Neural Network Formulas

CNS 4470

Feed Forward

To compute a hidden unit: $$O_j = \sigma(\sum x_i w_{ij})$$

To compute an output unit: $$O_k = \sigma(\sum o_j w_{jk})$$

where: $$\sigma(y) = \frac{1}{1+e^{-y}}$$

Back Propagation

error term for output units: $\delta_k = o_k(1-o_k)(t_k - o_k)$

error term for hidden units: $\delta_j = o_j(1-o_j)\sum_{k \in outputs} w_{jk}\delta_k$

weight updates

$$w_{ij} = w_{ij} + \Delta w_{ij}$$

$$w_{jk} = w_{jk} + \Delta w_{jk}$$

$$\Delta w_{ij} = \eta \delta_j x_i$$

$$\Delta w_{jk} = \eta \delta_k o_j$$