

# Using Node Biases with Conservative Learning

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As a modification to the conservative learning algorithm outlined here (ref), we want to add a bias term to the nodes:

$$y_j^k = \sum_{i \rightarrow j} x_i^k w_{i \rightarrow j} - b_j \quad (1)$$

We can accomplish this by introducing a special input node which is always set to 1. This node is then connected to all of the hidden and output nodes, and if we give this special node the index  $s$ , we can define

$$w_{s \rightarrow j} = -b_j$$

so that we can retain the formula

$$y_j^k = \sum_{i \rightarrow j} x_i^k w_{i \rightarrow j}$$