$$\frac{\partial E}{\partial out_{H_1}} = \frac{\partial E}{\partial out_y} \times \frac{\partial out_y}{\partial y} \times \frac{\partial y}{\partial out_{H_1}}$$

$$= -2(T - out_y) \times \sigma(y)(1-\sigma(y)) \times w_{11}^2$$

$$\frac{\partial E}{\partial out_{H_2}} = \frac{\partial E}{\partial out_y} \times \frac{\partial out_y}{\partial y} \times \frac{\partial y}{\partial out_{H_2}}$$

$$= -2(T - out_y) \times \sigma(y)(1-\sigma(y)) \times w_{12}^2$$

$$\frac{\partial E}{\partial w_{11}^1} = \frac{\partial E}{\partial out_{H_1}} \times \frac{\partial out_{H_1}}{\partial H_1} \times \frac{\partial H_1}{\partial w_{11}^1}$$

$$= \frac{\partial E}{\partial out_{H_1}} * \sinh H_1 \cosh H_1 * x_1$$

$$\frac{\partial E}{\partial w_{21}^1} = \frac{\partial E}{\partial out_{H_1}} \times \frac{\partial out_{H_1}}{\partial H_1} \times \frac{\partial H_1}{\partial w_{21}^1}$$

$$= \frac{\partial E}{\partial out_{H_1}} * \sinh H_1 \cosh H_1 * x_2$$

$$\frac{\partial E}{\partial w_{12}^1} = \frac{\partial E}{\partial out_{H_2}} \times \frac{\partial out_{H_2}}{\partial H_2} \times \frac{\partial H_2}{\partial w_{12}^1}$$

$$= \frac{\partial E}{\partial out_{H_2}} * \sinh H_2 \cosh H_2 * x_1$$

$$\frac{\partial E}{w_{22}} = \frac{\partial E}{\partial out_{H_2}} \times \frac{\partial out_{H_2}}{\partial H_2} \times \frac{\partial H_2}{\partial w_{22}^1}$$

$$= \frac{\partial E}{\partial out_{H_2}} * \sinh H_2 \cosh H_2 * x_2$$

So

$$w_{ij}^k \leftarrow w_{ij}^k + \eta \frac{\partial E}{\partial w_{ij}^k}$$

$\forall i, j \in \{1, 2\}$

$k \in \{1, 2\}$.