NPTEL ONLINE CERTIFICATION COURSES

Course Name: Deep Learning

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Topic

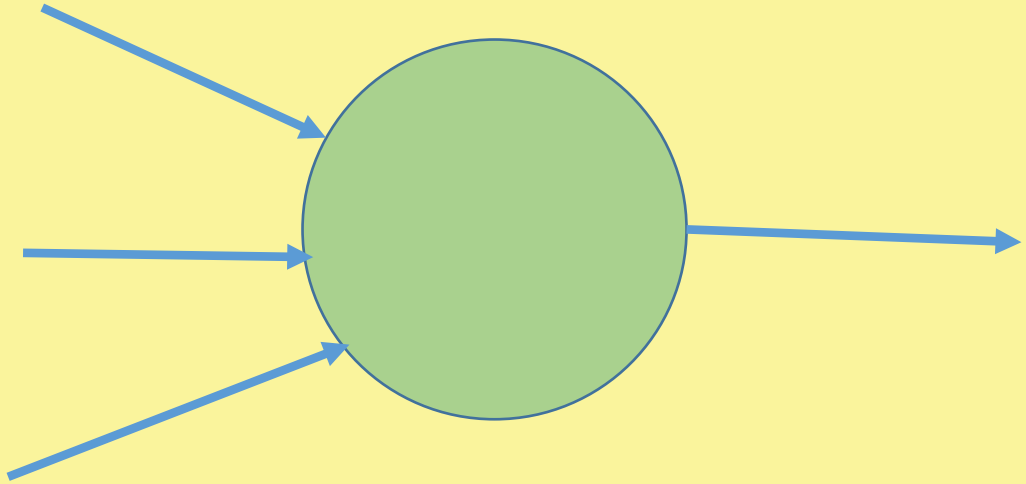
Lecture 20: Neural Network - II

CONCEPTS COVERED

Concepts Covered:

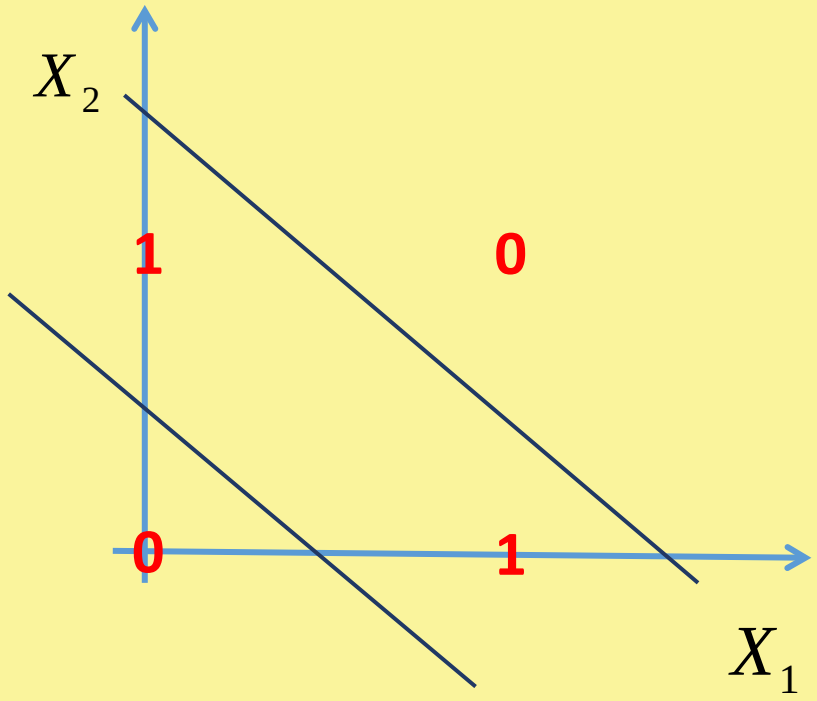
- Neural Network
  - AND Logic
  - OR Logic
  - XOR Logic
- Feed Forward NN
- Back Propagation Learning

AND/ OR Function



XOR Function

X_1	X_2	y
0	0	0
0	1	1
1	0	1
1	1	0



XOR Function

$$X_1 \oplus X_2 = (X_1 + X_2).(\overline{X}_1 + \overline{X}_2)$$

X_1	X_2	$h_1 = X_1 + X_2$	$h_2 = \overline{X}_1 + \overline{X}_2$	$h_1.h_2 = X_1 \oplus X_2$
0	0	0	1	0
0	1	1	1	1
1	0	1	1	1
1	1	1	0	0

XOR Function

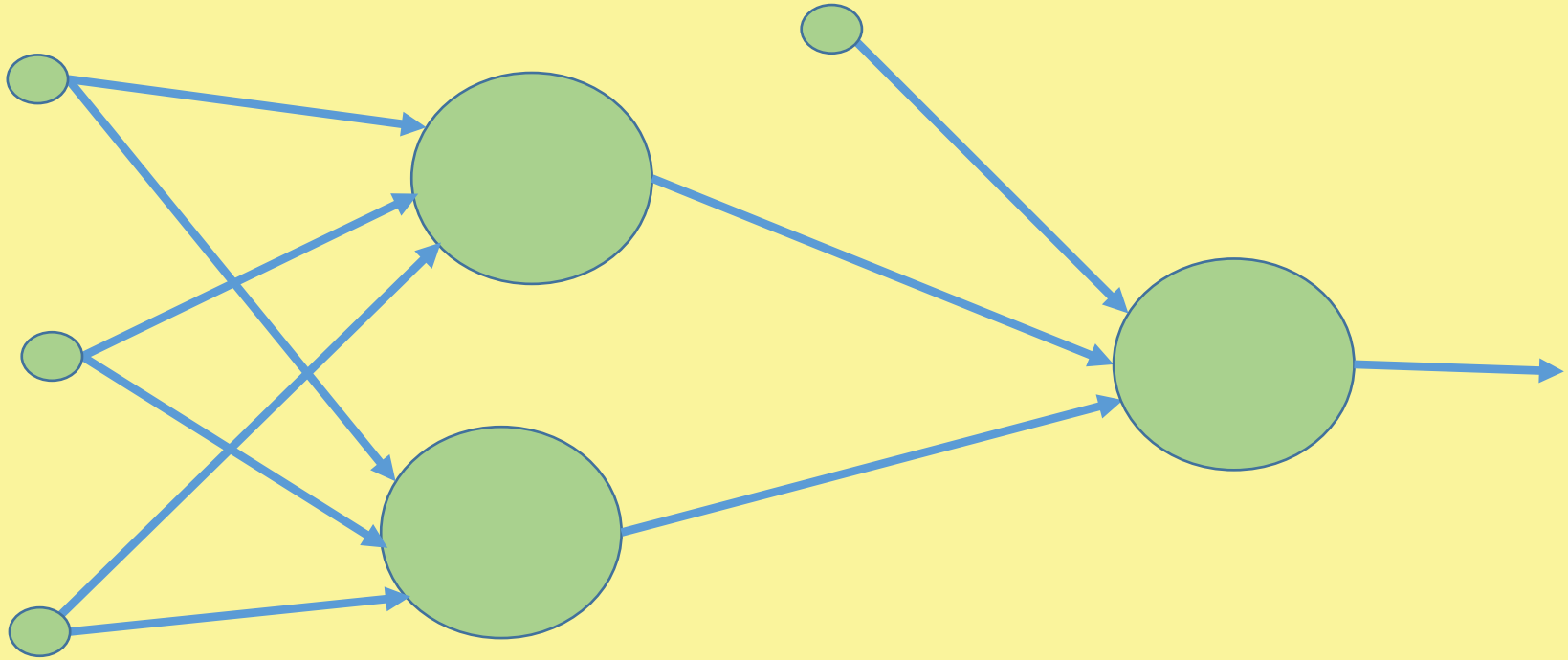
$$\begin{bmatrix} -0.5 & 1 & 1 \\ 1.5 & -1 & -1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix} = \begin{bmatrix} -0.5 & 0.5 & 0.5 & 1.5 \\ 1.5 & 0.5 & 0.5 & -0.5 \end{bmatrix} \Rightarrow \text{step} \Rightarrow \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

W_1^t $\quad$ X $\quad$ h

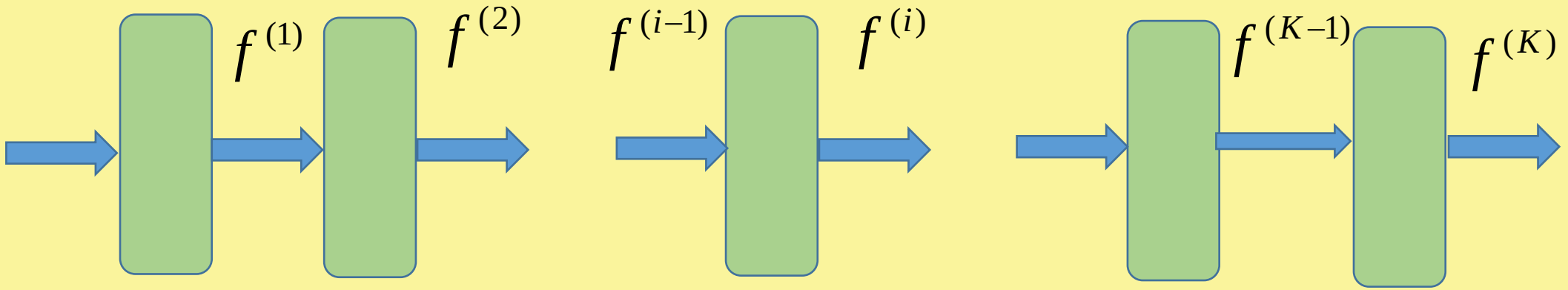
$$h^t W_2 = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} -1.5 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0.5 \\ 0.5 \\ -0.5 \end{bmatrix} \Rightarrow \text{step} \Rightarrow \begin{bmatrix} 0 \\ 1 \\ 1 \\ 0 \end{bmatrix}$$

$X_1 \oplus X_2$

XOR Function



Neural Network Function



$$f^{(K)}(f^{(K-1)}.....(f^{(i)}....(f^{(2)}(f^{(1)}(X)))))$$

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Thank you