* What is the function of a summation junction of a neuron? What is threshold activation function?
* >>>>>>>The summation junction (or summation node) of a neuron collects weighted input signals and sums them up to produce the neuron's total input.
* What is a step function? What is the difference of step function with threshold function?
* >>>>>>>>The threshold activation function, often referred to as a step function, is a type of activation function used in early neural network models. It works by comparing the total input of a neuron to a predefined threshold.
* Explain the McCulloch–Pitts model of neuron.
* >>>>>>Both the step function and threshold function have similar behavior, but the terminology can vary. Some sources use "step function" to describe the general concept of a function that has distinct output levels
* Explain the ADALINE network model.
* >>>>>>>The McCulloch–Pitts model is an early mathematical model of a biological neuron. It consists of a summation junction that sums weighted inputs and applies a threshold activation function
* What is the constraint of a simple perceptron? Why it may fail with a real-world data set?
* >>>>>>>>ADALINE is a single-layer neural network model with a linear activation function. It's used for regression tasks and adapts its weights to minimize a cost function.
* What is linearly inseparable problem? What is the role of the hidden layer?
* >>>>>>A simple perceptron can only learn linearly separable functions. It cannot solve problems that are not linearly separable, which limits its applicability to real-world datasets where data points may not be linearly separable.
* Explain XOR problem in case of a simple perceptron.
* >>>>>>A linearly inseparable problem is one where a single perceptron cannot draw a linear boundary to separate data points of different classes. To address such problems, neural networks with hidden layers (multi-layer perceptrons) are used.
* Design a multi-layer perceptron to implement A XOR B.
* >>>>>>>The XOR problem is not linearly separable, making it impossible for a simple perceptron to learn. XOR requires a multi-layer perceptron (at least one hidden layer) to capture its non-linear nature and find a solution.
* Explain the single-layer feed forward architecture of ANN.
* >>>>>>>A multi-layer perceptron for XOR requires one hidden layer with at least two neurons. The input layer has two nodes (A and B), and the output layer has one node. The hidden layer allows the network to learn the XOR function by introducing non-linearity.
* Explain the competitive network architecture of ANN.
* >>>>>A single-layer feed-forward artificial neural network consists of an input layer, an output layer, and no hidden layers. It's a simple architecture used for linear regression and other linear tasks.
* Consider a multi-layer feed forward neural network. Enumerate and explain steps in the backpropagation algorithm used to train the network.

>>>>>>>>>>>>Competitive neural networks, like the self-organizing map (SOM), are used for clustering and pattern recognition.

* What are the advantages and disadvantages of neural networks?
* >>>>>The backpropagation algorithm is used to train multi-layer feed-forward neural networks.
* Write short notes on any two of the following:

Biological Neuron:

A biological neuron is the fundamental building block of the human nervous system. It consists of a cell body, dendrites, an axon, and synapses. Neurons transmit electrochemical signals and play a critical role in information processing in the brain and nervous system.

ReLU Function (Rectified Linear Unit):

ReLU is an activation function commonly used in artificial neural networks. It's defined as f(x) = max(0, x), where x is the input. ReLU is popular because it introduces non-linearity while being computationally efficient. It's particularly effective in deep learning models.

Single-Layer Feed Forward ANN (Artificial Neural Network):

A single-layer feed-forward artificial neural network consists of an input layer and an output layer, with no hidden layers. It's a simple architecture used for linear regression and basic tasks. However, it cannot capture complex patterns like multi-layer networks.

Gradient Descent:

Gradient descent is an optimization algorithm used to minimize the loss (error) of a machine learning model. It iteratively adjusts the model's parameters (weights and biases) in the direction of the steepest decrease in the loss function. This process continues until convergence or a stopping criterion is met.

Recurrent Networks (Recurrent Neural Networks - RNNs):

Recurrent networks are a type of artificial neural network designed for sequences and time-series data. They have recurrent connections, allowing information to be passed from one step in the sequence to the next. RNNs are well-suited for tasks like natural language processing, speech recognition, and sequential data analysis.