

Input / 255.0  $\rightarrow$  Normalization

$\left[ \begin{array}{ccc} 0 \leftrightarrow 1 & -20 \leftrightarrow 30 & 0 \leftrightarrow 255 \end{array} \right]$   
 Sample-1 Sample-2 . . .

Same Data set  
 $\downarrow$  Normalization

$\left[ \begin{array}{ccc} 0 \leftrightarrow 1 & 0 \leftrightarrow 1 & 0 \leftrightarrow 1 \end{array} \right]$   
 Sample-1 Sample-2 . . .

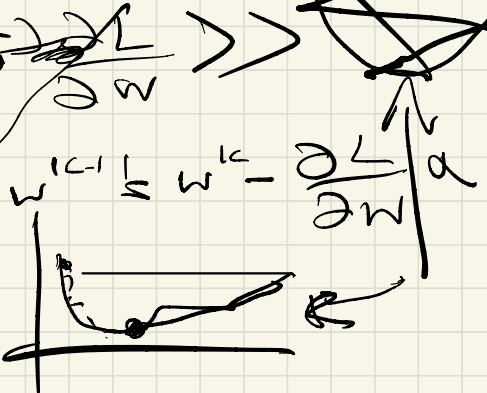
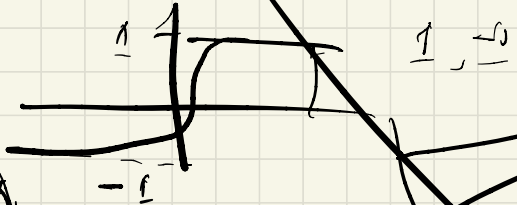
Same Range in each sample

$\hat{y} = wx + b$ ; No squashing  
 No sigmoid or tanh function

$$L = \frac{1}{2} (y - \hat{y})^2$$

$$\frac{\partial L}{\partial w} = (y - \hat{y})x$$

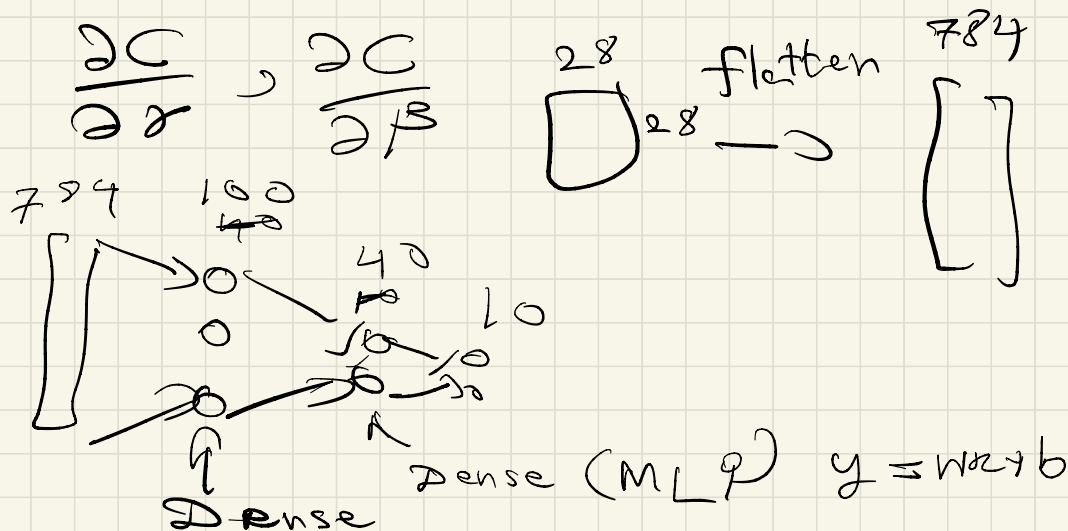
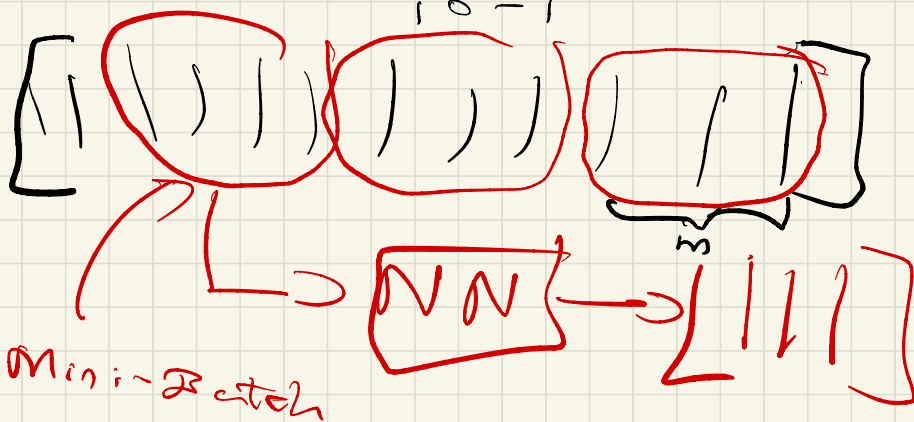
$$\frac{\partial L}{\partial w} = (y - \hat{y})x$$



# Min, max Normalization

$$\begin{bmatrix} 1 \\ 3 \\ 10 \\ 5 \\ 6 \end{bmatrix} \quad \begin{array}{l} \text{min} = 1 \\ \text{max} = 10 \end{array}$$

$$\left[ \begin{array}{l} \frac{1-1}{10-1} = 0 \\ \frac{3-1}{10-1} = \frac{2}{9} \\ \frac{10-1}{10-1} = 1 \\ \frac{5-1}{10-1} = \frac{4}{9} \\ \frac{6-1}{10-1} = \frac{5}{9} \end{array} \right] \quad [0 \dots 1]$$



~~3~~ Dataset with 20 classes

class - 1 :- 3 samples

$$C = \begin{pmatrix} 1 & -2 & 1 \\ 0 & -10 & 1 \\ 0 & -20 & 1 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Class - 10 : - 80 %  
- 20 % : - 100 %

-20 - 1

↓ After Augmentation

Max  
number of  
sums

Class - 1 : 30 (we added 27) <sup>in</sup> places

Class 20 - 30 (we added 29 <sup>samples</sup> through <sup>enrollment</sup>)

tf record  $\xrightarrow{\text{image\_label}}$  image, image shape, label

Flatten image

Dictionary { <sup>image</sup> label: [(image, image shape) .. ()], ()  
label: . . . . . }

$(\text{dict}[\text{label-1}])^2 \xrightarrow{\text{length}}$  Number of samples

$$\left[ \min \times (\text{len}(\text{Die})) \right] \rightarrow \text{max number of samples}$$

↳ How many samples to <sup>sample</sup> experiment

↳ Augmentation of the samples

→ update the Dictionary with the new samples