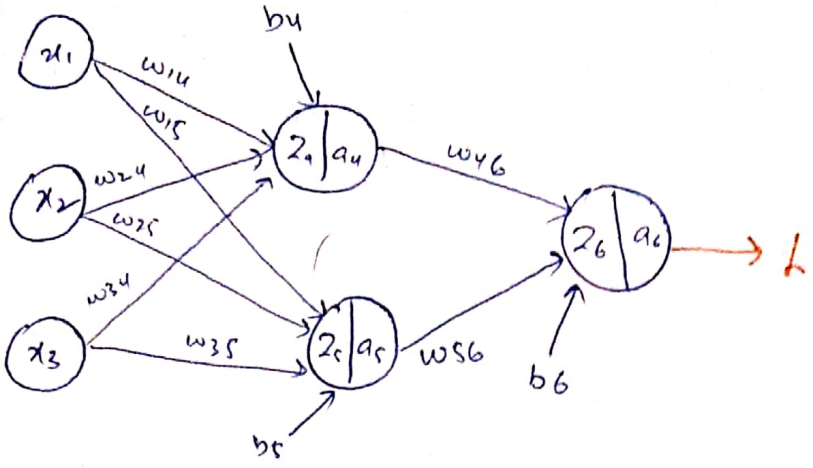
Activation Function is Sigmoid in all layers.



For log Loss / Cross Entropy loss:

$$L = -\left[y \log(a) + (1-y)\log(1-a)\right]$$

$$\frac{\partial L}{\partial a_6} = \frac{\partial}{\partial a_6}\left[y \log(a_6) + (1-y)\log(1-a_6)\right]$$

$$= \frac{-y}{a_6} - \frac{(1-y)(-1)}{1-a_6}$$

$$\boxed{\frac{\partial L}{\partial a_6} = \frac{-y}{a_6} + \frac{1-y}{1-a_6}}$$

$$\frac{\partial L}{\partial w_{46}} = \frac{\partial L}{\partial a_6} \cdot \frac{\partial a_6}{\partial z_6} \cdot \frac{\partial z_6}{\partial w_{46}}$$

$$\frac{\partial L}{\partial w_{46}} = \left[\frac{-y}{a_6} + \frac{1-y}{1-a_6}\right] a_6(1-a_6)\, a_4$$

$$= \left[\frac{-y(1-a_6) + a_6(1-y)}{a_6(1-a_6)}\right] a_6(1-a_6)\, a_4$$

$$= \left[-y + a_6 y + a_6 - a_6 y\right] a_4$$

$$\boxed{\frac{\partial L}{\partial w_{46}} = [a_6 - y]\, a_4}$$

$$\boxed{\frac{\partial L}{\partial w_{56}} = [a_6 - y]\, a_5}$$

$$\boxed{\frac{\partial L}{\partial b_6} = [a_6 - y]}$$

For Hidden Layer:

$$\frac{\partial L}{\partial w_{14}} = \frac{\partial L}{\partial a_4} \cdot \frac{\partial a_4}{\partial z_4} \cdot \frac{\partial z_4}{\partial w_{14}}$$

$$\frac{\partial L}{\partial a_4} = \frac{\partial L}{\partial a_6} \cdot \frac{\partial a_6}{\partial z_6} \cdot \frac{\partial z_6}{\partial a_4}$$

$$= (a_6 - y)\, w_{46}$$

$$\boxed{\frac{\partial L}{\partial w_{14}} = (a_6 - y)\, w_{46}\, a_4(1-a_4)\, x_1}$$

$$\frac{\partial L}{\partial w_{24}} = (a_6 - y)\, w_{46}\, a_4 (1 - a_4)\, x_2$$

$$\frac{\partial L}{\partial w_{34}} = (a_6 - y)\, w_{46}\, a_4 (1 - a_4)\, x_3$$

$$\frac{\partial L}{\partial b_4} = (a_6 - y)\, w_{46} \cdot a_4 \cdot (1 - a_4)$$

$$\frac{\partial L}{\partial w_{15}} = (a_6 - y)\, w_{56}\, a_5 (1 - a_5)\, x_1$$

$$\frac{\partial L}{\partial w_{25}} = (a_6 - y)\, w_{56}\, a_5 (1 - a_5)\, x_2$$

$$\frac{\partial L}{\partial w_{35}} = (a_6 - y)\, w_{56}\, a_5 (1 - a_5)\, x_3$$

$$\frac{\partial L}{\partial b_5} = (a_6 - y)\, w_{56}\, a_5 (1 - a_5)$$