7020) \times (1 - 0.7020) = 0.2092$$

$$③ a_2 = .35$$

$$-0.0134 \times 0.2092 \times .35 = -0.000984$$

$$① (0.1432 \times .33) + (-0.0515 \times .07) = 0.0437$$

$$② 0.5841 \times (1 - 0.5841) = 0.2429$$

$$③ a_2 = .35$$

$$0.0437 \times 0.2429 \times .35 = 0.003715$$