

$$\begin{array}{l} 0 \quad 0.1432 \\ 1 \quad -0.0515 \end{array}$$

Part 3: Calculating Gradients for Hidden Layer Weights

$$\frac{\partial \mathcal{E}}{\partial W_1} = \underbrace{\left(\sum_i \delta_2 W_i \right)}_{(1)} \underbrace{out_{b_1} (1 - out_{b_1})}_{(2)} \underbrace{out_{a_1}}_{(3)}$$

W₁

①

$$\begin{array}{rcl} 0.1432 \times 0.05 & & -0.0515 \times 0.40 \\ = 0.0072 & + & = -0.0206 \end{array}$$

$$-0.0134$$

②

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

③ a₁ = 0.15

①23 $-0.0134 \times 0.2092 \times 0.15$
 $= -0.000420492$

W₂

① $(0.1432 \times 0.33) + (-0.0515 \times 0.07) = 0.0437$

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

③ a₁ = 0.15

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

W₃

① $(0.1432 \times 0.05) + (-0.0515 \times 0.40) = -0.01344$

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

③ a₂ = 0.35

$$-0.01344 \times 0.2092 \times 0.35 = -0.000984$$

W₄

① $(0.1432 \times 0.33) + (-0.0515 \times 0.07) = 0.0437$

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

③ a₂ = 0.35

$$0.0437 \times 0.2429 \times 0.35 = 0.003715$$