



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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ARTIFICIAL INTELLIGENCE FOR ELECTRICAL ENGINEERING

TOPIC: **ARCHITECTURES OF NEURAL NETWORK
MODELS**



AI TECHNIQUES FOR ELECTRICAL
ENGINEERING / 19EET401

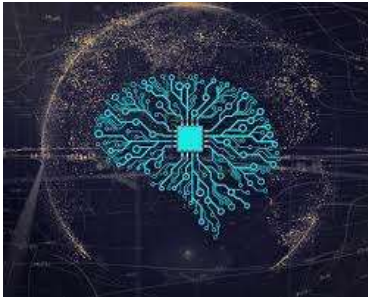


TOPIC OUTLINE



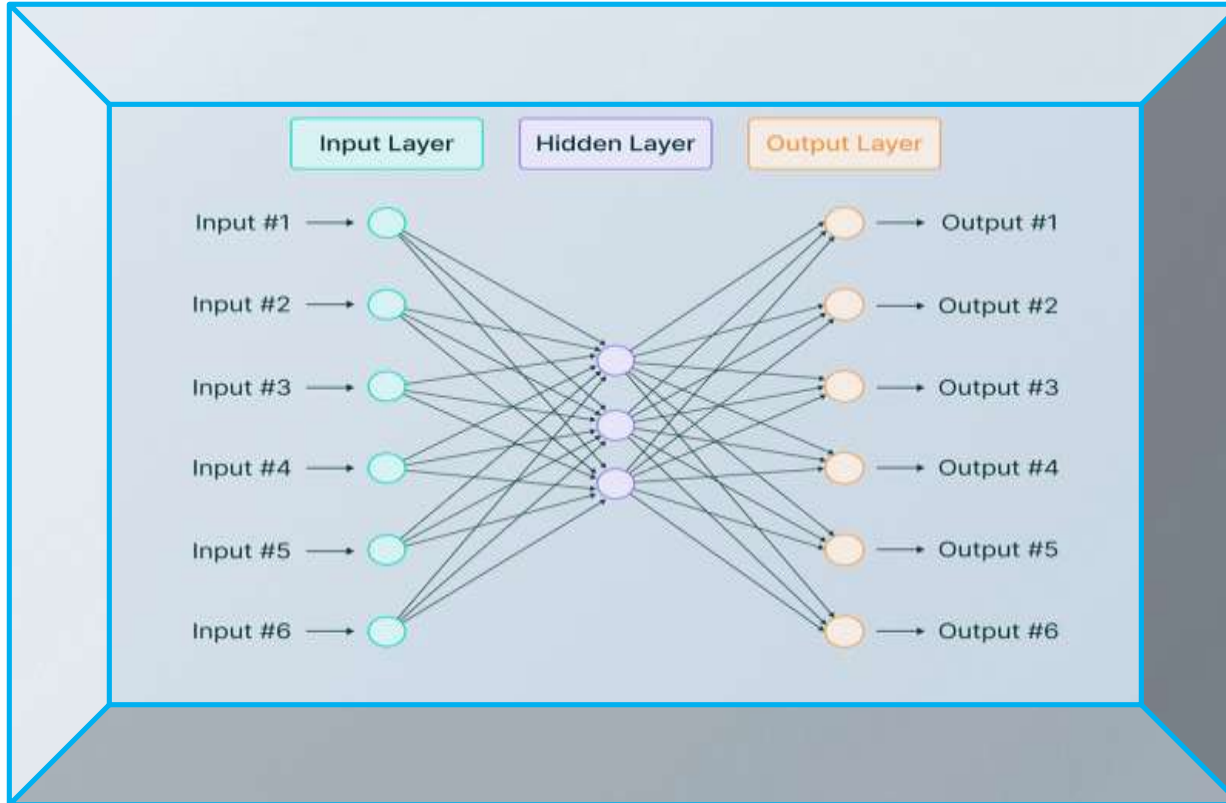
Neural networks are straightforward representations of how the nervous system functions. Neurons serve as the fundamental building blocks and are often arranged in layers.

A neural network is a simplified model of the way the human brain processes information. It works by simulating a large number of interconnected processing units that resemble abstract versions of neurons.





ARCHITECTURES OF NEURAL NETWORK MODELS

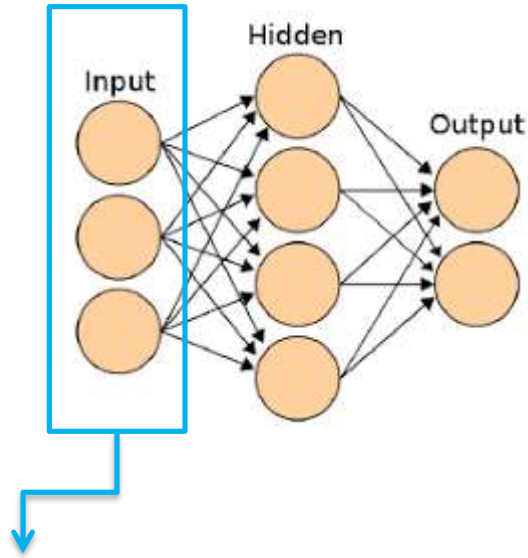




INPUT LAYER OF NEURAL NETWORK MODELS



Input Layer– First is the input layer. This layer will accept the data and pass it to the rest of the network. Hidden Layer– The second type of layer is called the hidden layer. Hidden layers are either one or more in number for a neural network.



INPUT LAYER

WORKING OF INPUT LAYER

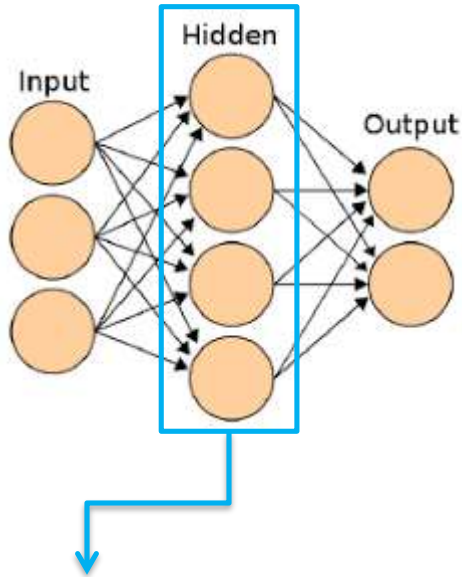
The input layer of a neural network is composed of artificial input neurons, and **brings the initial data into the system for further processing by subsequent layers of artificial neurons**. The input layer is the very beginning of the workflow for the artificial neural network.



HIDDEN LAYER OF NEURAL NETWORK MODELS



A hidden layer in an artificial neural network is a layer in between input layers and output layers, where artificial neurons take in a set of weighted inputs and produce an output through an activation function.



WORKING OF HIDDEN LAYER

In neural networks, a hidden layer is located between the input and output of the algorithm, in which the function applies weights to the inputs and directs them through an activation function as the output. In short, the hidden layers **perform nonlinear transformations of the inputs entered into the network.**

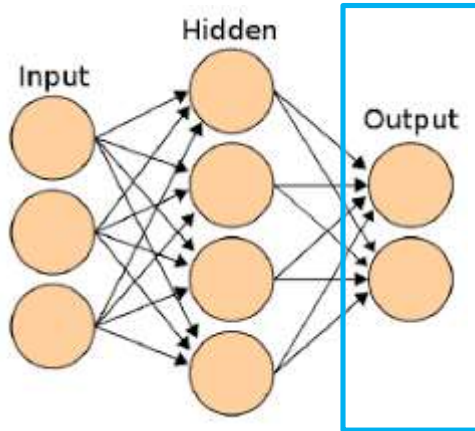
HIDDEN LAYER



OUTPUT LAYER OF NEURAL NETWORK MODELS



The output layer in an artificial neural network is the last layer of neurons that produces given outputs for the program.



OUTPUT LAYER

WORKING OF OUTPUT LAYER

The output layer **takes in the inputs which are passed in from the layers before it, performs the calculations via its neurons and then the output is computed.** In a complex neural network with multiple hidden layers, the output layer receives inputs from the previous hidden layer.



TYPES OF NEURAL NETWORK MODELS



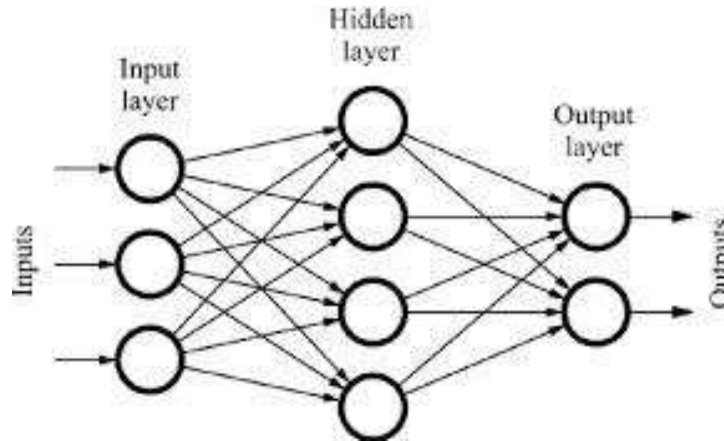
- Feedforward artificial neural networks,
- Perceptron and Multilayer Perceptron neural networks,
- Radial basis function artificial neural networks,
- Recurrent neural networks,
- Modular neural networks.



FEEDFORWARD ARTIFICIAL NEURAL NETWORKS



The feedforward neural network was **the first and simplest type of artificial neural network devised**. In this network, the information moves in only one direction—forward—from the input nodes, through the hidden nodes (if any) and to the output nodes. There are no cycles or loops in the network

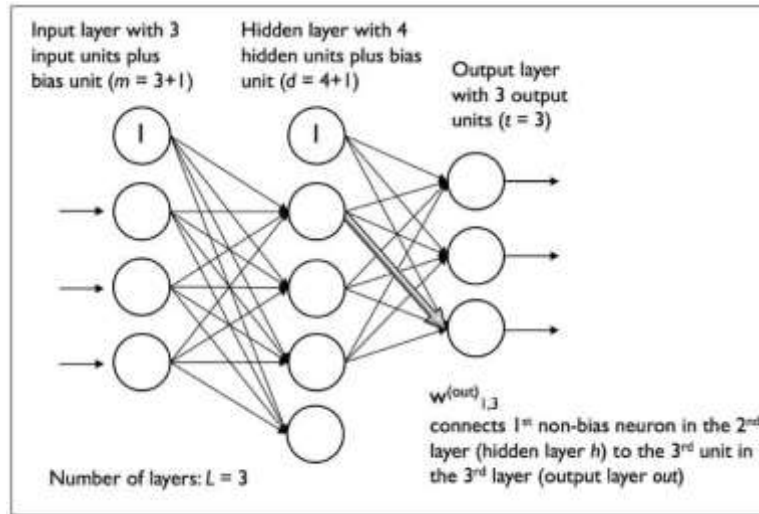




PERCEPTRON AND MULTILAYER PERCEPTRON NEURAL NETWORKS



Perceptron is a neural network with only one neuron, and can only understand linear relationships between the input and output data provided. However, with Multilayer Perceptron, horizons are expanded and now this neural network can have many layers of neurons, and ready to learn more complex pattern.

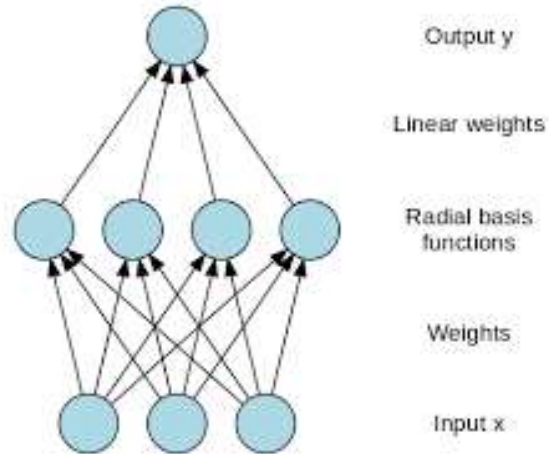




RADIAL BASIS FUNCTION ARTIFICIAL NEURAL NETWORKS



Radial basis function (RBF) networks are **a commonly used type of artificial neural network for function approximation problems**. Radial basis function networks are distinguished from other neural networks due to their universal approximation and faster learning speed.

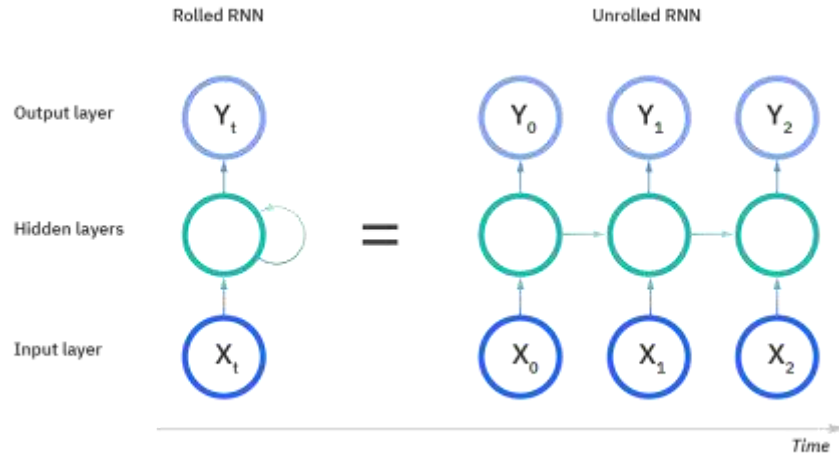




RECURRENT NEURAL NETWORKS



A **recurrent neural network (RNN)** is a class of artificial neural networks where connections between nodes can create a cycle, allowing output from some nodes to affect subsequent input to the same nodes. This allows it to exhibit temporal dynamic behavior. Derived from feedforward neural networks.

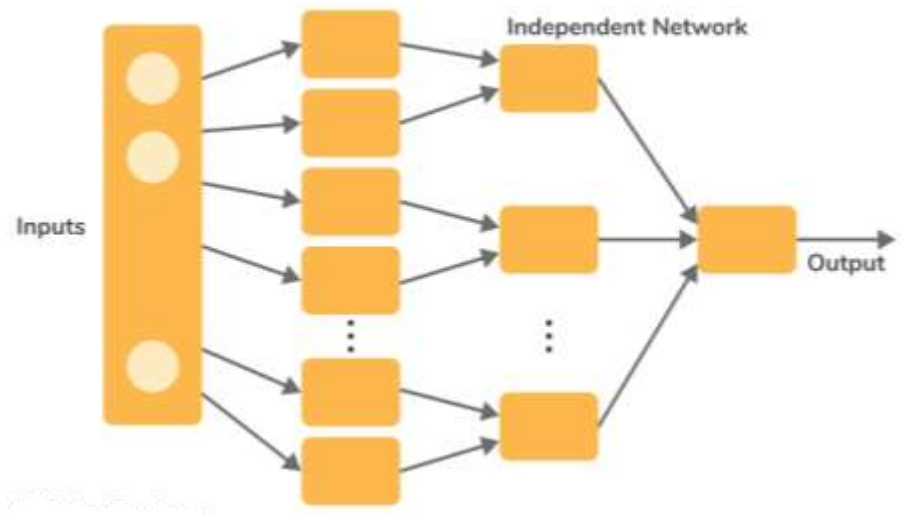




MODULAR NEURAL NETWORKS



Neural network module is an experimental module that allows to perform post-classification of messages based on their current symbols and some training corpus obtained from the previous learns.





ADVANTAGES OF NEURAL NETWORK MODELS



- Store information on the entire network,
- The ability to work with insufficient knowledge,
- Good fault tolerance,
- Distributed memory,
- Gradual Corruption,
- Ability to train machine,
- The ability of parallel processing.



DISADVANTAGES OF NEURAL NETWORK MODELS



Disadvantages include its **"black box" nature, greater computational burden, proneness to overfitting, and the empirical nature of model development.** An overview of the features of neural networks and logistic regression is presented, and the advantages and disadvantages of using this modeling technique are discussed.





Thank You!