



NPTEL ONLINE CERTIFICATION COURSES

Course Name: Deep Learning

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Topic

Lecture 22: Multilayer Perceptron -II

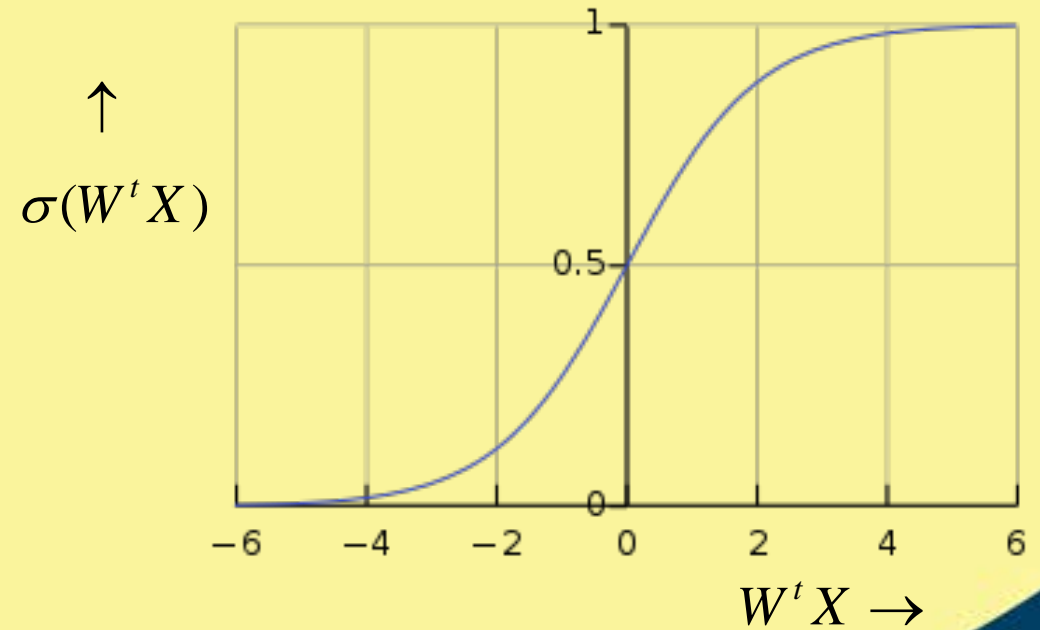
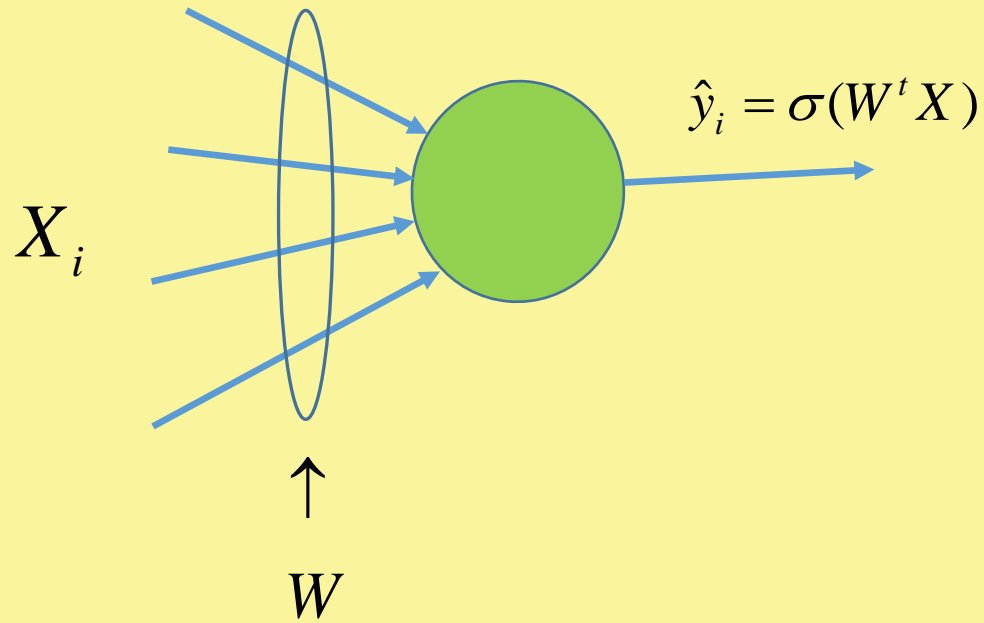
CONCEPTS COVERED

Concepts Covered:

- ☐ Neural Network
- ☐ Feed Forward NN
- ☐ Back Propagation Learning



Single Layer Network- Single Output with nonlinearity



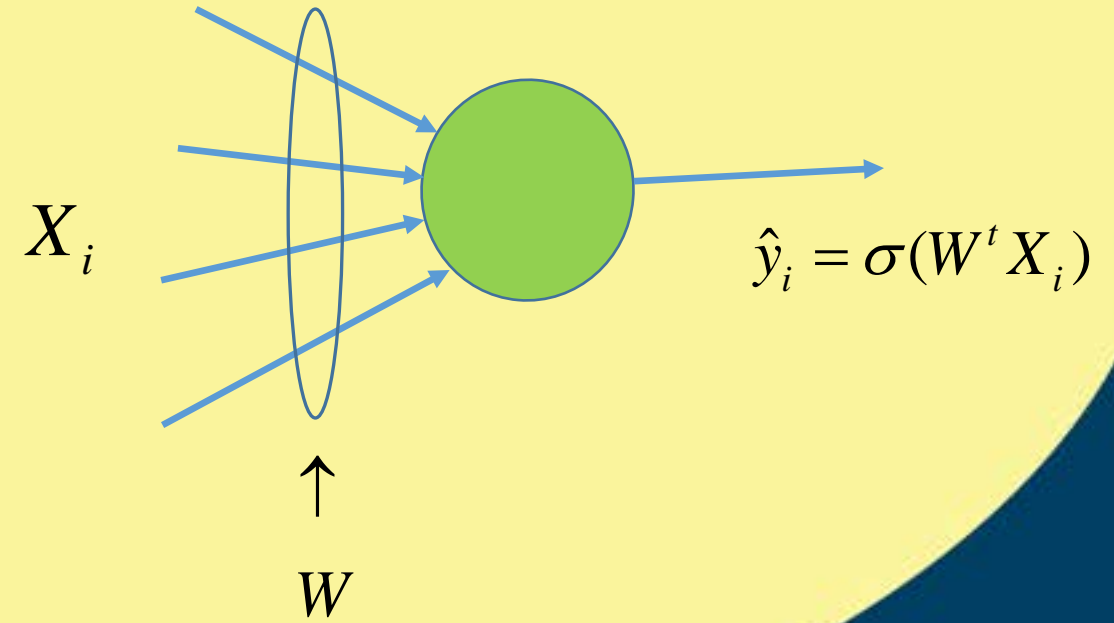
Single Layer Network- Single Output with nonlinearity

$$E = \frac{1}{2}(\hat{y}_i - y_i)^2 = \frac{1}{2}(\sigma(W^t X_i) - y_i)^2$$

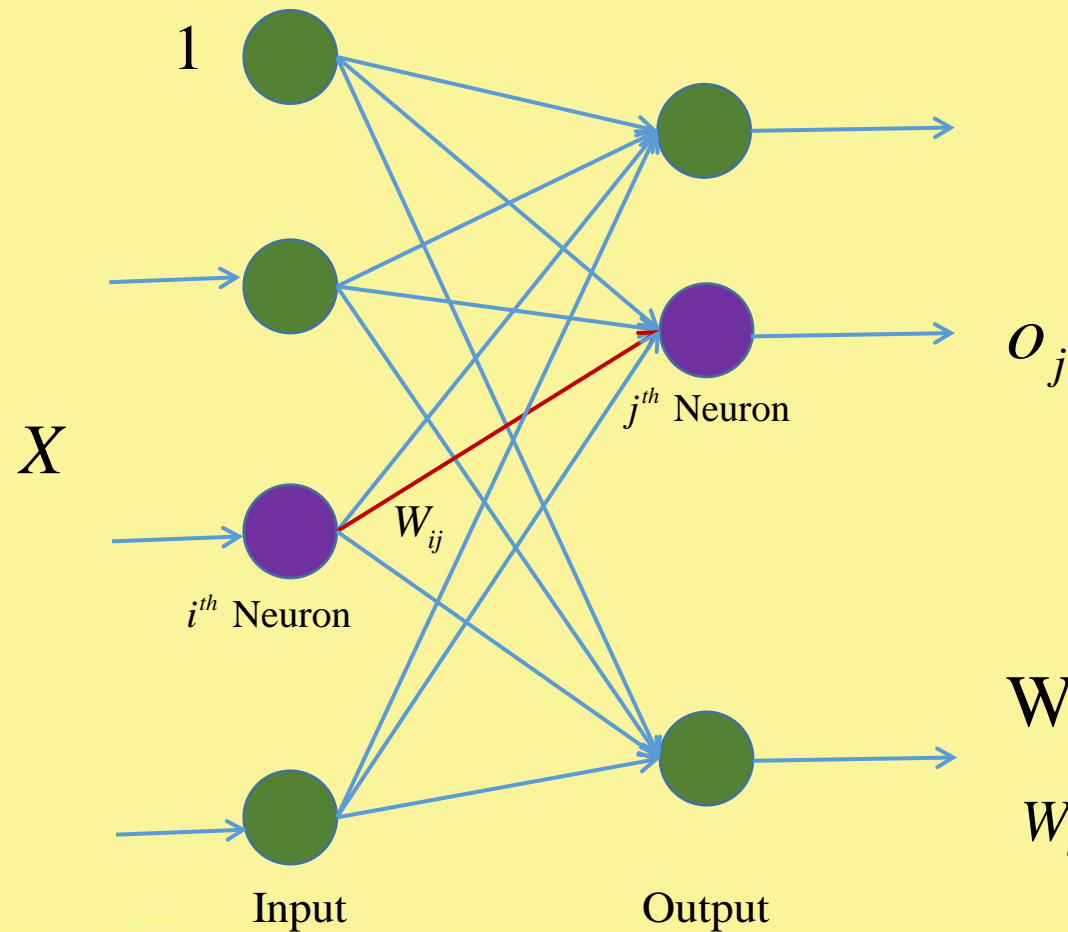
$$\nabla_W E = \hat{y}_i(1 - \hat{y}_i)(\hat{y}_i - y_i)X_i$$

Weight updation rule \Rightarrow

$$W \leftarrow W - \eta \hat{y}_i(1 - \hat{y}_i)(\hat{y}_i - y_i)X_i$$



Back Propagation Learning:- Single Layer Multiple Output



$$o_j = \frac{1}{1 + e^{-\theta_j}} \quad \theta_j = \sum_{i=1}^D W_{ij} x_i$$

$$E = \frac{1}{2} \sum_{j=1}^M (o_j - t_j)^2$$

$$\frac{\partial E}{\partial W_{ij}} = \frac{\partial E}{\partial o_j} \cdot \frac{\partial o_j}{\partial \theta_j} \cdot \frac{\partial \theta_j}{\partial W_{ij}}$$

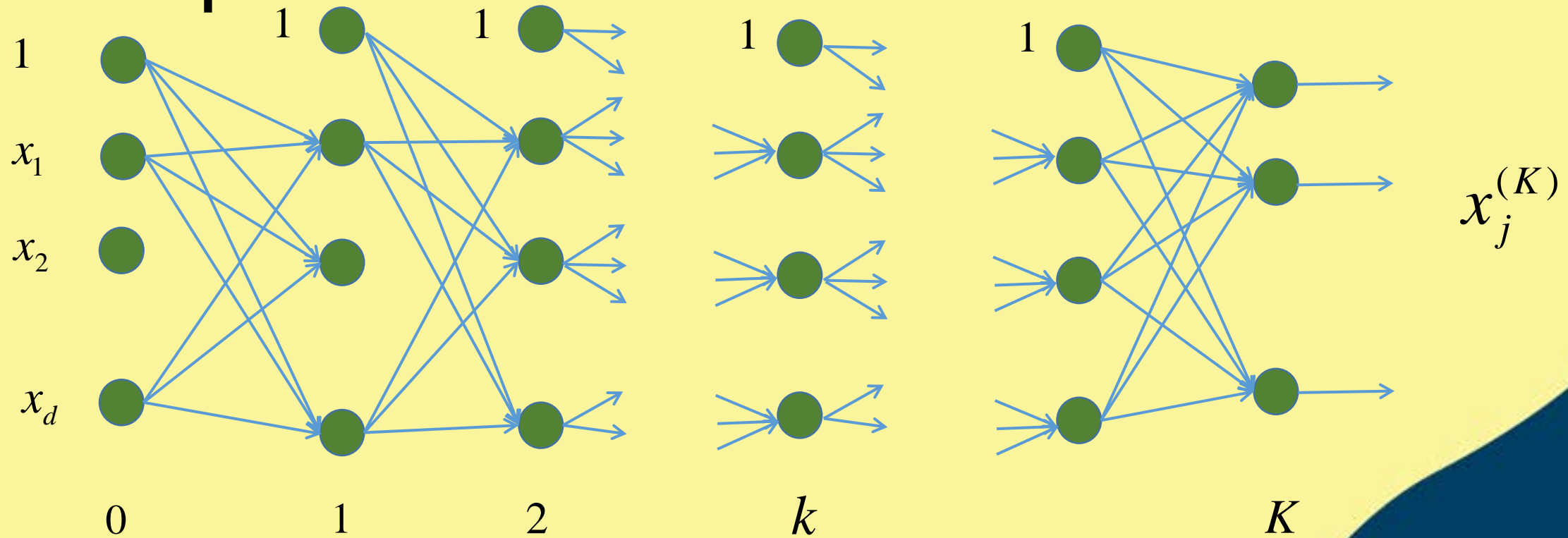
$$= (o_j - t_j) o_j (1 - o_j) x_i$$

Weight updation rule \Rightarrow

$$W_{ij} \leftarrow W_{ij} - \eta (o_j - t_j) o_j (1 - o_j) x_i$$



Multilayer Perceptron



$M_k \rightarrow$ No. of nodes in k^{th} layer





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*Thank
you*

