

## Derivação da Regra do Gradiente Descendente:

$$\nabla E(w) = \left[ \frac{\partial E}{\partial w_1}, \frac{\partial E}{\partial w_2}, \dots, \frac{\partial E}{\partial w_n} \right]$$

$$w = w + \Delta w, \quad \Delta w = -\eta \nabla E(w)$$

Analisando para um peso  $w_i$ , podemos ver:

$$\frac{\partial E}{\partial w_i} = \frac{\partial}{\partial w_i} \frac{1}{2} \sum_{d \in D} (d - y)^2$$

$$= \frac{1}{2} \sum_{d \in D} \frac{\partial}{\partial w_i} (d - y)^2$$

$$= \frac{1}{2} \sum_{d \in D} 2(d - y) \frac{\partial}{\partial w_i} (d - y)$$

$$= \sum_{d \in D} (d - y) \frac{\partial}{\partial w_i} (d - \sum x w)$$

$$\frac{\partial E}{\partial w_i} = \sum_{d \in D} (d - y)(-x_i)$$

$\Downarrow$

$$\Delta w_i = \eta \sum_{d \in D} (d - y) x_i$$