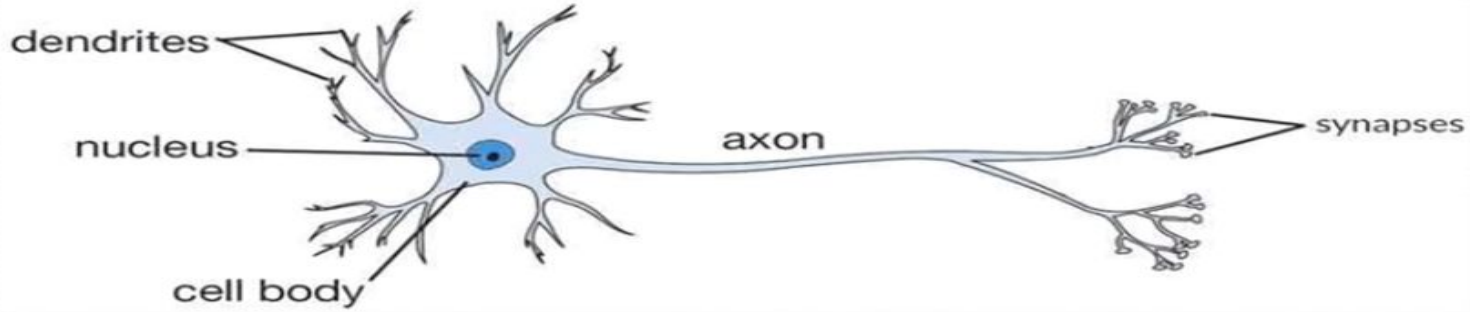
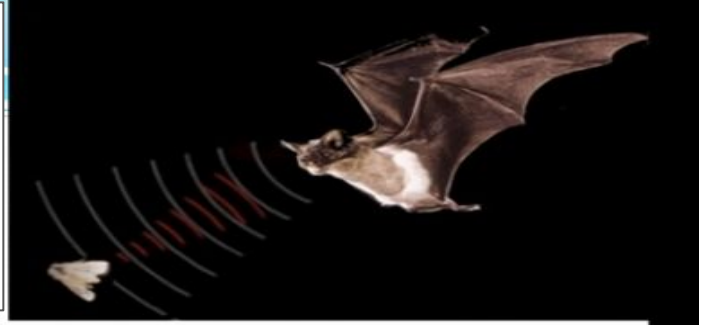
Background

- An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the biological nervous systems, such as the human brain's information processing mechanism.
- The Brain is a highly complex . Nonlinear , and parallel computer.
- To recognize a face of a person our brain takes approximately 100-200 ms where a conventional computer may take days.

Biological Neuron



For Example



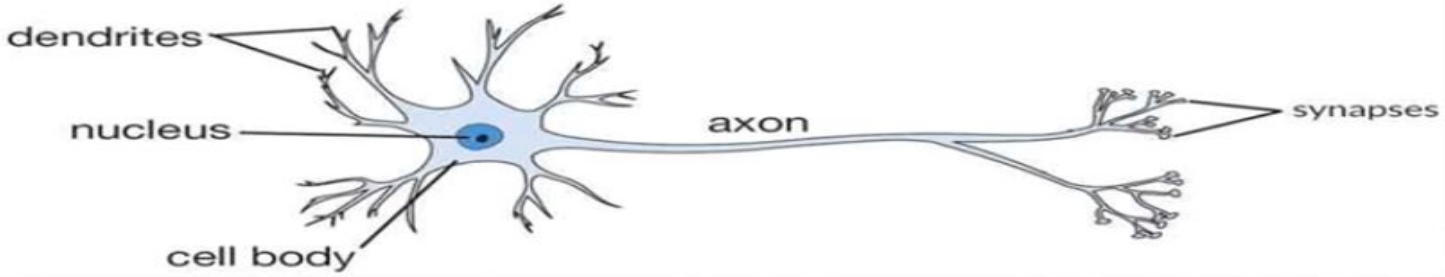
- Consider sonar of a bat.
- In addition to providing of information about how far away the insect is it conveys information about relative velocity of the target , size of target, the size of various features of target.

- How does a biological brain do this?

Architecture of Specific Neuron

How the Human Brain learns

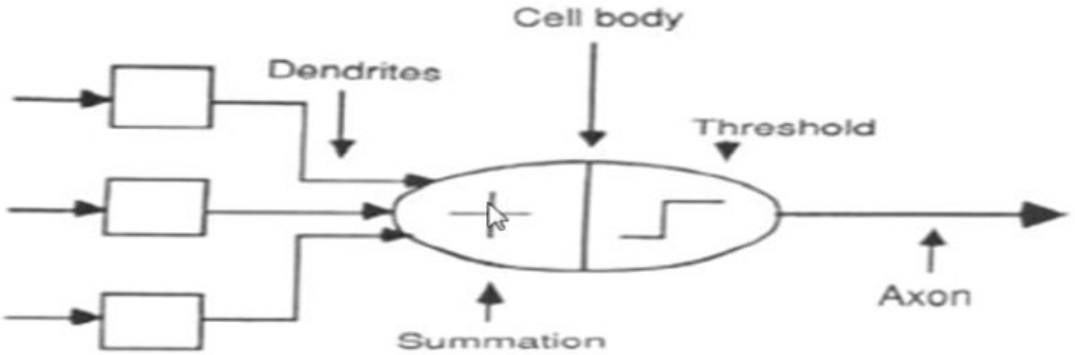
Biological Neuron



- **Dendrite** — It receives signals from other neurons.
- **Soma (cell body)** — It sums all the incoming signals to generate input.
- **Axon** — When the sum reaches a threshold value, neuron fires and the signal travels down the axon to the other neurons.
- **Synapses** — The point of interconnection of one neuron with other neurons. The amount of signal transmitted depend upon the strength (synaptic weights) of the connections.
- The connections can be inhibitory (decreasing strength) or excitatory (increasing strength) in nature.
- So, neural network, in general, is a highly interconnected network of billions of neuron with trillion of interconnections between them.

A Neuron Model

- When a neuron receives excitatory input that is sufficiently large compared with its inhibitory input, it sends a spike of electrical activity down its axon. Learning occurs by changing the effectiveness of the synapses so that the influence of one neuron on another changes.



- We conduct these neural networks by first trying to deduce the essential features of neurons and their interconnections.
- We then typically program a computer to simulate these features.