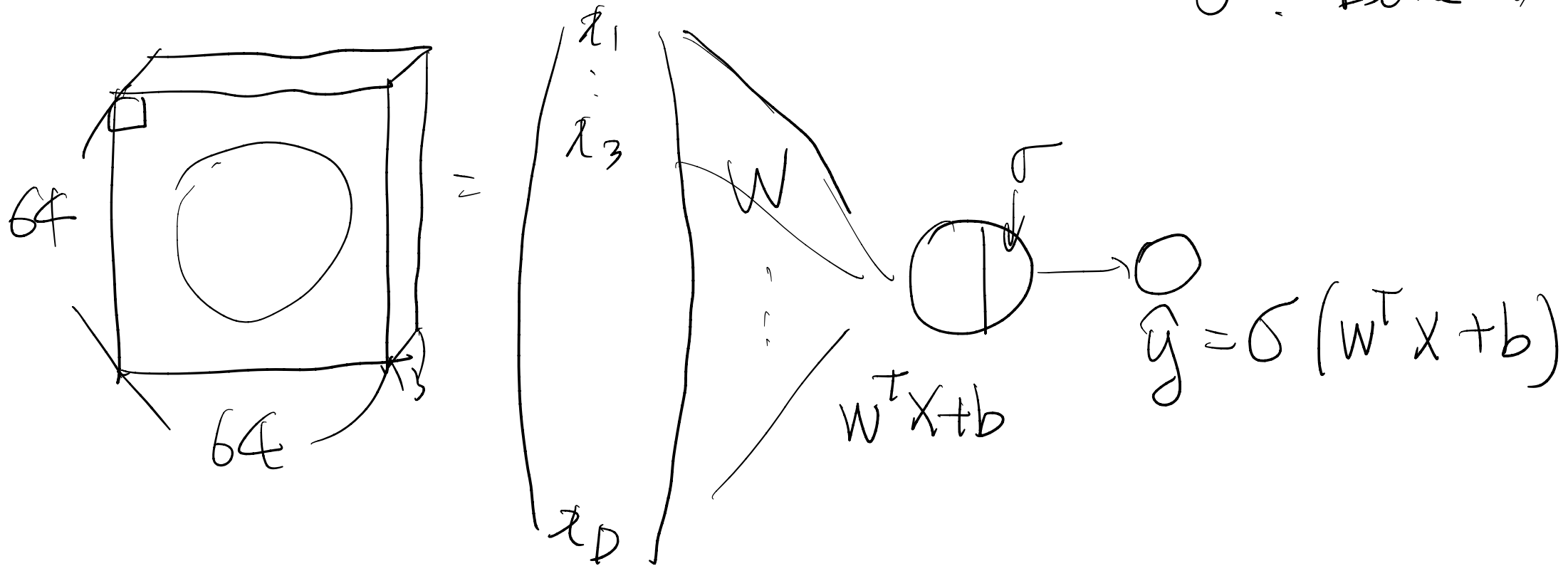


Defining Labels / Obj. func.

① Find oranges in images.

$\begin{cases} 1: \text{presence of an orange} \\ 0: \text{absence} \end{cases}$



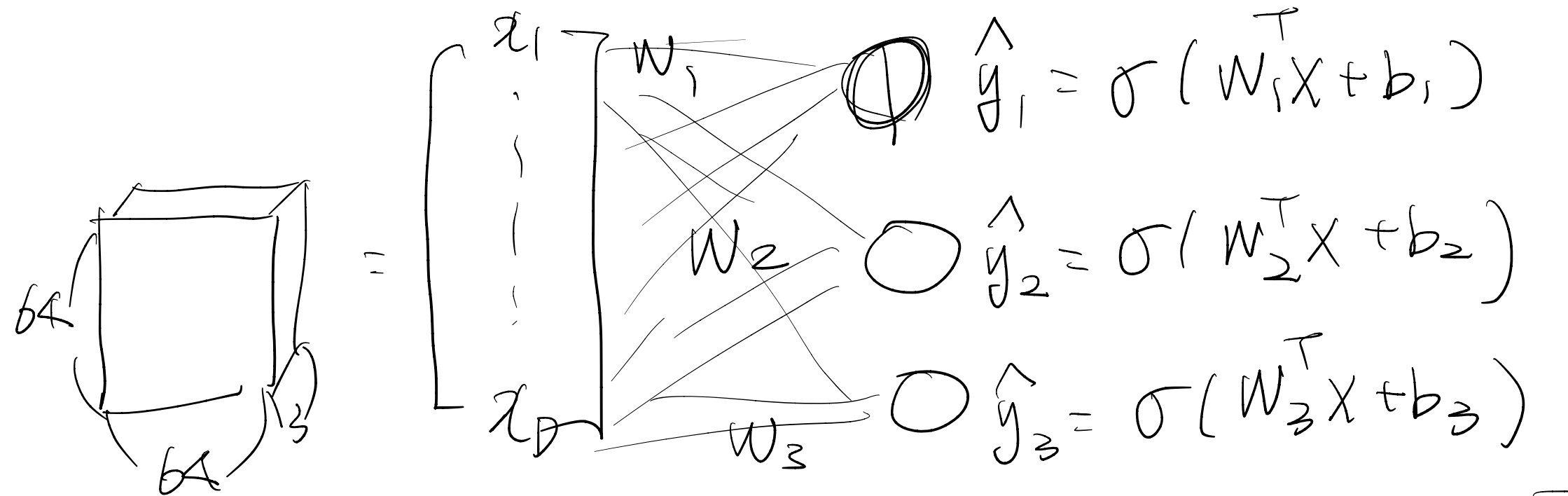
$$D: 64 \times 64 \times 3 = 12,288$$

$$L = - \sum_{i=1}^N \left[y_i \log \hat{y}_i + (1-y_i) \log (1-\hat{y}_i) \right]$$

$$W_{t+1} \leftarrow W_t - \eta \cdot \frac{\partial L}{\partial W}$$

$$b_{t+1} \leftarrow b_t - \eta \cdot \frac{\partial L}{\partial b}$$

② Find orange / apple / mango in image.



$$D = 12288$$

$$L_2 = - \sum_{k=1}^3 \left[y_k \log \hat{y}_k + (1 - y_k) \log (1 - \hat{y}_k) \right]$$

$$\frac{\partial L_2}{\partial W_2}$$

③ Find fruit, "unique constraint".

$$\begin{aligned}
 & \bigcirc z_1 = w_1^T x + b_1 \\
 & \bigcirc z_2 = w_2^T x + b_2 \\
 & \bigcirc z_3 = w_3^T x + b_3
 \end{aligned}$$

$$\hat{y}_k = \frac{e^{z_1}}{\sum_{k=1} e^{z_k}}$$

Label $y = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$

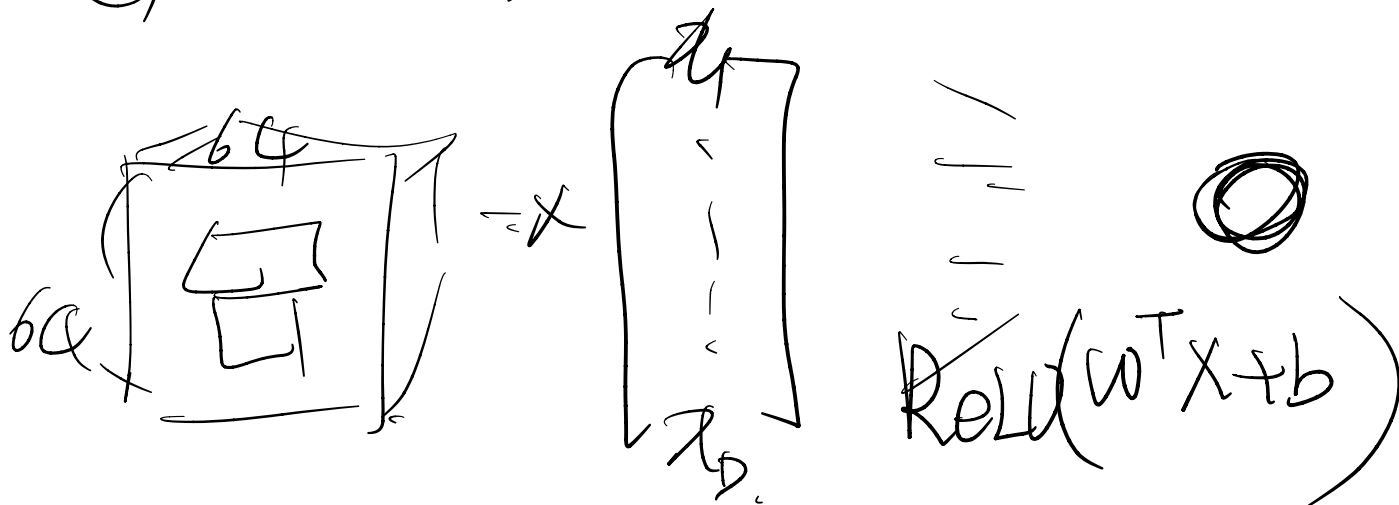
(one-hot encoding).

$$L_3 = - \sum_{k=1}^3 y_k \log \hat{y}_k$$

Cross-entropy
loss

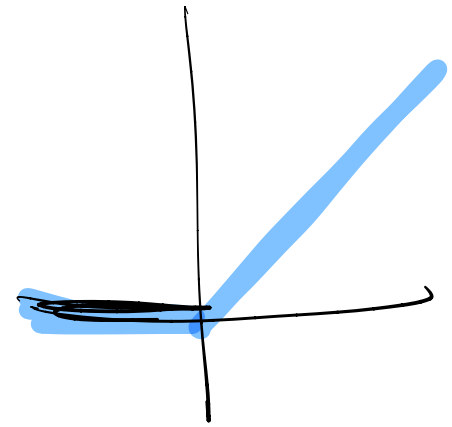
Multi-class Classification -

④ House Price Prediction.

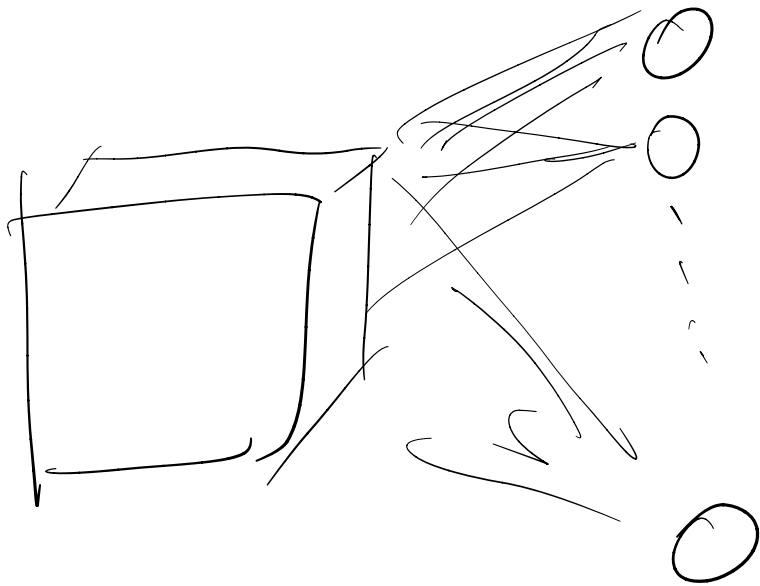


$$\text{ReLU}(w^T x + b)$$

ReLU



MSE.



0 ~ 100	y = 0
101 ~ 200	y = 1
201 ~ 300	y = 2