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# Basics of Neural Network Programming

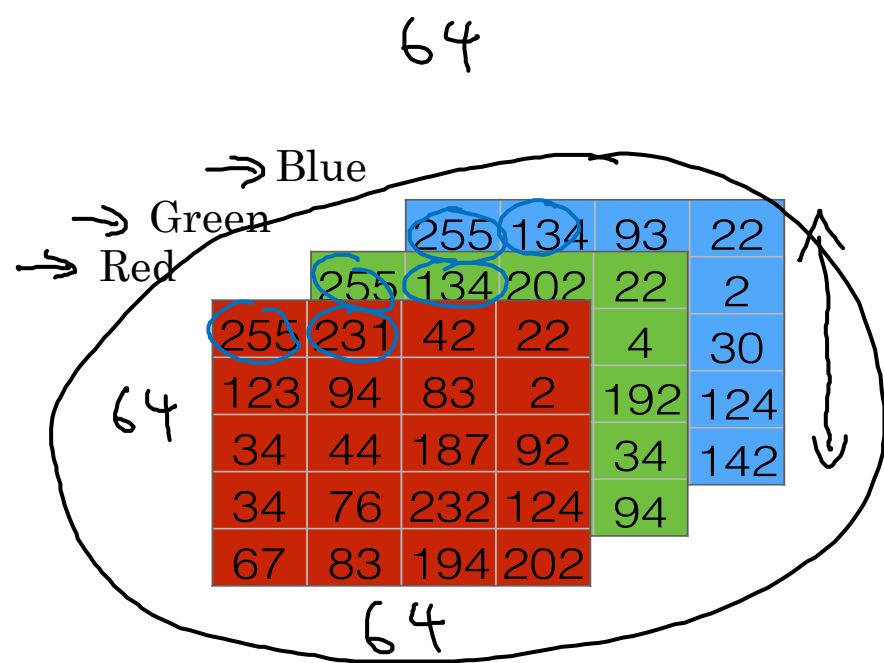
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**Binary Classification**

# Binary Classification



→ 1 (cat) vs 0 (non cat)



$X = \begin{bmatrix} 255 \\ 231 \\ \vdots \\ 255 \\ 134 \\ \vdots \end{bmatrix}$

Unroll

$64 \times 64 \times 3 = 12288$

$n = n_x = 12288$

$X \rightarrow y$

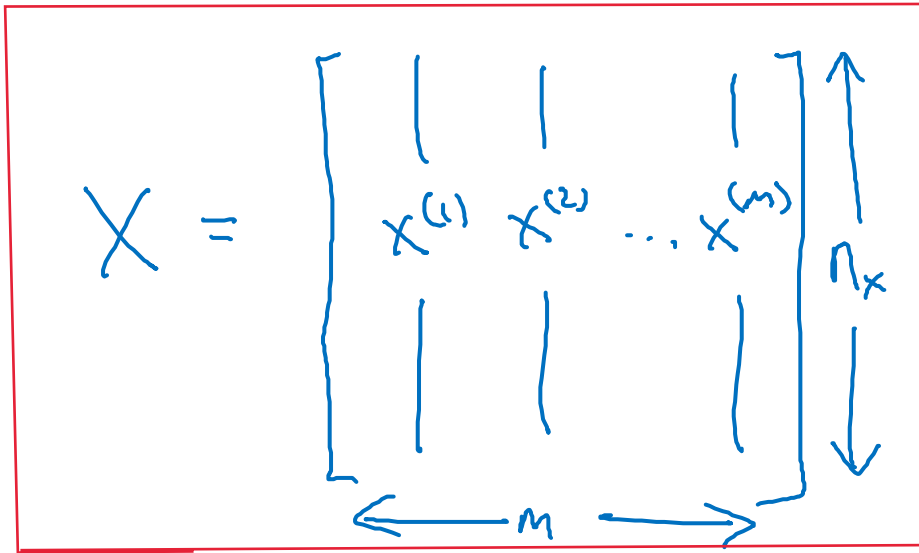
# Notation

$$(x, y) \quad x \in \mathbb{R}^{n_x}, y \in \{0, 1\}$$

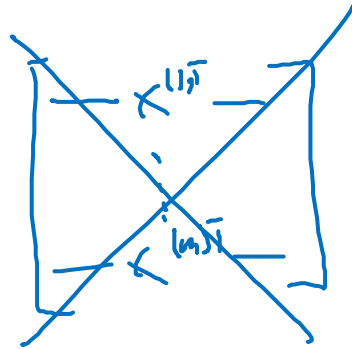
$$m \text{ training examples: } \{(\underline{x}^{(1)}, \underline{y}^{(1)}), (\underline{x}^{(2)}, \underline{y}^{(2)}), \dots, (\underline{x}^{(m)}, \underline{y}^{(m)})\}$$

$$M = M_{\text{train}}$$

$$M_{\text{test}} = \# \text{test examples.}$$



A diagram of a matrix  $X$  enclosed in a red box. The matrix is represented as a large square bracket containing vertical lines for each column. The columns are labeled  $x^{(1)}$ ,  $x^{(2)}$ , and  $x^{(m)}$  from left to right. A horizontal double-headed arrow at the bottom indicates the width is  $m$ . A vertical double-headed arrow on the right indicates the height is  $n_x$ .



$$Y = [y^{(1)} \ y^{(2)} \ \dots \ y^{(m)}]$$

$$Y \in \mathbb{R}^{1 \times m}$$

$$Y.\text{shape} = (1, m)$$

$$X \in \mathbb{R}^{n_x \times m}$$

$$X.\text{shape} = (n_x, m)$$