Artificial Neural Network(ANN):
The term "Artificial Neural Network" is derived from Biological neural networks that develop the structure of a human brain. Similar to the human brain that has neurons interconnected to one another, artificial neural networks also have neurons that are interconnected to one another in various layers of the networks. These neurons are known as nodes.

How Artificial Neural Network(ANN) works:
To understand the concept of the architecture of an artificial neural network, we have to understand what a neural network consists of. In order to define a neural network that consists of a large number of artificial neurons, which are termed units arranged in a sequence of layers. Lets us look at various types of layers available in an artificial neural network.

Artificial Neural Network primarily consists of three layers:
Input Layer:
As the name suggests, it accepts inputs in several different formats provided by the programmer.

Hidden Layer:
The hidden layer presents in-between input and output layers. It performs all the calculations to find hidden features and patterns.

Output Layer:

The input goes through a series of transformations using the hidden layer, which finally results in output that is conveyed using this layer.

The artificial neural network takes input and computes the weighted sum of the inputs and includes a bias. This computation is represented in the form of a transfer function.

convolutional neural network (CNN):
A convolutional neural network (CNN) is a category of machine learning model, namely a type of deep learning algorithm well suited to analyzing visual data.

Working of convolutional neural network (CNN):
CNNs use a series of layers, each of which detects different features of an input image. Depending on the complexity of its intended purpose, a CNN can contain dozens, hundreds or even thousands of layers, each building on the outputs of previous layers to recognize detailed patterns.

The process starts by sliding a filter designed to detect certain features over the input image, a process known as the convolution operation (hence the name "convolutional neural network"). The result of this process is a feature map that highlights the presence of the detected features in the image.

A CNN typically consists of several layers, which can be broadly categorized into three groups: convolutional layers, pooling layers and fully connected layers. As data passes through these layers, the complexity of the CNN increases, which lets the CNN successively identify larger portions of an image and more abstract features.

Convolutional layer
The convolutional layer is the fundamental building block of a CNN and is where the majority of computations occur.
The process begins by sliding the kernel over the image’s width and height, eventually sweeping across the entire image over multiple iterations. At each position, a dot product is calculated between the kernel’s

weights and the pixel values of the image under the kernel. This transforms the input image into a set of feature maps or convolved features, each of which represents the presence and intensity of a certain feature at various points in the image.

Pooling layer

The pooling layer of a CNN is a critical component that follows the convolutional layer. Similar to the convolutional layer, the pooling layer's operations involve a sweeping process across the input image, but its function is otherwise different. The pooling layer aims to reduce the dimensionality of the input data while retaining critical information, thus improving the network's overall efficiency. This is typically achieved through downsampling: decreasing the number of data points in the input.

Fully connected layer

The fully connected layer plays a critical role in the final stages of a CNN, where it is responsible for classifying images based on the features extracted in the previous layers. The term fully connected means that each neuron in one layer is connected to each neuron in the subsequent layer. The fully connected layer integrates the various features extracted in the previous convolutional and pooling layers and maps them to specific classes or outcomes. Each input from the previous layer connects to each activation unit in the fully connected layer, enabling the CNN to simultaneously consider all features when making a final classification decision.