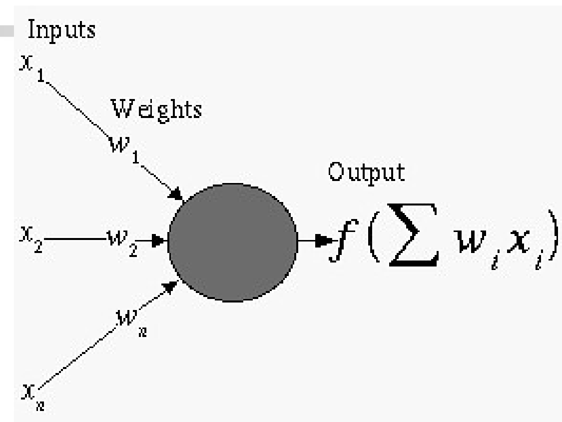
Backpropagation Preparation

- $e_j(n) = d_j(n) - y_j(n)$



$$\mathrm{E(n)} = \frac{1}{2}\sum_{j\in c} e_j^2(n) \qquad E_{AV} = \frac{1}{N}\sum_{n=1}^{N} \mathrm{E(n)}$$

$$v_j(n) = \sum_{i=0}^{p} w_{ji}(n) y_i(n) \qquad y_j(n) = \varphi_j(v_j(n))$$

$$\frac{\partial \mathrm{E(n)}}{\partial w_{ji}(n)} = \frac{\partial \mathrm{E(n)}}{\partial e_j(n)} \frac{\partial e_j(n)}{\partial y_j(n)} \frac{\partial y_j(n)}{\partial v_j(n)} \frac{\partial v_j(n)}{\partial w_{ji}(n)}$$

$$\frac{\partial \mathrm{E(n)}}{\partial e_j(n)} = e_j(n), \quad \frac{\partial e_j(n)}{\partial y_j(n)} = -1, \quad \frac{\partial y_j(n)}{\partial v_j(n)} = \varphi_j'(v_j(n)), \quad \frac{\partial v_j(n)}{\partial w_{ji}(n)} = y_j(n)$$

$$\frac{\partial \mathrm{E(n)}}{\partial w_{ji}(n)} = -e_j(n)\varphi_j'(v_j(n)) y_j(n)$$