Νευρο-Ασαφής Υπολογιστική
Neuro-Fuzzy Computing

Διδάσκων –
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Διάλεξη 7η

More practice on ADALINE

Exercise-04

Suppose that we want to design an ADALINE network to distinguish between the following categories of equiprobable input vectors:

- Category I: $p_1=[1\ 1]^T$ $p_2=[-1\ -1]^T$
- Category II: $p_3=[2\ 2]^T$

- Can an ADALINE network be designed to make such a distinction?
- If the answer to the previous questions is yes, what set of weights and bias might be used?
  - Compute them empirically
  - Compute them by calculating the Mean Square Error function $F(\mathbf{x})=c-2\mathbf{x}^T\mathbf{h}+\mathbf{x}^T R\mathbf{x}$

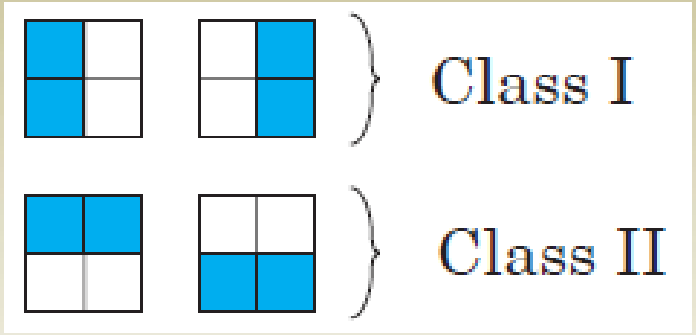
Practice on multi-layer neural networks

Exercise-05

Show that a multilayer network with linear transfer functions is equivalent to a single-layer linear network

Exercise-06

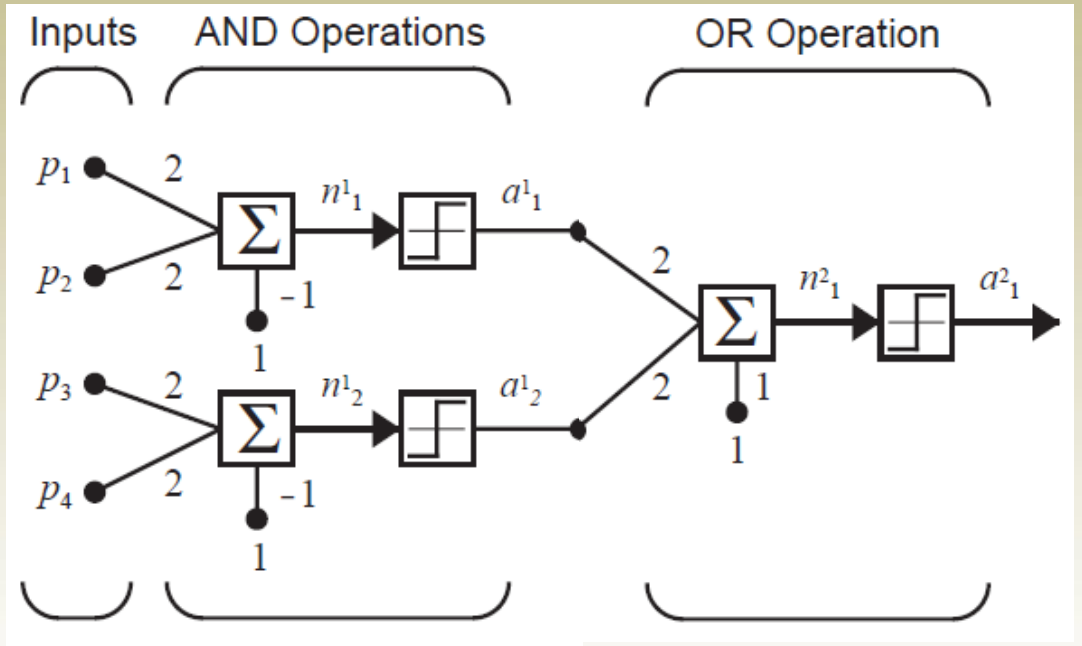
Consider the two classes of patterns that are shown below. Class I represents vertical lines and Class II represents horizontal lines.



- Are these categories linearly separable?
  - In forming patterns' vectors: go from top, then down, then right, top, down, …
  - White cells by "-1"; blue cells by "1"
  - HINT: Arrive at contradicting inequalities
- Design a multilayer network to distinguish these categories.

Exercise-06 Solution: NN architecture

- The first neuron in the first layer tests the first two elements of the input vector
  - If they are both "1" it outputs a "1", otherwise it outputs a "-1".
- The second neuron in the first layer tests the last two elements of the input vector in the same way
- Both of the neurons in the first layer perform AND operations.
- The second layer of the network tests whether either of the outputs of the first layer are "1"
- It performs an OR operation.



- In this way, the network will output a "1" if either the first two elements or the last two elements of the input vector are both "1".