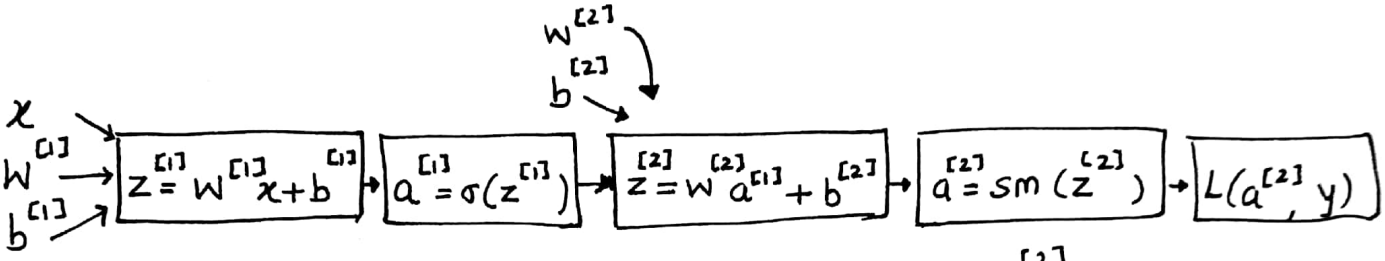
$$z^{[1]} = w^{[1]} x + b^{[1]}$$

$$a^{[1]} = \sigma(z^{[1]})$$

$$z^{[2]} = w^{[2]} a^{[1]} + b^{[2]}$$

$$a^{[2]} = \text{softmax}(z^{[2]})$$

$$L(a^{[2]}, y) = -\sum y \log a^{[2]}$$



$$\Delta a^{[2]} = \frac{\partial L}{\partial a^{[2]}}$$

$$\Delta z^{[2]} = \frac{\partial L}{\partial z^{[2]}} = a^{[2]} - y$$

$$\Delta a^{[1]} = \frac{\partial L}{\partial z^{[2]}} \frac{\partial z^{[2]}}{\partial a^{[1]}}$$

$$\Delta a^{[1]} = (a^{[2]} - y) w^{[2]}$$

$$\Delta z^{[1]} = \Delta a^{[1]} \frac{\partial a^{[1]}}{\partial z^{[1]}}$$

$$\Delta w^{[2]} = \frac{\partial L}{\partial z^{[2]}} \frac{\partial z^{[2]}}{\partial w^{[2]}}$$

$$\Delta w^{[2]} = (a^{[2]} - y) a^{[1]}$$

$$\Delta z^{[1]} = (a^{[2]} - y) w^{[2]} a^{[1]} (1 - a^{[1]})$$

$$\Delta w^{[1]} = \Delta z^{[1]} \cdot \frac{\partial z^{[1]}}{\partial w^{[1]}}$$

$$\Delta w^{[1]} = (a^{[2]} - y) w^{[2]} a^{[1]} (1 - a^{[1]}) x$$