**NEURAL NETWORKS**

**#Neural Networks**

Neural networks are classification algorithms which work based on the human minds working. Neural networks contain layers of perceptrons which form layers.

There are three layers in neural networks. All components of neural networks are as follows:

**Input layer**: This takes in the input. This can be in the form of images, or features or output of some other neural network.

**Hidden layer:** Take the output of the input layer as their input. Hidden layer is where the computation on the data takes place.

**Output layer:** GIves the final output as the classification .

**Activation function:** activation function determines whether a neuron should be activated based on the input. Activation functions help neural networks use important information while ignoring irrelevant data points. They also add non-linearity to the neural network.

**Weights:** Weights are multiplied to each feature, which determines how important the feature is.

**Bias:** bias is a scalar that represents the systematic error in the network's predictions. Bias is a constant that is added to the product of features and weights.

Formula: Z = Bias + W1X1 + W2X2 + …+ WnXn

**#Types of neural networks**

**Convolutional neural networks (CNNs)**

An advanced artificial neural network that differs from regular neural networks in how signals flow between neurons. Consists of input layer, convolution layer and maxpool layer.

**Recurrent neural networks (RNNs)**

A neural network that feeds the output of a layer back to the input layer multiple times to learn from past data.

Used to process sequential data.

**Perceptrons**

A basic feed-forward artificial neural network with one hidden layer. In a perceptron network, each neuron is connected to every other neuron in the forward direction. This is the simplest type of neural network.

**Feedforward neural networks**

A type of artificial neural network where information travels in one direction, from the input nodes to the output nodes.

**#Improving accuracy of a neural network:**

The accuracy of neural networks can be improved via the following techniques:

**Cross validation**

Testing the model on multiple data subsets can help reduce overfitting and improve the model's performance.

**Ensemble learning**

This technique combines the predictions of multiple models, which can help to reduce the bias and variance of the individual models.

**Regularization**

Regularization can improve the accuracy and reliability of neural network predictions on new data by reducing overfitting. One way to add regularization is to use dropout layers, which randomly block some neurons from connecting to the next layer.