Neural Networks Basics

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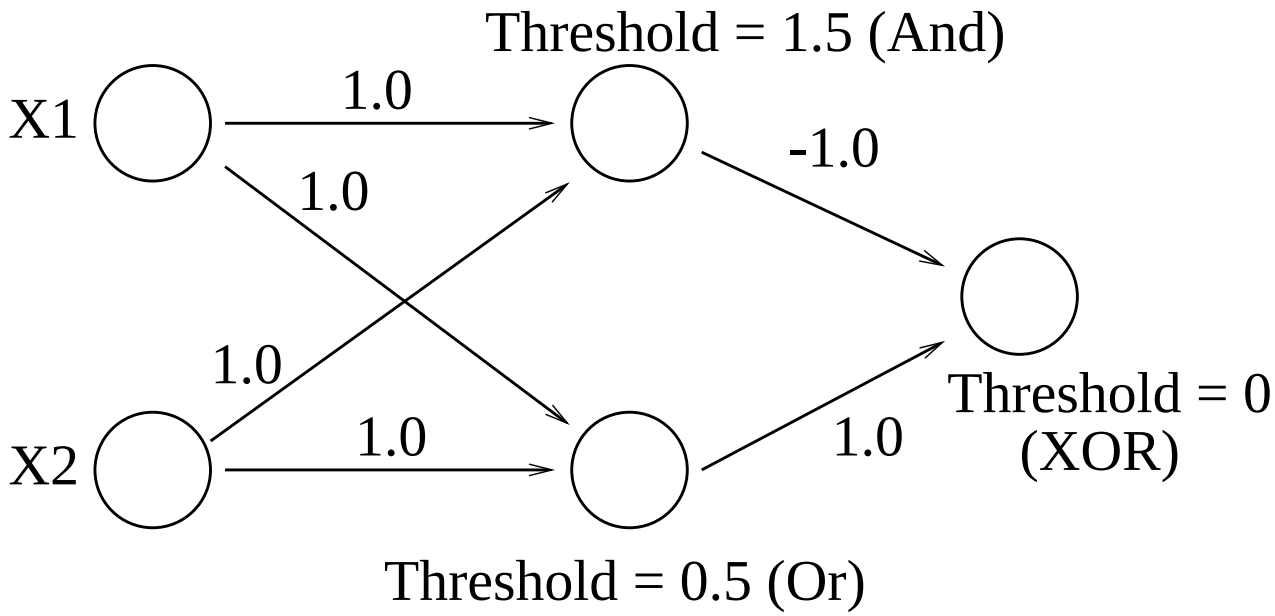
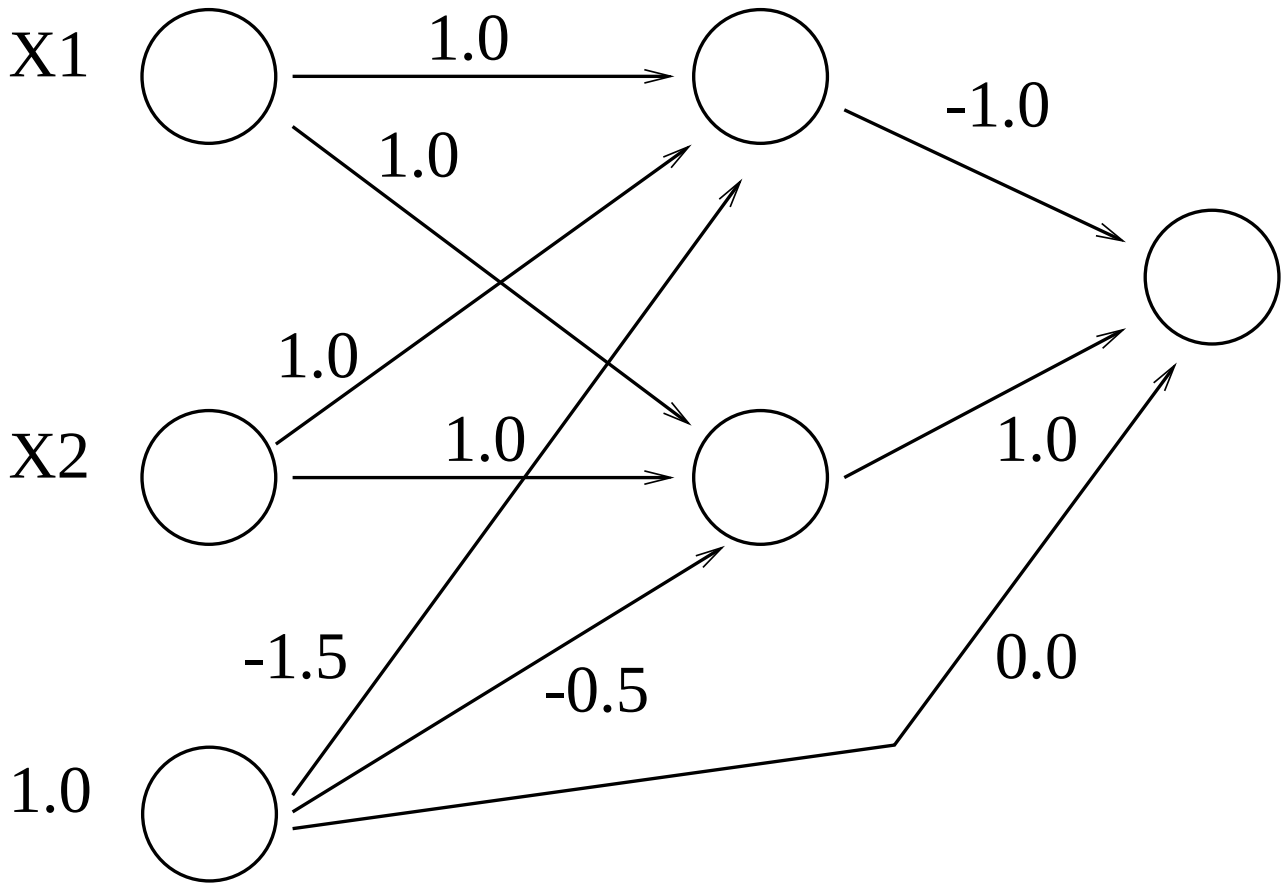
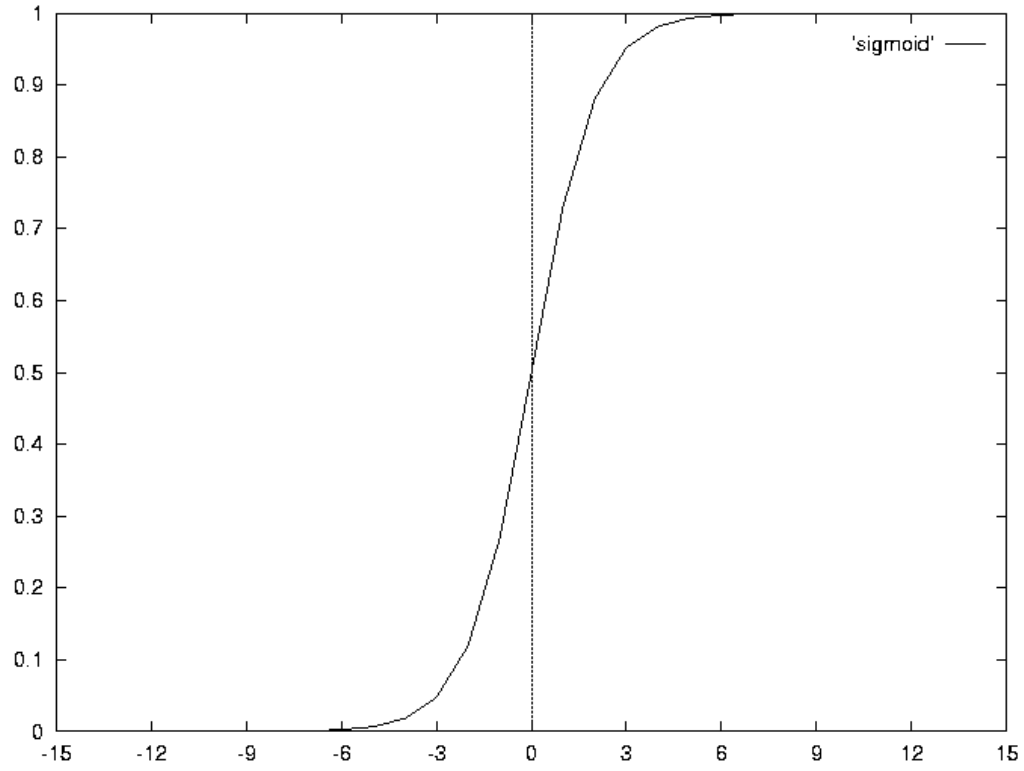
A Simple XOR Network



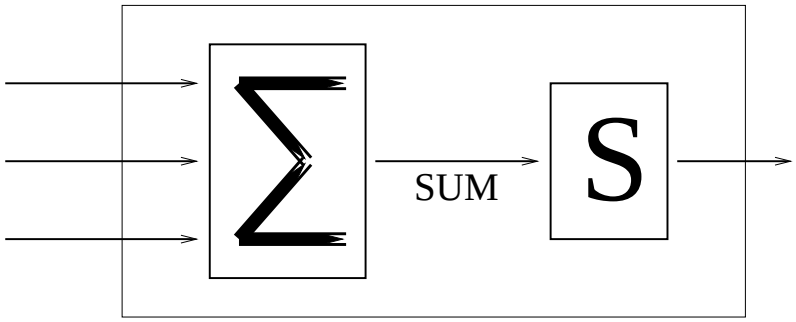
A Simple XOR Network



A Sigmoid



A Transfer Function



For the Logistics Function:

$$S(sum) = \frac{1}{1 + e^{-sum}}$$

$$S(sum) = (1 + e^{-sum})^{-1}$$

$$S(sum) = \frac{1}{1 + e^{-sum}}$$

$$S(sum) = (1 + e^{-sum})^{-1}$$

$$S'(x) = (-(1 + e^{-sum})^{-2})(-e^{-x})$$

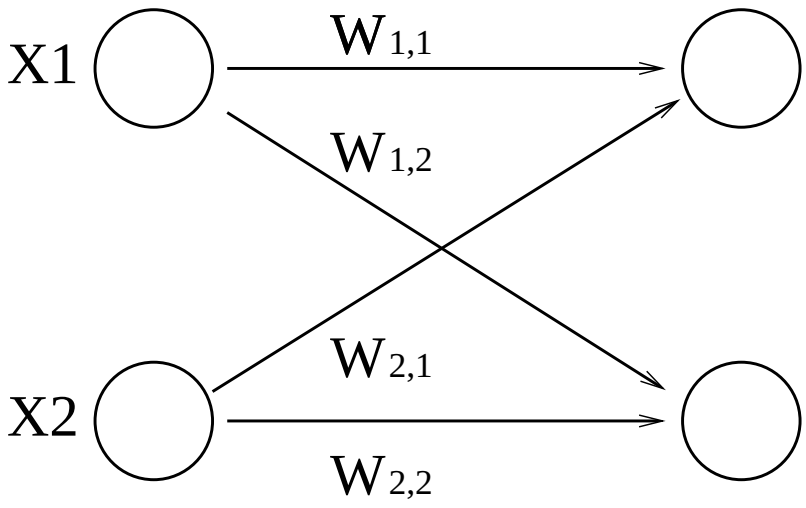
$$S'(x) = \frac{e^{-x}}{(1 + e^{-x})^2}$$

$$S'(x) = \{\frac{1}{(1 + e^{-x})}\}\{\frac{e^{-x}}{(1 + e^{-x})}\}$$

$$S'(x) = S(x)\{\frac{1 + e^{-x} - 1}{(1 + e^{-x})}\}$$

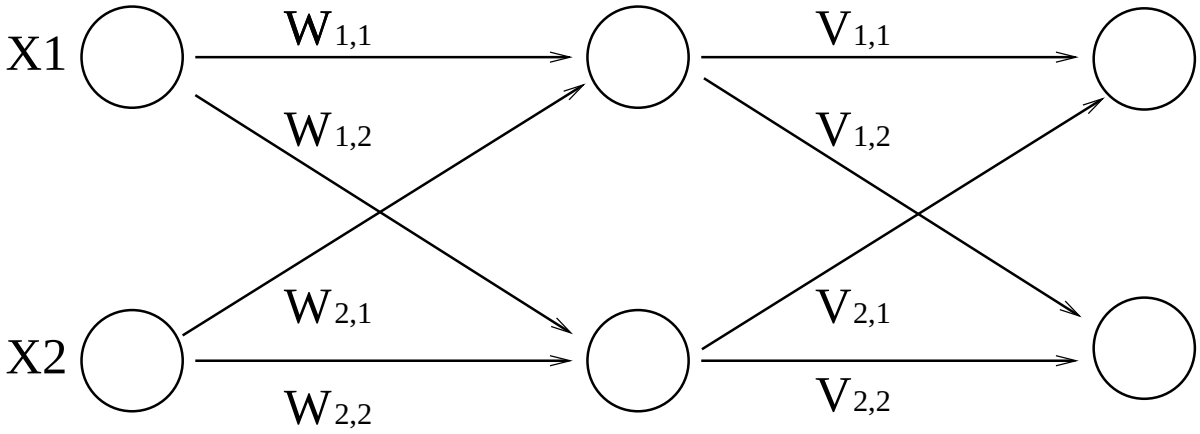
$$S'(x) = S(x)\{\frac{1 + e^{-x}}{1 + e^{-x}} - \frac{1}{(1 + e^{-x})}\}$$

$$S'(x) = S(x)(1 - S(x))$$



W source, destination

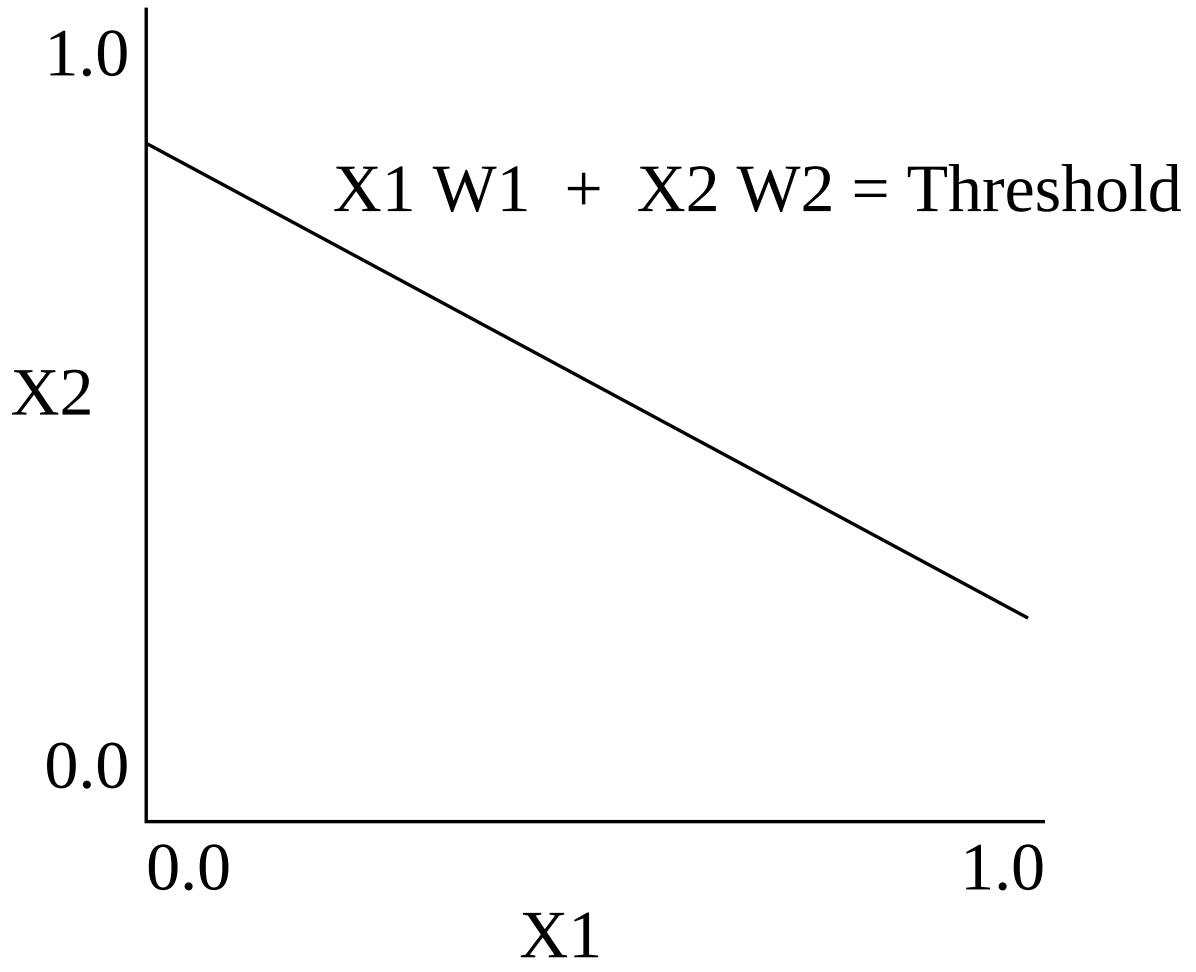
$$[X_1 X_2] \begin{bmatrix} W_{1,1} & W_{1,2} \\ W_{2,1} & W_{2,2} \end{bmatrix}$$



W source, destination

$$XWV = XM$$

$$S(XW)V \neq XM$$



Let $W_0 = -Threshold$

Then

$$X_1 W_1 + X_2 W_2 + W_0 = 0$$

$$X_2 W_2 = -X_1 W_1 - W_0$$

$$X_2 = -(W_1/W_2) X_1 - (W_0/W_2)$$