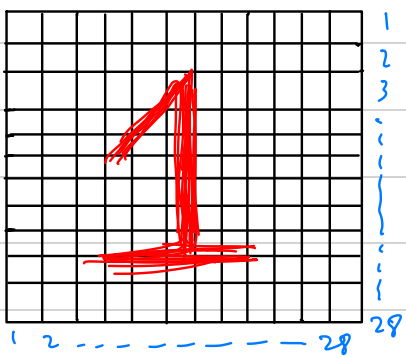
Neural Network : from Scratch

Digits Classifier : MNIST Dataset



28 x 28 → Pixels : Grayscale image

Total 70,000 samples

x_train → 60,000 sample

x_test → 10,000 sample.

x_train = (60,000 x 28 x 28) # shape

(no. of images, pixel of an image)

x_test = (10,000 x 28 x 28)

The input of NN should be 1d tensor = vector.

∴ (28, 28) → (784,)

∴ ⇒ [60,000 x 784] Shape.

R = each image

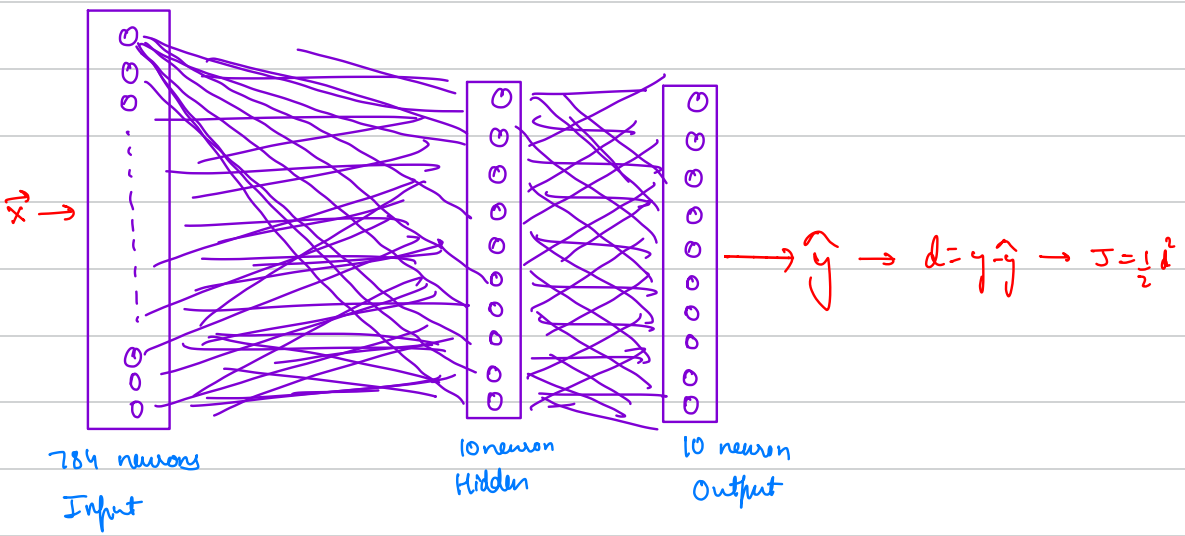
C = Pixel in image.

[[1 2 3], [4 5 6], [7 8 9]] → [1 2 3 4 5 6 7 8 9]

& then transpose.

$(784, 60000)$ → 60000 = each image.

784 = pixel in img



$w1 = 10 \times 784$ $\quad b1 = 10,1$

$w2 = 10 \times 10$ $\quad b2 = 10,1$

$\vec{w1} \cdot \vec{x} + \vec{b1} = \vec{z1}$

$\vec{a1} = \text{Relu}(\vec{z1})$

$\vec{w2} \cdot \vec{a1} + \vec{b2} = \vec{z2}$

$\vec{a2} = \text{Softmax}(\vec{z2})$

$$dz2 = a2 - y$$

$$dw2 = \frac{1}{m} \times dz2 \times a1(T)$$

$$db2 = \frac{1}{m} dz2$$

$$dz1 = w2 \cdot T.dot(dz2) \times (z1 > 0)$$

$$dw1 = \frac{1}{m} \times dz1 * X.T$$

$$db1 = \frac{1}{m} (dz1)$$