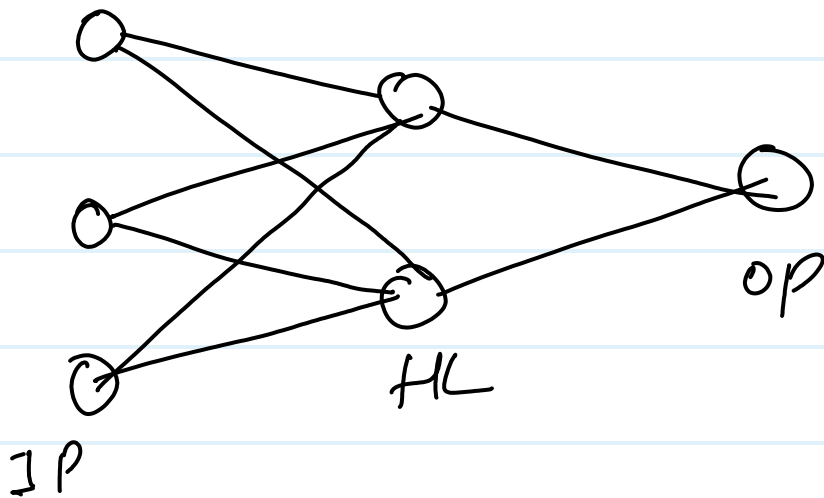


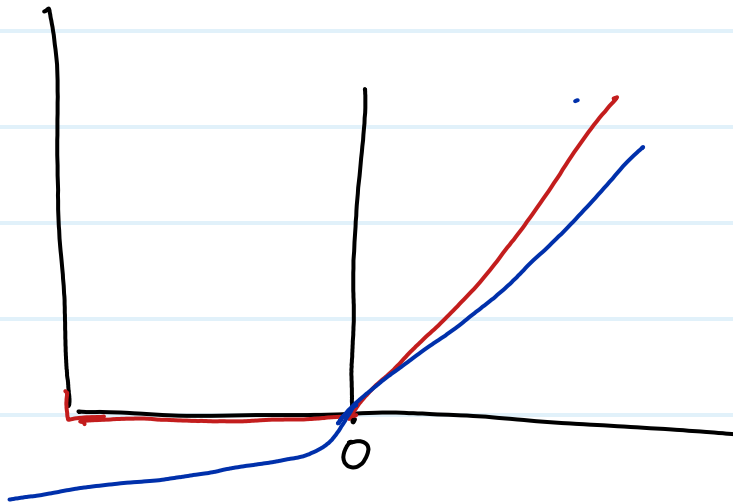
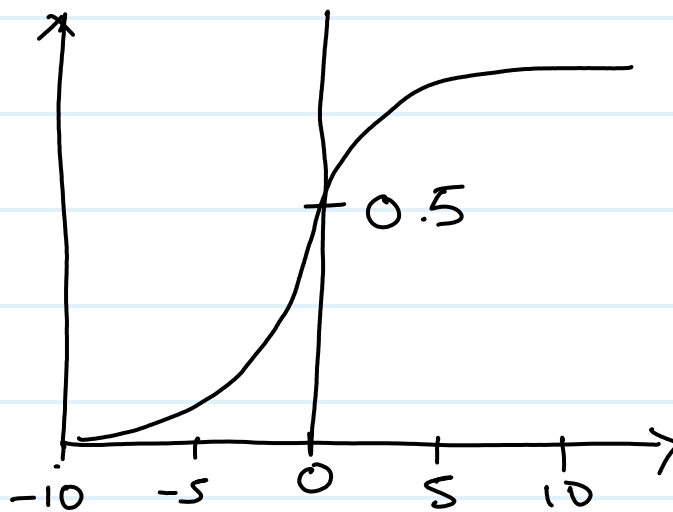
# vanishing Gradient Problem and Activation function



## Activation function

- (I) TanH - zero centric
- (II) ReLU - vanishing.  
Gradient solve
- (III) PreReLU
- (IV) ELU Variant of ReLU
- (V) SWISS
- (VI) Leaky ReLU

- (VII) Sigmoid  $\rightarrow$  Binary class.  
(VIII) Softmax  $\rightarrow$  multiclass class.
- o/p



(IX) Linear Activation function

## Loss function

Linear Loss fun.

- ① MSE    ② MAE    ③ Huber loss

Classification loss fun.

- ① Binary cross entropy  
② Categorical cross entropy

## Optimizers

- ① Gradient Descent  
② SGD (stochastic Gradient Descent)  
③ mini batch SGD  
④ SGD with momentum  
⑤ Adagrad and RMSprop  
~~⑥~~ Adam optimizer.

## Weight Initializing Technique.

- 1) Uniform Distribution
- 2) Xavier / Glorot Initialization
- 3) kaiming He initialization

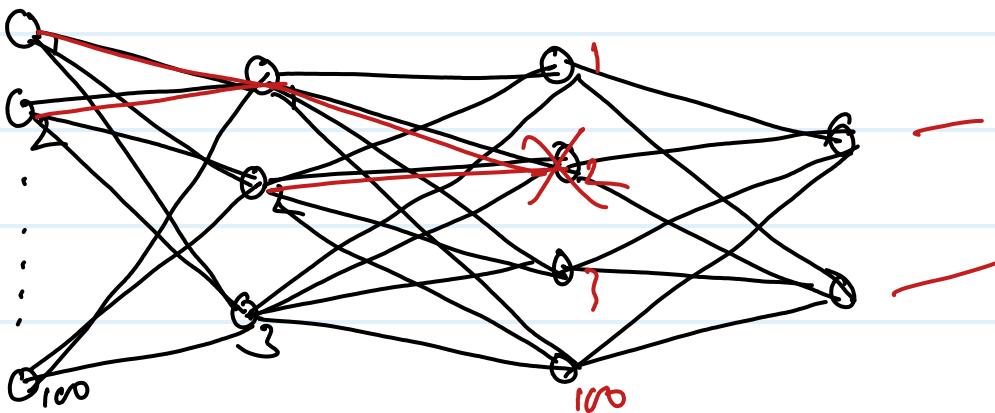
Epoch

$$10000 = 5$$

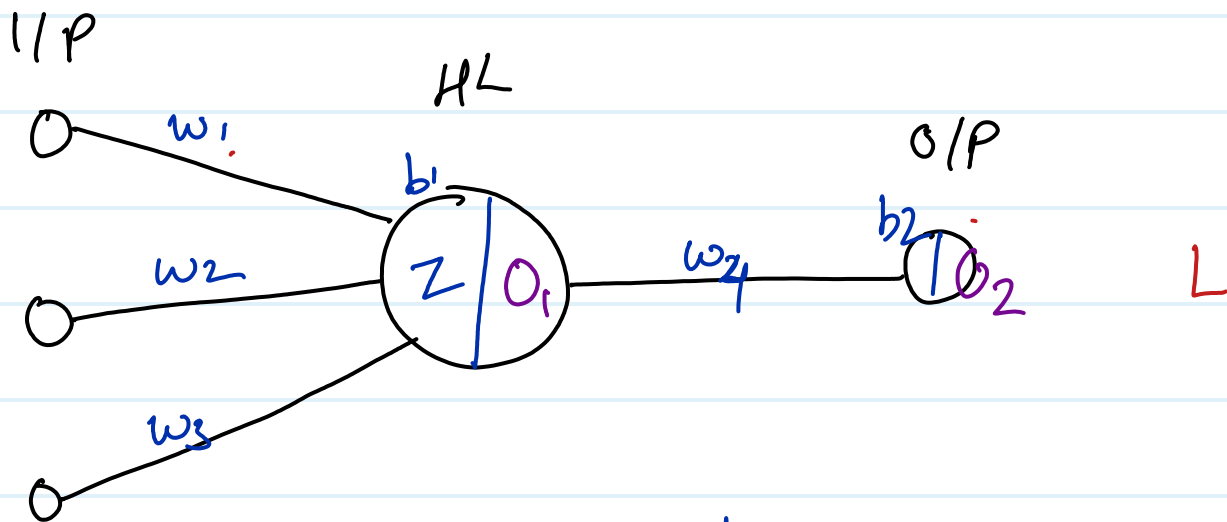
Batch size  $\Rightarrow 500$

Iteration  $\Rightarrow \frac{10000}{500} \Rightarrow 20$

Dropout



$x_1$	$x_2$	$x_3$	$y$
2	1	4	1
1	3	2	0



$$Z = \sum x w + b$$

Assume  $w_1 = 0.01$        $w_2 = 0.02$        $w_3 = 0.03$   
 $b_1 = 0.001$

$$Z = 2 \times 0.01 + 1 \times 0.02 + 4 \times 0.03 + 0.001$$

$$Z = 0.161$$

$$\sigma = \frac{1}{1 + e^{-Z}}$$

$$O_1 = \frac{1}{1 + e^{-0.161}} \Rightarrow 0.5460$$

$$w_4 = 0.02$$

$$b_2 = 0.002$$

$$Z = 0.5460 \times 0.02 + 0.002$$

$$Z = 0.0129$$

$$\sigma = \frac{1}{1 + e^{-0.0129}}$$

$$O_2 = 0.503$$

$$\text{Loss} = \gamma - \hat{\gamma}$$

$$= 1 - 0.503$$

$$= 0.497$$

optimizer  $\Rightarrow$

$$w_{4\text{new}} = w_{4\text{old}} - \eta \frac{\partial \text{Loss}}{\partial w_{4\text{old}}}$$

$$b_{2\text{new}} = b_{2\text{old}} - \eta \frac{\partial \text{Loss}}{\partial b_{2\text{old}}}$$

$$w_{\text{new}} = w_{\text{old}} - \eta \frac{\partial \text{Loss}}{\partial w_{\text{old}}}$$

$$\frac{\partial \text{Loss}}{\partial w_{\text{old}}} = \frac{\partial L}{\partial o_2} \times \frac{\partial o_2}{\partial o_1} \times \frac{\partial o_1}{\partial w_{\text{old}}}$$