

Appendix E. Artificial Neural Network Analysis

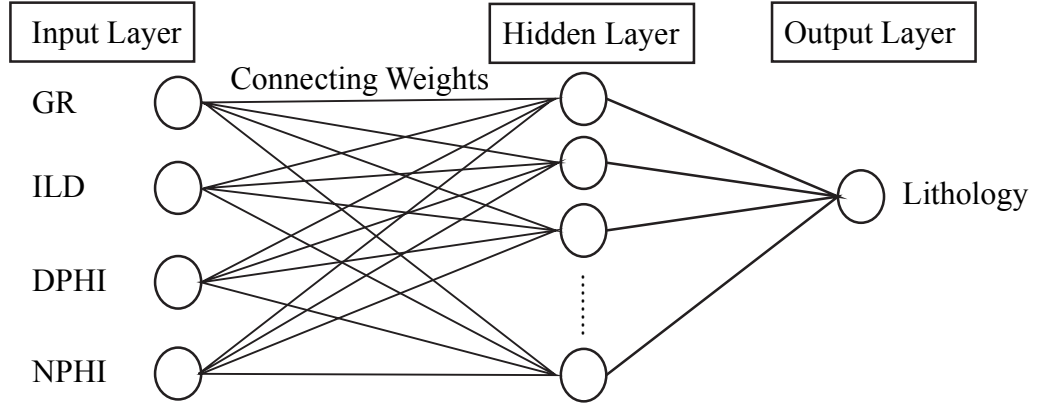


Figure E-1. Schematic diagram showing the architecture of the Artificial Neural Network. Modified from Kumar and Kisra, 2006; Verma et. al., 2014.

The standard workflow of back propagation method used in this work consists of the following steps:

- 1) Initialize the network synaptic weights to small random values.
- 2) From the set of training input/output pairs, present an input pattern and calculate the network response.
- 3) The desired network response is compared with the actual and using the equations, the local errors are computed.
- 4) The weights of the network are updated.
- 5) Step 2 to step 4 are repeated until a minimum overall error is obtained.

In general, suppose there are “n” number of inputs ($x_1, x_2, x_3, \dots, x_n$) and one output, then the output (y) can be presented by following relationship:

$$y = f(\text{net}) = f\left(\sum_{i=1}^n w_i x_i\right)$$

$$\text{net} = w^T x = w_1 x_1 + w_2 x_2 + \dots + w_n x_n$$

where “ $f(\text{net})$ ” refers to activation or transfer function and, “ w_i ” is the weight vector.