**Aim: To implement Mc-Culloch pits Model using XOR**

Neural network was inspired by the design and functioning of human brain and components. Definition: ―Information processing model that is inspired by the way biological nervous system (i.e the brain) process information, is called Neural Network.‖ Neural Network has the ability to learn by examples. It is not designed to perform fix /specific task, rather task which need thinking (e.g. Predictions). ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems. It mimic human brain. It is configured for special application such as pattern recognition and data classification through a learning process. ANN is 85-90% accurate.



X1 and X2 – input neurons. Y- output neuron Weighted interconnection links- W1 and W2. Net input calculation is : Yin= x1w1+x2w2 Output is : y=f(Yin) Output= function

**The McCulloch-Pitts Model of Neuron:** The McCulloch-Pitts neural model is also known as linear threshold gate. It is a neuron of a set of inputs I1,I2,I3…Im and one output y . The linear threshold gate simply classifies the set of inputs into two different classes. Thus the output y is binary. Such a function can be described mathematically using these equations.



W1,W2…Wm are weight values normalized in the range of either (0,1) or (-1,1) and associated with each input line, Sum is the weighted sum, and T is a threshold constant. The function f is a linear step function at threshold T



A simple M-P neuron is shown in the figure. It is excitatory with weight (w>0) / inhibitory with weight –p (p<0). In the Fig., inputs from x1 to xn possess excitatory weighted connection and Xn+1 to xn+m has inhibitory weighted interconnections. Since the firing of neuron is based on threshold, activation function is defined as



For inhibition to be absolute, the threshold with the activation function should satisfy the following condition: θ >nw –p Output will fire if it receives ―k‖ or more excitatory inputs but no inhibitory inputs where kw≥θ>(k-1) w

- The M-P neuron has no particular training algorithm. - An analysis is performed to determine the weights and the threshold. - It is used as a building block where any function or phenomenon is modelled based on a logic function. **Problem Statement**: Implement XOR function using MP model Truth table for XOR function is:

Activation function Yin is as follows: Yin=x1w1+x2w2



Let Z1=and Z2=

For Z1, W11=1 and W12=-1 Θ=1

|  |  |  |
| --- | --- | --- |
| X1 | X2 | Z1 |
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |