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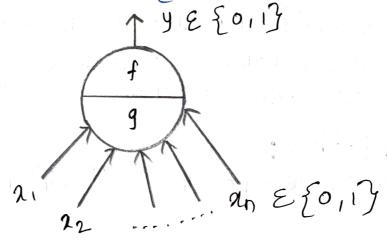
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McCalloch - Pitts Newson

McCulloch (neuroscientist) and Pitts (legician)
proposed a highly simplified computational
model of the neuron (1943)



- -g gaggoegates the inputs
- Junction + takes decision based on this
- The M-P newsons are connected by directed weighted paths.
- At any step, the neuron may five or may not
- The weights associated with communication links

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may be excitatooy (weights are tre) or inhibitory (weights are -ve).

- Threshold plays a major vole in M-P neuron.

- If the net input to the neuron is greater than the threshold then the neuron frees.

- The M-P newsons are most widely used in the case of legic functions.

Architecture:

The simple MP neuron is shown in below fig.

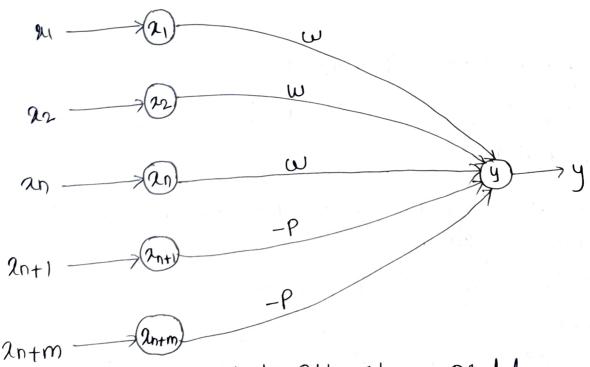


Fig. McCalloch-Pitts Newson Model

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## A P SIMI INSTITUTED OF THEORY

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- It is excitory with weight (w70) or inhibitory with weigh -p (p<0).

- In the given fig., 2, to 2n possess excitatory weighted connections.

- Inputs from 21/1 to 21/1 possess inhibitory weighted interconnections.

- The activation function here is defined as,

$$f(y_{in}) = \begin{cases} 1 & y_{in} > 0 \\ 0 & y_{in} < 0 \end{cases}$$

- The threshold with adivation function should satisfy the following endition:

- The MP newson has no particular training algorithm.

- An analysis has to be profromed to deturmine the values of the weights and the threshold.

- The weights ort the newson are set along with the thrushold to make the newson perform a simple legic function.

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Solved Example:

Implement ANDNOT function using MP neuron.

- 21 22 4
- 0 0 0
- 0 0
- 1 1 2 0

case 1: Assume both weights to be excitatory i.e.  $w_1 = w_2 = 1$ 

Calculate net input for th 4 inputs

Yin = 21 w 1 + 22 w 2

(1/1), (1/1), (1/1)

(110), yin)=1+0=1

(0,1), yin = 0+1=1

(0,0) , yin = 0 +0 =0

It is not possible to fire the input (1,0) only. Hence those weights are not suitable.

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case 2: Assume I weight as excitatory and other as inhibitatory.

 $\omega_1=1$   $\omega_2=-1$ 

Calculate the net inputs for 4 inputs

Yin = 2101+2202

(11), yin = 1-1=0

(110) / yin = 1-0=1

(01), Yin = 0-1=1

(010), yin = 0+0=0

Now, it is possible to five newson for input ( C110), by foxing the thoushold 1.
i.e. 07/1

:. W1=1 W2=-1 and 071

Value of 0:

can be calculated using 07/nw-p

07/(2\*1)-1

[n: no of features wino of excitatory weights]



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