The activation functions used by the Neuron Class are given below. Let the output be represented by:

$$O_i = g\left(\sum_j w_{ji} O_j\right) = g\left(h_i\right)$$

Where O_i is the output of Neuron i, $g(x)$ is the *activation function*, w_{ji} is the value of the weight connecting the output of Neuron j to the input of Neuron i and h_i is the net input to Neuron i given by the summation in the above equation.

The activation functions, $g(x)$, are given by:

- Binary ($T = 0$)

$$O_i = \begin{cases} 1.0, & \text{if } h_i > 0.0 \\ 0.0, & \text{if } h_i < 0.0 \end{cases}$$

- Binary ($T > 0$)

$$O_i = \begin{cases} 1.0, & \text{if } rnd \leq \left(1 + e^{-2h_i/T}\right)^{-1} \\ 0.0, & \text{otherwise} \end{cases}$$

- Sigmoid

$$O_i = \frac{1}{1 + e^{-h_i}}$$

- Sign ($T = 0$)

$$O_i = sgn\left(h_i\right)$$

- Sign ($T > 0$)

$$O_i = \begin{cases} 1.0, & \text{if } rnd \leq \left(1 + e^{-2h_i/T}\right)^{-1} \\ -1.0, & \text{otherwise} \end{cases}$$

- Tanh

$$O_i = \begin{cases} tanh\left(h_i\right), & \text{if } T = 0 \\ tanh\left(h_i/T\right), & \text{if } T > 0 \end{cases}$$

NOTE: rnd is a random number between 0 and 1.