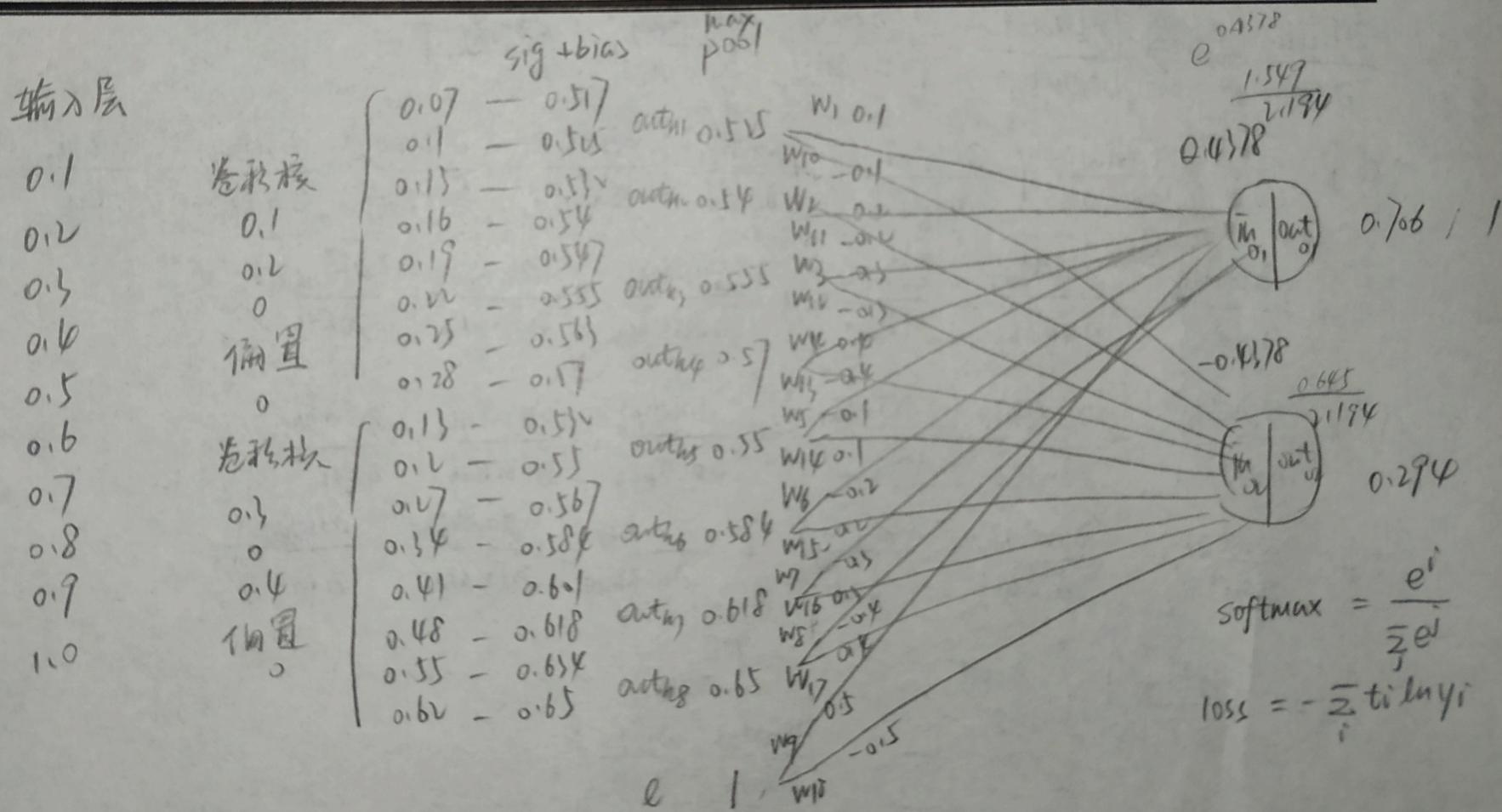
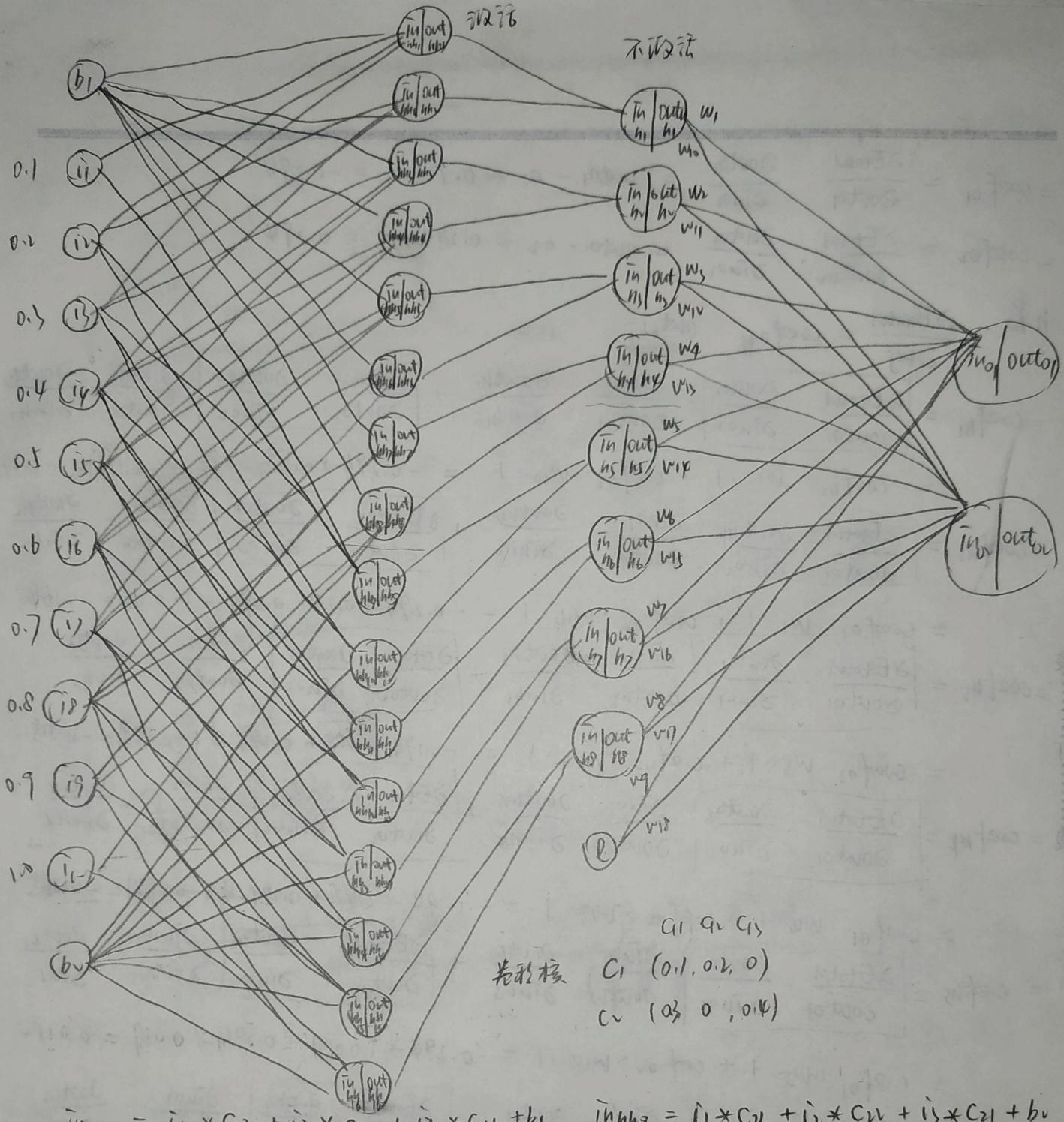


$$\text{loss} = -(1 \cdot \ln 0.706 + 0 \cdot \ln 0.294)$$

$$= 0.348$$



装



卷积核 $C_1 (0.1, 0.2, 0)$
 $C_2 (0.3, 0, 0.4)$

$$\begin{aligned} \bar{i}_{hh1} &= i_1 * C_{13} + i_2 * C_{12} + i_3 * C_{11} + b_1 \\ \bar{i}_{hh2} &= i_2 * C_{13} + i_3 * C_{12} + i_4 * C_{11} + b_1 \\ \bar{i}_{hh3} &= i_3 * C_{13} + i_4 * C_{12} + i_5 * C_{11} + b_1 \\ \bar{i}_{hh4} &= i_4 * C_{13} + i_5 * C_{12} + i_6 * C_{11} + b_1 \\ \bar{i}_{hh5} &= i_5 * C_{13} + i_6 * C_{12} + i_7 * C_{11} + b_1 \\ \bar{i}_{hh6} &= i_6 * C_{13} + i_7 * C_{12} + i_8 * C_{11} + b_1 \\ \bar{i}_{hh7} &= i_7 * C_{13} + i_8 * C_{12} + i_9 * C_{11} + b_1 \\ \bar{i}_{hh8} &= i_8 * C_{13} + i_9 * C_{12} + i_{10} * C_{11} + b_1 \end{aligned}$$

$$\begin{aligned} \bar{i}_{hh9} &= i_1 * C_{23} + i_2 * C_{22} + i_3 * C_{21} + b_2 \\ \bar{i}_{hh10} &= i_2 * C_{23} + i_3 * C_{22} + i_4 * C_{21} + b_2 \\ \bar{i}_{hh11} &= i_3 * C_{23} + i_4 * C_{22} + i_5 * C_{21} + b_2 \\ \bar{i}_{hh12} &= i_4 * C_{23} + i_5 * C_{22} + i_6 * C_{21} + b_2 \\ \bar{i}_{hh13} &= i_5 * C_{23} + i_6 * C_{22} + i_7 * C_{21} + b_2 \\ \bar{i}_{hh14} &= i_6 * C_{23} + i_7 * C_{22} + i_8 * C_{21} + b_2 \\ \bar{i}_{hh15} &= i_7 * C_{23} + i_8 * C_{22} + i_9 * C_{21} + b_2 \\ \bar{i}_{hh16} &= i_8 * C_{23} + i_9 * C_{22} + i_{10} * C_{21} + b_2 \end{aligned}$$

$$\frac{\partial E_{\text{total}}}{\partial \ln o_1} = \text{coef } o_1 = \frac{\partial E_{\text{total}}}{\partial o_{101}} \cdot \frac{\partial o_{101}}{\partial \ln o_1} = o_{101} - o_1 = 0,706 - 1 = -0,294$$

$$\frac{\partial E_{\text{total}}}{\partial n_{\text{air}}} = \text{coefor} = \frac{\partial E_{\text{total}}}{\partial n_{\text{air}}} \cdot \frac{\partial n_{\text{air}}}{\partial n_{\text{air}}} = 0.194 - 0 = 0.194 - 0 = 0.194$$

$$h_{\text{PA}} \frac{\partial E_{\text{total}}}{\partial w_j} = \text{coef}_j \cdot \text{out}_{hhj}$$

$$\frac{\partial E_{total}}{\partial Th_{hi}} = \text{coef}_{Th_{hi}} = \left[\begin{array}{cc} \frac{\partial E_{total}}{\partial Th_{hi}} & \frac{\partial E_{total}}{\partial d_{101}} \\ \frac{\partial d_{101}}{\partial Th_{hi}} & \frac{\partial d_{101}}{\partial Th_{hi}} \end{array} \right] \cdot \left[\begin{array}{c} \frac{\partial d_{101}}{\partial Th_{hi}} \\ \frac{\partial d_{101}}{\partial Th_{hi}} \end{array} \right] + \left[\begin{array}{cc} \frac{\partial E_{total}}{\partial d_{101}} & \frac{\partial E_{total}}{\partial d_{101}} \\ \frac{\partial d_{101}}{\partial Th_{hi}} & \frac{\partial d_{101}}{\partial Th_{hi}} \end{array} \right] \cdot \left[\begin{array}{c} \frac{\partial d_{101}}{\partial Th_{hi}} \\ \frac{\partial d_{101}}{\partial Th_{hi}} \end{array} \right]$$

$$\frac{\partial E_{total}}{\partial \bar{m}_{hr}} = \text{coef}_{hr} = \left[\frac{\partial E_{total}}{\partial m_{01}} \cdot \frac{\partial m_{01}}{\partial \bar{m}_{hr}} + \frac{\partial E_{total}}{\partial m_{02}} \cdot \frac{\partial m_{02}}{\partial \bar{m}_{hr}} \right] = -0.294 \cdot 0.48 + 0.294 \cdot (-0.74) = -0.164$$

$$= \text{coef}_{01} \cdot W_2 \cdot 1 + \text{coef}_{02} \cdot W_{11} \cdot 1 = -0,274 * 0,48 + 0,17 = 0,00$$

$$= \left[\frac{\partial E_{total}}{\partial w_{01}} \cdot \frac{\partial w_{01}}{\partial w_{11}} \right] \left[\frac{\partial w_{01}}{\partial \text{births}} \cdot \frac{\partial \text{births}}{\partial \text{births}} \right] + \left[\frac{\partial E_{total}}{\partial w_{02}} \cdot \frac{\partial w_{02}}{\partial w_{11}} \right] \left[\frac{\partial w_{02}}{\partial \text{births}} \cdot \frac{\partial \text{births}}{\partial \text{births}} \right]$$

$$\frac{\partial E_{total}}{\partial \bar{t}_{101}} = \text{coef}_{101} = \left[\frac{\partial E_{total}}{\partial v_{101}} \cdot \frac{\partial v_{101}}{\partial \bar{t}_{101}} + \frac{\partial E_{total}}{\partial u_{101}} \cdot \frac{\partial u_{101}}{\partial \bar{t}_{101}} \right] = -0.294 \cdot 0.782 + 0.194 \cdot (-0.782) = -0.225$$

$$\frac{\partial E_{\text{total}}}{\partial \text{Inuy}} = \text{cof}_{\text{Inuy}} = \begin{bmatrix} \frac{\partial E_{\text{total}}}{\partial \text{out01}}, \frac{\partial \text{out01}}{\partial \text{Inuy}} \\ \frac{\partial \text{out01}}{\partial \text{Inuy}}, \frac{\partial E_{\text{total}}}{\partial \text{Inuy}} \end{bmatrix} \cdot \begin{bmatrix} \frac{\partial \text{Inuy}}{\partial \text{out01}}, \frac{\partial \text{out01}}{\partial \text{Inuy}} \\ \frac{\partial \text{out01}}{\partial \text{Inuy}}, \frac{\partial E_{\text{total}}}{\partial \text{Inuy}} \end{bmatrix} + \begin{bmatrix} \frac{\partial E_{\text{total}}}{\partial \text{out01}}, \frac{\partial \text{out01}}{\partial \text{Inuy}} \\ \frac{\partial \text{out01}}{\partial \text{Inuy}}, \frac{\partial E_{\text{total}}}{\partial \text{Inuy}} \end{bmatrix} \cdot \begin{bmatrix} \frac{\partial \text{Inuy}}{\partial \text{out01}}, \frac{\partial \text{out01}}{\partial \text{Inuy}} \\ \frac{\partial \text{out01}}{\partial \text{Inuy}}, \frac{\partial E_{\text{total}}}{\partial \text{Inuy}} \end{bmatrix}$$

$$\frac{\partial E_{\text{total}}}{\partial \text{Inhs}} = w_{\text{Inhs}} = \left(\frac{\partial E_{\text{total}}}{\partial \text{Inhs}} \cdot \frac{\partial \text{Inhs}}{\partial \text{Inhs}} + \frac{\partial E_{\text{total}}}{\partial \text{ouths}} \cdot \frac{\partial \text{ouths}}{\partial \text{Inhs}} \right) \frac{\partial \text{Inhs}}{\partial \text{ouths}}$$

$$= \text{cef}_{01} \cdot w_5 \cdot 1 + \text{cef}_{02} \cdot w_{14} \cdot 1 = -0.294 \cdot (-0.019) + 0.1294 \cdot 0.019 = 0.011$$

$$\frac{\partial E_{total}}{\partial \eta_{hb}} = \text{coef}_{hb} = \left[\frac{\partial E_{total}}{\partial \eta_{v1}} - \frac{\partial \eta_{v1}}{\partial \eta_{hb}} \right] \cdot \frac{\partial \eta_{v1}}{\partial \eta_{hb}} + \left[\frac{\partial E_{total}}{\partial \eta_{v2}} - \frac{\partial \eta_{v2}}{\partial \eta_{hb}} \right] \cdot \frac{\partial \eta_{v2}}{\partial \eta_{hb}} + \dots$$

$$= \text{coef}_{v1} \cdot w_b - 1 + \text{coef}_{v2} \cdot w_{15} \cdot 1 = -0.294 \cdot (-0.114) + 0.294 \cdot 0.114 = 0.067$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{u}_{hj}} = \text{cof}_{hj} = \left[\frac{\partial E_{\text{total}}}{\partial u_{01}}, \frac{\partial E_{\text{total}}}{\partial u_{02}} \right] \cdot \frac{\partial \bar{u}_{01}}{\partial \bar{u}_{hj}}, \frac{\partial \bar{u}_{02}}{\partial \bar{u}_{hj}} + \left[\frac{\partial E_{\text{total}}}{\partial u_{01}}, \frac{\partial E_{\text{total}}}{\partial u_{02}} \right] \cdot \frac{\partial \bar{u}_{01}}{\partial \bar{u}_{hj}}, \frac{\partial \bar{u}_{02}}{\partial \bar{u}_{hj}}$$

$$\frac{\partial E_{\text{total}}}{\partial \text{Inhs}} = w_{\text{efh8}} = \left[\frac{\partial E_{\text{total}}}{\partial \text{Inhs}}, \frac{\partial E_{\text{total}}}{\partial \text{D101}} \right] \cdot \begin{bmatrix} \text{D101} \\ \text{Douths} \end{bmatrix} + \left[\frac{\partial E_{\text{total}}}{\partial \text{D101}}, \frac{\partial E_{\text{total}}}{\partial \text{Douths}} \right] \cdot \begin{bmatrix} \text{D101} \\ \text{Douths} \end{bmatrix}$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{m}_{\text{HS}}} = w_{\text{efhs}} = \left[\frac{\partial E_{\text{total}}}{\partial m_{\text{f01}}} \cdot \frac{\partial m_{\text{f01}}}{\partial \bar{m}_{\text{HS}}} + \frac{\partial E_{\text{total}}}{\partial m_{\text{f02}}} \cdot \frac{\partial m_{\text{f02}}}{\partial \bar{m}_{\text{HS}}} \right] = w_{\text{ef01}} \cdot W_8 \cdot 1 + w_{\text{ef02}} \cdot V_{17} \cdot 1 = -0,294 \cdot 1 \cdot 0,305 + 0,294 \cdot 0,305 = 0,179$$

$$\frac{\partial E_{\text{total}}}{\partial w_1} = \left| \begin{array}{cc} \frac{\partial E_{\text{total}}}{\partial w_{01}} & \frac{\partial E_{\text{total}}}{\partial w_{n1}} \\ \frac{\partial w_{01}}{\partial w_1} & \frac{\partial w_{n1}}{\partial w_1} \end{array} \right| \cdot \frac{\partial \bar{w}_{01}}{\partial w_1} = (0.706 - 1) \cdot 0.515 = -0.1154$$

$$\frac{\partial E_{\text{total}}}{\partial w_2} = \text{coef}_{01} \cdot \frac{\partial \bar{w}_{01}}{\partial w_2} = -0.294 \cdot 0.54 = -0.159 \quad w_1 = w_1 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_1} = 0.1 + 0.5 \cdot -0.1154 = 0.177$$

$$\frac{\partial E_{\text{total}}}{\partial w_3} = \text{coef}_{01} \cdot \frac{\partial \bar{w}_{01}}{\partial w_3} = -0.294 \cdot 0.555 = -0.163 \quad w_2 = w_2 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_2} = 0.2 + 0.5 \cdot -0.159 = 0.278$$

$$\frac{\partial E_{\text{total}}}{\partial w_4} = \text{coef}_{01} \cdot \frac{\partial \bar{w}_{01}}{\partial w_4} = -0.294 \cdot 0.57 = -0.168 \quad w_3 = w_3 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_3} = 0.3 + 0.5 \cdot -0.163 = 0.382$$

$$\frac{\partial E_{\text{total}}}{\partial w_5} = \text{coef}_{01} \cdot \frac{\partial \bar{w}_{01}}{\partial w_5} = -0.294 \cdot 0.55 = -0.162 \quad w_4 = w_4 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_4} = 0.4 + 0.5 \cdot -0.168 = 0.484$$

$$\frac{\partial E_{\text{total}}}{\partial w_6} = \text{coef}_{01} \cdot \frac{\partial \bar{w}_{01}}{\partial w_6} = -0.294 \cdot 0.584 = -0.172 \quad w_5 = w_5 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_5} = -0.1 + 0.5 \cdot -0.162 = -0.019$$

$$\frac{\partial E_{\text{total}}}{\partial w_7} = \text{coef}_{01} \cdot \frac{\partial \bar{w}_{01}}{\partial w_7} = -0.294 \cdot 0.618 = -0.182 \quad w_6 = w_6 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_6} = -0.2 + 0.5 \cdot -0.172 = -0.114$$

$$\frac{\partial E_{\text{total}}}{\partial w_8} = \text{coef}_{01} \cdot \frac{\partial \bar{w}_{01}}{\partial w_8} = -0.294 \cdot 0.65 = -0.191 \quad w_7 = w_7 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_7} = -0.3 + 0.5 \cdot -0.182 = -0.209$$

$$\frac{\partial E_{\text{total}}}{\partial b} = \text{coef}_{01} \cdot 1 = -0.294 \quad w_8 = w_8 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial w_8} = -0.4 + 0.5 \cdot -0.191 = -0.305$$

coefor 0.294

$$\frac{\partial E_{\text{total}}}{\partial W_{10}} = \left(\frac{\partial E_{\text{total}}}{\partial \bar{W}_{10}} - \frac{\partial E_{\text{total}}}{\partial \bar{W}_{11}} \right) \cdot \frac{\partial \bar{W}_{10}}{\partial W_{10}} = (0.294 - 0.159) \cdot 0.5 = 0.1154$$

$$W_{10} = W_{10} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{10}}$$

$$\frac{\partial E_{\text{total}}}{\partial W_{11}} = \text{coefor} \cdot \frac{\partial \bar{W}_{11}}{\partial W_{11}} = 0.294 \cdot 0.159 = 0.159$$

$$W_{11} = W_{11} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{11}} = -0.1 - 0.5 \cdot 0.159 = -0.179$$

$$\frac{\partial E_{\text{total}}}{\partial W_{12}} = \text{coefor} \cdot \frac{\partial \bar{W}_{12}}{\partial W_{12}} = 0.294 \cdot 0.163 = 0.163$$

$$W_{12} = W_{12} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{12}} = -0.2 - 0.5 \cdot 0.163 = -0.278$$

$$\frac{\partial E_{\text{total}}}{\partial W_{13}} = \text{coefor} \cdot \frac{\partial \bar{W}_{13}}{\partial W_{13}} = 0.294 \cdot 0.168 = 0.168$$

$$W_{13} = W_{13} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{13}} = -0.3 - 0.5 \cdot 0.168 = -0.388$$

$$\frac{\partial E_{\text{total}}}{\partial W_{14}} = \text{coefor} \cdot \frac{\partial \bar{W}_{14}}{\partial W_{14}} = 0.294 \cdot 0.162 = 0.162$$

$$W_{14} = W_{14} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{14}} = -0.4 - 0.5 \cdot 0.162 = -0.484$$

$$\frac{\partial E_{\text{total}}}{\partial W_{15}} = \text{coefor} \cdot \frac{\partial \bar{W}_{15}}{\partial W_{15}} = 0.294 \cdot 0.17 = 0.17$$

$$W_{15} = W_{15} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{15}}$$

$$\frac{\partial E_{\text{total}}}{\partial W_{16}} = \text{coefor} \cdot \frac{\partial \bar{W}_{16}}{\partial W_{16}} = 0.294 \cdot 0.18 = 0.18$$

$$W_{16} = W_{16} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{16}} = 0.1 - 0.5 \cdot 0.18 = 0.019$$

$$\frac{\partial E_{\text{total}}}{\partial W_{17}} = \text{coefor} \cdot \frac{\partial \bar{W}_{17}}{\partial W_{17}} = 0.294 \cdot 0.19 = 0.19$$

$$W_{17} = W_{17} - \alpha \cdot \frac{E_{\text{total}}}{\partial W_{17}} = 0.2 - 0.5 \cdot 0.19 = 0.114$$

$$\frac{\partial E_{\text{total}}}{\partial l} = \text{coefor} \cdot 1 = 0.294$$

$$l = l - \alpha \cdot \frac{E_{\text{total}}}{\partial l} = 0.1 + 0.5 \cdot 0.294 = 0.209$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{W}_{11}} = \sum \left(\frac{\partial E_{\text{total}}}{\partial \bar{W}_i} \cdot \frac{\partial \bar{W}_i}{\partial \bar{W}_{11}} \right)$$

$$l = l - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial l} = 0.4 - 0.5 \cdot 0.209 = 0.305$$

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$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh1}}} = \text{coef}_{\text{hh1}} = \left| \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh1}}} \right| \cdot \frac{\partial \bar{t}_{\text{nhh1}}}{\partial \text{outhh1}} \cdot \frac{\partial \text{outhh1}}{\partial \bar{t}_{\text{nhh1}}} = \text{coef}_{\text{hh1}} \cdot 0 \cdot \text{outhh1} (1 - \text{outhh1}) = 0$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh2}}} = \text{coef}_{\text{hh2}} = \left| \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh2}}} \right| \cdot \frac{\partial \bar{t}_{\text{nhh2}}}{\partial \text{outhh2}} \cdot \frac{\partial \text{outhh2}}{\partial \bar{t}_{\text{nhh2}}} = \text{coef}_{\text{hh2}} \cdot 1 \cdot \text{outhh2} (1 - \text{outhh2}) \\ = -0.104 \cdot 1 \cdot 0.525 (1 - 0.525) = -0.026$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh3}}} = \text{coef}_{\text{hh3}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh3}}} \cdot \frac{\partial \bar{t}_{\text{nhh3}}}{\partial \text{outhh3}} \cdot \frac{\partial \text{outhh3}}{\partial \bar{t}_{\text{nhh3}}} = \text{coef}_{\text{hh3}} \cdot 0 \cdot \text{outhh3} (1 - \text{outhh3}) \Rightarrow$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh4}}} = \text{coef}_{\text{hh4}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh4}}} \cdot \frac{\partial \bar{t}_{\text{nhh4}}}{\partial \text{outhh4}} \cdot \frac{\partial \text{outhh4}}{\partial \bar{t}_{\text{nhh4}}} = \text{coef}_{\text{hh4}} \cdot 1 \cdot \text{outhh4} (1 - \text{outhh4}) \\ = -0.164 \cdot 1 \cdot 0.54 (1 - 0.54) = -0.041$$

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$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh5}}} = \text{coef}_{\text{hh5}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh5}}} \cdot \frac{\partial \bar{t}_{\text{nhh5}}}{\partial \text{outhh5}} \cdot \frac{\partial \text{outhh5}}{\partial \bar{t}_{\text{nhh5}}} = \text{coef}_{\text{hh5}} \cdot 0 \cdot \text{outhh5} (1 - \text{outhh5}) \Rightarrow$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh6}}} = \text{coef}_{\text{hh6}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh6}}} \cdot \frac{\partial \bar{t}_{\text{nhh6}}}{\partial \text{outhh6}} \cdot \frac{\partial \text{outhh6}}{\partial \bar{t}_{\text{nhh6}}} = \text{coef}_{\text{hh6}} \cdot 1 \cdot \text{outhh6} (1 - \text{outhh6}) \\ = -0.225 \cdot 1 \cdot 0.555 (1 - 0.555) = -0.055$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh7}}} = \text{coef}_{\text{hh7}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh7}}} \cdot \frac{\partial \bar{t}_{\text{nhh7}}}{\partial \text{outhh7}} \cdot \frac{\partial \text{outhh7}}{\partial \bar{t}_{\text{nhh7}}} = \text{coef}_{\text{hh7}} \cdot 0 \cdot \text{outhh7} (1 - \text{outhh7}) = 0$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh8}}} = \text{coef}_{\text{hh8}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh8}}} \cdot \frac{\partial \bar{t}_{\text{nhh8}}}{\partial \text{outhh8}} \cdot \frac{\partial \text{outhh8}}{\partial \bar{t}_{\text{nhh8}}} = \text{coef}_{\text{hh8}} \cdot 1 \cdot \text{outhh8} (1 - \text{outhh8}) \\ = -0.285 \cdot 1 \cdot 0.57 (1 - 0.57) = -0.070$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh9}}} = \text{coef}_{\text{hh9}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh9}}} \cdot \frac{\partial \bar{t}_{\text{nhh9}}}{\partial \text{outhh9}} \cdot \frac{\partial \text{outhh9}}{\partial \bar{t}_{\text{nhh9}}} = \text{coef}_{\text{hh9}} \cdot 0 \cdot \text{outhh9} (1 - \text{outhh9}) = 0$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh10}}} = \text{coef}_{\text{hh10}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh10}}} \cdot \frac{\partial \bar{t}_{\text{nhh10}}}{\partial \text{outhh10}} \cdot \frac{\partial \text{outhh10}}{\partial \bar{t}_{\text{nhh10}}} = \text{coef}_{\text{hh10}} \cdot 1 \cdot \text{outhh10} (1 - \text{outhh10}) \\ = 0.011 \cdot 1 \cdot 0.55 (1 - 0.55) = 0.003$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh11}}} = \text{coef}_{\text{hh11}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh11}}} \cdot \frac{\partial \bar{t}_{\text{nhh11}}}{\partial \text{outhh11}} \cdot \frac{\partial \text{outhh11}}{\partial \bar{t}_{\text{nhh11}}} = \text{coef}_{\text{hh11}} \cdot 0 \cdot \text{outhh11} (1 - \text{outhh11}) = 0$$

$$\frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh12}}} = \text{coef}_{\text{hh12}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{\text{nhh12}}} \cdot \frac{\partial \bar{t}_{\text{nhh12}}}{\partial \text{outhh12}} \cdot \frac{\partial \text{outhh12}}{\partial \bar{t}_{\text{nhh12}}} = \text{coef}_{\text{hh12}} \cdot 1 \cdot \text{outhh12} (1 - \text{outhh12}) \\ = 0.067 \cdot 1 \cdot 0.584 (1 - 0.584) = 0.016$$

$$\text{coef}_{hh3} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh3}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh7}} \cdot \frac{\partial \bar{t}_{hh7}}{\partial \bar{t}_{hh3}} \cdot \frac{\partial \bar{t}_{hh13}}{\partial \bar{t}_{hh3}} = \text{coef}_{h7} \cdot 0 \cdot \text{out}_{hh13} \cdot (1 - \text{out}_{hh13}) = 0$$

$$\text{coef}_{hh4} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh4}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh7}} \cdot \frac{\partial \bar{t}_{hh7}}{\partial \bar{t}_{hh4}} \cdot \frac{\partial \bar{t}_{hh14}}{\partial \bar{t}_{hh4}} = \text{coef}_{h7} \cdot 1 \cdot \text{out}_{hh14} \cdot (1 - \text{out}_{hh14}) \\ = 0.175 \cdot 1 \cdot 0.618 \cdot (1 - 0.618) = 0.029$$

$$\text{coef}_{hh5} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh5}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh8}} \cdot \frac{\partial \bar{t}_{hh8}}{\partial \bar{t}_{hh5}} \cdot \frac{\partial \bar{t}_{hh15}}{\partial \bar{t}_{hh5}} = \text{coef}_{h8} \cdot 0 \cdot \text{out}_{hh15} \cdot (1 - \text{out}_{hh15}) = 0$$

$$\text{coef}_{hh6} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh6}} = \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh8}} \cdot \frac{\partial \bar{t}_{hh8}}{\partial \bar{t}_{hh6}} \cdot \frac{\partial \bar{t}_{hh16}}{\partial \bar{t}_{hh6}} = \text{coef}_{h8} \cdot 1 \cdot \text{out}_{hh16} \cdot (1 - \text{out}_{hh16}) \\ = 0.175 \cdot 1 \cdot 0.65 \cdot (1 - 0.65) = 0.041$$

$$b_1 = b_1 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial b_1} = b_1 - \alpha \left(\frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh1}} \cdot \frac{\partial \bar{t}_{hh1}}{\partial b_1} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh2}} \cdot \frac{\partial \bar{t}_{hh2}}{\partial b_1} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh3}} \cdot \frac{\partial \bar{t}_{hh3}}{\partial b_1} \right. \\ \left. + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh4}} \cdot \frac{\partial \bar{t}_{hh4}}{\partial b_1} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh5}} \cdot \frac{\partial \bar{t}_{hh5}}{\partial b_1} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh6}} \cdot \frac{\partial \bar{t}_{hh6}}{\partial b_1} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh7}} \cdot \frac{\partial \bar{t}_{hh7}}{\partial b_1} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh8}} \cdot \frac{\partial \bar{t}_{hh8}}{\partial b_1} \right) \\ = b_1 - \alpha (\text{coef}_{hh1} \cdot 1 + \text{coef}_{hh2} \cdot 1 + \text{coef}_{hh3} \cdot 1 + \text{coef}_{hh4} \cdot 1 \\ + \text{coef}_{hh5} \cdot 1 + \text{coef}_{hh6} \cdot 1 + \text{coef}_{hh7} \cdot 1 + \text{coef}_{hh8} \cdot 1) \\ = 0 - 0.5 (0 - 0.026 + 0 - 0.041 + 0 - 0.055 + 0 - 0.070) = 0.096$$

$$C_{11} = C_{11} - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial C_{11}} = C_{11} - \alpha \left(\frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh1}} \cdot \frac{\partial \bar{t}_{hh1}}{\partial C_{11}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh2}} \cdot \frac{\partial \bar{t}_{hh2}}{\partial C_{11}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh3}} \cdot \frac{\partial \bar{t}_{hh3}}{\partial C_{11}} \right. \\ \left. + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh4}} \cdot \frac{\partial \bar{t}_{hh4}}{\partial C_{11}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh5}} \cdot \frac{\partial \bar{t}_{hh5}}{\partial C_{11}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh6}} \cdot \frac{\partial \bar{t}_{hh6}}{\partial C_{11}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh7}} \cdot \frac{\partial \bar{t}_{hh7}}{\partial C_{11}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh8}} \cdot \frac{\partial \bar{t}_{hh8}}{\partial C_{11}} \right) \\ = C_{11} - \alpha (\text{coef}_{hh1} \cdot i_5 + \text{coef}_{hh2} \cdot i_4 + \text{coef}_{hh3} \cdot i_5 + \text{coef}_{hh4} \cdot i_6 \\ + \text{coef}_{hh5} \cdot i_7 + \text{coef}_{hh6} \cdot i_8 + \text{coef}_{hh7} \cdot i_9 + \text{coef}_{hh8} \cdot i_{10}) \\ = 0.1 - 0.5 (0 - 0.026 * 0.4 + 0 - 0.041 * 0.6 + 0 - 0.055 * 0.8 \\ + 0 - 0.070 * 0.0)$$

$$= 0.175 \\ C_{12} = C_{12} - \alpha \frac{\partial E_{\text{total}}}{\partial C_{12}} = C_{12} - \alpha \left(\frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh1}} \cdot \frac{\partial \bar{t}_{hh1}}{\partial C_{12}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh2}} \cdot \frac{\partial \bar{t}_{hh2}}{\partial C_{12}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh3}} \cdot \frac{\partial \bar{t}_{hh3}}{\partial C_{12}} \right. \\ \left. + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh4}} \cdot \frac{\partial \bar{t}_{hh4}}{\partial C_{12}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh5}} \cdot \frac{\partial \bar{t}_{hh5}}{\partial C_{12}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh6}} \cdot \frac{\partial \bar{t}_{hh6}}{\partial C_{12}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh7}} \cdot \frac{\partial \bar{t}_{hh7}}{\partial C_{12}} + \frac{\partial E_{\text{total}}}{\partial \bar{t}_{hh8}} \cdot \frac{\partial \bar{t}_{hh8}}{\partial C_{12}} \right) \\ = C_{12} - \alpha (\text{coef}_{hh1} * i_2 + \text{coef}_{hh2} * i_3 + \text{coef}_{hh3} * i_4 + \text{coef}_{hh4} * i_5 \\ + \text{coef}_{hh5} * i_6 + \text{coef}_{hh6} * i_7 + \text{coef}_{hh7} * i_8 + \text{coef}_{hh8} * i_9) \\ = 0.2 - 0.5 (0 - 0.026 * 0.3 + 0 - 0.041 * 0.5 + 0 - 0.055 * 0.7 + 0 - 0.070 * 0 \\ = 0.265$$

$$\begin{aligned}
 C_{13} &= C_{13} - \alpha \frac{\partial E_{\text{total}}}{\partial C_{13}} = C_{13} - \alpha \left(\frac{\partial E_{\text{total}}}{\partial \bar{h}_{111}} \cdot \frac{\partial \bar{h}_{111}}{\partial C_{13}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{112}} \cdot \frac{\partial \bar{h}_{112}}{\partial C_{13}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{113}} \cdot \frac{\partial \bar{h}_{113}}{\partial C_{13}} \right. \\
 &\quad \left. + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{114}} \cdot \frac{\partial \bar{h}_{114}}{\partial C_{13}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{115}} \cdot \frac{\partial \bar{h}_{115}}{\partial C_{13}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{116}} \cdot \frac{\partial \bar{h}_{116}}{\partial C_{13}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{117}} \cdot \frac{\partial \bar{h}_{117}}{\partial C_{13}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{118}} \cdot \frac{\partial \bar{h}_{118}}{\partial C_{13}} \right) \\
 &= C_1 - \alpha (\text{coef}_{h11} \cdot i_1 + \text{coef}_{h112} \cdot i_2 + \text{coef}_{h113} \cdot i_3 + \text{coef}_{h114} \cdot i_4 \\
 &\quad + \text{coef}_{h115} \cdot i_5 + \text{coef}_{h116} \cdot i_6 + \text{coef}_{h117} \cdot i_7 + \text{coef}_{h118} \cdot i_8) \\
 &= 0 - 0.5 (0 - 0.026 * 0.2 + 0 - 0.041 * 0.4 + 0 - 0.055 * 0.6 \\
 &\quad + 0 - 0.070 * 0.8) \\
 &= 0.055
 \end{aligned}$$

$$\begin{aligned}
 C_{21} &= C_{21} - \alpha \frac{\partial E_{\text{total}}}{\partial C_{21}} = C_{21} - \alpha \left(\frac{\partial E_{\text{total}}}{\partial \bar{h}_{111}} \cdot \frac{\partial \bar{h}_{111}}{\partial C_{21}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{112}} \cdot \frac{\partial \bar{h}_{112}}{\partial C_{21}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{113}} \cdot \frac{\partial \bar{h}_{113}}{\partial C_{21}} \right. \\
 &\quad \left. + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{114}} \cdot \frac{\partial \bar{h}_{114}}{\partial C_{21}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{115}} \cdot \frac{\partial \bar{h}_{115}}{\partial C_{21}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{116}} \cdot \frac{\partial \bar{h}_{116}}{\partial C_{21}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{117}} \cdot \frac{\partial \bar{h}_{117}}{\partial C_{21}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{118}} \cdot \frac{\partial \bar{h}_{118}}{\partial C_{21}} \right) \\
 &= C_{21} - \alpha (\text{coef}_{h11} * i_1 + \text{coef}_{h112} * i_2 + \text{coef}_{h113} * i_3 + \text{coef}_{h114} * i_4 \\
 &\quad + \text{coef}_{h115} * i_5 + \text{coef}_{h116} * i_6 + \text{coef}_{h117} * i_7 + \text{coef}_{h118} * i_8) \\
 &= 0.3 - 0.5 (0 + 0.003 * 0.4 + 0 + 0.016 * 0.6 + 0 + 0.029 * 0.8 + 0 + 0.041 * 1.0)
 \end{aligned}$$

$$\begin{aligned}
 C_{22} &= C_{22} - \alpha \frac{\partial E_{\text{total}}}{\partial C_{22}} = C_{22} - \alpha \left(\frac{\partial E_{\text{total}}}{\partial \bar{h}_{111}} \cdot \frac{\partial \bar{h}_{111}}{\partial C_{22}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{112}} \cdot \frac{\partial \bar{h}_{112}}{\partial C_{22}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{113}} \cdot \frac{\partial \bar{h}_{113}}{\partial C_{22}} \right. \\
 &\quad \left. + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{114}} \cdot \frac{\partial \bar{h}_{114}}{\partial C_{22}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{115}} \cdot \frac{\partial \bar{h}_{115}}{\partial C_{22}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{116}} \cdot \frac{\partial \bar{h}_{116}}{\partial C_{22}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{117}} \cdot \frac{\partial \bar{h}_{117}}{\partial C_{22}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{118}} \cdot \frac{\partial \bar{h}_{118}}{\partial C_{22}} \right) \\
 &= C_{22} - \alpha (\text{coef}_{h11} * i_2 + \text{coef}_{h110} * i_3 + \text{coef}_{h111} * i_4 + \text{coef}_{h112} * i_5 \\
 &\quad + \text{coef}_{h113} * i_6 + \text{coef}_{h114} * i_7 + \text{coef}_{h115} * i_8 + \text{coef}_{h116} * i_9) \\
 &= 0 - 0.5 (0 + 0.003 * 0.3 + 0 + 0.016 * 0.5 + 0 + 0.029 * 0.7 + 0 + 0.041 * 0.9)
 \end{aligned}$$

$$\begin{aligned}
 C_{15} &= C_{15} - \alpha \frac{\partial E_{\text{total}}}{\partial C_{15}} = C_{15} - \alpha \left(\frac{\partial E_{\text{total}}}{\partial \bar{h}_{111}} \cdot \frac{\partial \bar{h}_{111}}{\partial C_{15}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{112}} \cdot \frac{\partial \bar{h}_{112}}{\partial C_{15}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{113}} \cdot \frac{\partial \bar{h}_{113}}{\partial C_{15}} \right. \\
 &\quad \left. + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{114}} \cdot \frac{\partial \bar{h}_{114}}{\partial C_{15}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{115}} \cdot \frac{\partial \bar{h}_{115}}{\partial C_{15}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{116}} \cdot \frac{\partial \bar{h}_{116}}{\partial C_{15}} + \frac{\partial E_{\text{total}}}{\partial \bar{h}_{117}} \cdot \frac{\partial \bar{h}_{117}}{\partial C_{15}} \right) \\
 &= C_{15} - \alpha (\text{coef}_{h11} * i_1 + \text{coef}_{h110} * i_2 + \text{coef}_{h111} * i_3 + \text{coef}_{h112} * i_4 \\
 &\quad + \text{coef}_{h113} * i_5 + \text{coef}_{h114} * i_6 + \text{coef}_{h115} * i_7 + \text{coef}_{h116} * i_8) \\
 &= 0.4 - 0.5 (0 + 0.003 * 0.2 + 0 + 0.016 * 0.4 + 0 + 0.029 * 0.6 + 0 + 0.041 * 0.8) \\
 &= 0.371
 \end{aligned}$$

$$\begin{aligned}
 b_2 &= b_2 - \alpha \cdot \frac{\partial E_{\text{total}}}{\partial b_2} = b_2 - \alpha \left(\frac{\partial E_{\text{total}}}{\partial h_{h1}} \cdot \frac{\partial h_{h1}}{\partial b_2} + \frac{\partial E_{\text{total}}}{\partial h_{h10}} \cdot \frac{\partial h_{h10}}{\partial b_2} + \frac{\partial E_{\text{total}}}{\partial h_{h11}} \cdot \frac{\partial h_{h11}}{\partial b_2} + \frac{\partial E_{\text{total}}}{\partial h_{h12}} \cdot \frac{\partial h_{h12}}{\partial b_2} \right. \\
 &\quad \left. + \frac{\partial E_{\text{total}}}{\partial h_{h13}} \cdot \frac{\partial h_{h13}}{\partial b_2} + \frac{\partial E_{\text{total}}}{\partial h_{h14}} \cdot \frac{\partial h_{h14}}{\partial b_2} + \frac{\partial E_{\text{total}}}{\partial h_{h15}} \cdot \frac{\partial h_{h15}}{\partial b_2} + \frac{\partial E_{\text{total}}}{\partial h_{h16}} \cdot \frac{\partial h_{h16}}{\partial b_2} \right) \\
 &= b_2 - \alpha (coef_{hh1} * 1 + coef_{hh10} * 1 + coef_{hh11} * 1 + coef_{hh12} * 1 + coef_{hh13} * 1 \\
 &\quad + coef_{hh14} * 1 + coef_{hh15} * 1 + coef_{hh16} * 1) \\
 &= 0 - 0.5 (0 + 0.007 + 0 + 0.016 + 0 + 0.027 + 0 + 0.041) = -0.045
 \end{aligned}$$