NEURAL NETWORKS (CH. 5.)

CLASSIFICATION ↘
REGRESSION ↗ DATA MODEL $y(\underline{x}, \underline{w}) = f\left(\sum_{j=1}^{M} w_j \, \phi_j(\underline{x})\right)$

$\phi_j(\underline{x})$ < FIXED / DATA DEPENDENT

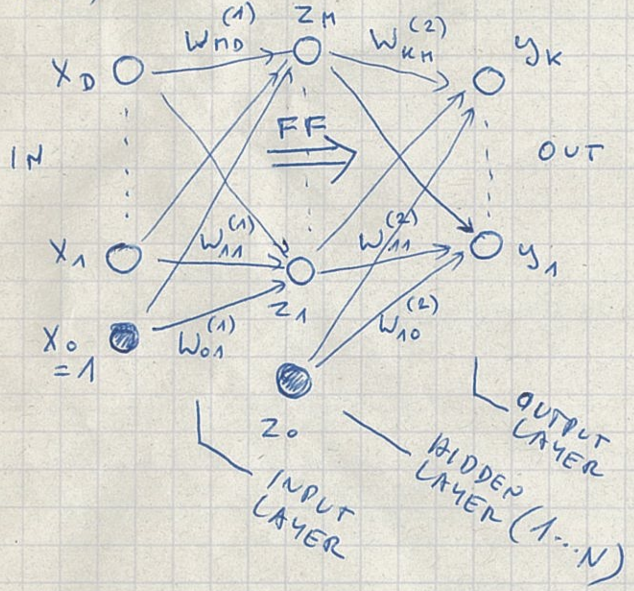
f — LINEAR, POLYNOMIAL
SGN
SIGMOID
ETC.

FEED-FORWARD TOP.

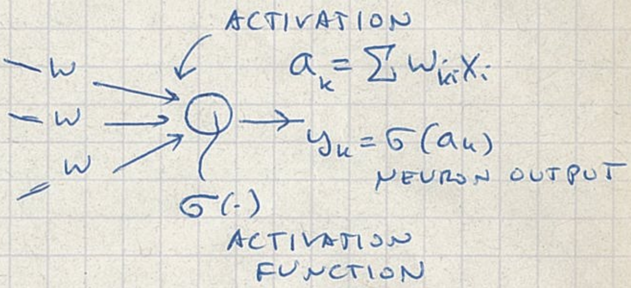
$$y_k(\underline{x}, \underline{w}) = \sigma\left(\sum_{j=0}^{M} w_{kj}^{(2)} \, h\left(\sum_{i=0}^{D} w_{ji}^{(1)} x_i\right)\right) \qquad \sigma(a) = \frac{1}{1+\exp(-a)}$$

(BIAS INCLUDED)

(FIG. 5.1)



$\underline{y} = f_{NL}(\underline{x})$



MULTILAYER PERCEPTRON

- UNIVERSAL APPROXIMATOR (FIG. 5.3)
- FEED-FORWARD ARCHITECTURE (FEED-BACK RECURRENT) (FIG. 5.2)
- NETWORK TRAINING
  - SETTING $\underline{w}$ TO MINIMIZE OUTPUT ERROR ON TRAINING DATA

NETWORK TRAINING (CH. 5.2)

$$\{\underline{x}_n, \underline{t}_n\}_{n=1\ldots N} \longrightarrow \underline{w} \ (?)$$

$$E(\underline{w}) = \frac{1}{2} \sum_{n=1}^{N} \| \underline{y}(\underline{x}_n, \underline{w}) - \underline{t}_n \|^2 = \text{MIN}$$

↑ $\underline{w}_{OPT}$