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Date: Sec 02

Question 04

Given that,

$$V_j = \sum_i^i w_j y_i$$

$$e_j = d_j^j - y_j$$

$$\text{error}, E = \frac{1}{2} \sum_j e_j^2$$

output from m layer neuron, $y_m = \phi'(V_m)$

Here,

$$\delta_m = \frac{\delta E}{\delta V_m} = \frac{\delta E}{\delta y_m} \frac{\delta y_m}{\delta V_m}$$

$$= \frac{-\delta E}{\delta y_p} \phi'(V_m)$$

And, $E(n) = \frac{1}{2} \sum_{P \in C} e_p^2(n)$

$$\Rightarrow -\frac{\delta E}{\delta y_m} = \sum_{P \in C} e_p \frac{\delta e_p}{\delta y_m}$$

$$= -\sum_{P \in C} e_p (-1) \phi(V_p) W_{pm}$$

$$= \sum_{P \in C} \delta_p W_{pm}$$

$$\frac{\delta e_p}{\delta y_m} = \frac{\delta e_p}{\delta y_p} \frac{\delta y_p}{\delta V_p} \frac{\delta V_p}{\delta y_m}$$

$$= (-1) \phi'(V_p) W_{pm}$$

$$\therefore \delta_m = \phi'(V_m) \sum_{P \in C} \delta_p W_{pm}$$

Finally, $\delta_m = \begin{cases} e_p \phi'(V_m) & \text{[When, m is output neuron]} \\ \phi'(V_m) \sum_{P \in C} \delta_p W_{pm} & \text{[when, m is hidden neuron]} \end{cases}$

So, this is our computed local induced gradient, δ_m (Ans)