Neural Networks
- Homework 3 -

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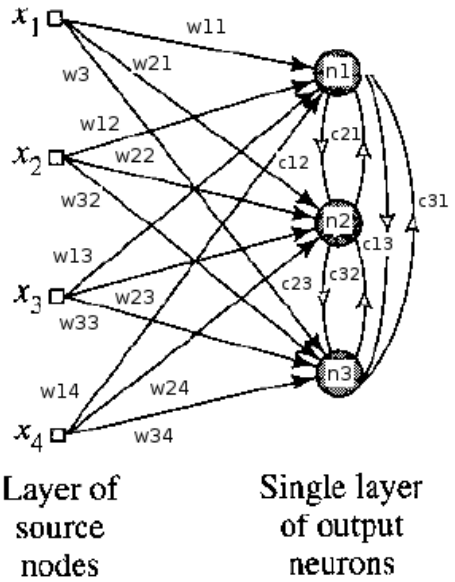
1 Exercises

1.1 Exercise 2.10

Formulate the expression for the output y_j of neuron j in the network of Fig. 1, where:

$x_i = i^{th}$ input signal,
w_{ji} = synaptic weight from input i to neuron j,
c_{kj} = weight of lateral connection from neuron k to neuron j,
$y_j = \phi(v_j)$.

Figure 1: Competitive neural network with feedforward connections.



What is the condition that would have to be satisfied for neuron j to be the winning neuron?

Solution:

$$y_j = \phi(\sum_{i=1}^{4} w_{ji}x_i + \sum_{k=1,k\neq j}^{3} c_{kj}y_k) = \phi(\sum_{i=1}^{4} w_{ji}x_i + \sum_{k=1,k\neq j}^{3} c_{kj}\phi(v_k))$$

, where k_1, k_2 are numbers from 1 to 3 those are not equal j.

Neuron j is a winning neuron if $v_j > v_k$ for all $k \neq j$.