1. What is Deep Learning(DL)?
   Deep learning is a subset of machine learning within artificial intelligence (AI) that mimics the way humans learn and process information. It's based on artificial neural networks, which are designed to model how the brain works, processing data through layers of interconnected nodes.
   Here’s how it works: these layers analyze and extract patterns or features from large amounts of data, making decisions or predictions. Deep learning is particularly powerful for tasks such as image recognition, speech processing, natural language understanding, and even playing complex games.
   It's called "deep" learning because the neural networks consist of multiple layers—often tens or even hundreds—where information is processed and refined as it moves through the network.
2. What is Neural Networks and Its types?
   A neural network is a computational model inspired by the structure and functioning of the human brain. It's a system of algorithms that attempts to recognize relationships or patterns in data by passing it through layers of interconnected nodes (neurons). Each node processes input, applies a function, and produces output, mimicking how biological neurons communicate.
   Types of Neural Networks
   There are various types of neural networks, each tailored for specific tasks. Here are some common ones:
   - Feedforward Neural Networks (FNN)- The simplest type, where data flows in one direction: from input to output, passing through hidden layers. It's widely used in tasks like classification and regression.

- Convolutional Neural Networks (CNN)- Ideal for image processing tasks such as object recognition and facial detection. CNNs use convolutional layers to extract spatial features from data.

- Recurrent Neural Networks (RNN)- Designed for sequential or temporal data, such as time-series analysis or natural language processing. RNNs use loops to store memory of previous outputs to inform later processing.

- Long Short-Term Memory Networks (LSTM)- A specialized type of RNN capable of retaining long-term dependencies, making them well-suited for text generation, speech recognition, and complex sequence prediction.

- Generative Adversarial Networks (GAN)- Consist of two networks: a generator and a discriminator, which compete to produce high-quality synthetic data (e.g., creating realistic images or videos).

- Autoencoders- Unsupervised neural networks that learn efficient representations of data. They're commonly used for tasks like dimensionality reduction or anomaly detection.

- Radial Basis Function Networks (RBFN)- Used for functions like regression, classification, and approximation, employing radial basis functions to measure distances.

3. What is Convolutional Neural Network(CNN) in simple words?

   Convolutional Neural Networks (CNNs) are a type of artificial intelligence used mainly for analyzing visual data, like images or videos. In simple terms, they work like a "camera brain," learning to recognize patterns, shapes, and objects in pictures.

   Think of it this way: if you show a CNN a bunch of pictures of cats, it focuses on features like fur, whiskers, and ears by breaking the image down into smaller parts. It processes these parts step-by-step, similar to how humans might notice the eyes, nose, and tail separately before recognizing the whole cat.

4. Create a short note about the pipeline that has been discussed in the lecture.
   Project Pipeline for CNN Model Development:
   - Data Collection and Loading:- Sources include Kaggle.com and Google Glob.
   - Steps involve gathering and loading the dataset for further processing.

   - Image Processing and Augmentation:- Enhances and prepares image data for training, ensuring better model performance.

   - Model Building (Convolutional Neural Network - CNN):- Includes training, validating, and testing the model.
   - Evaluates the model's accuracy and ensures reliable performance.

   - Testing and Evaluation:- Tests the model on unseen data to assess performance.
   - Reviews accuracy metrics to validate results.

- Binary Classification:- Focuses on classifying images into two categories (e.g., disease present or not).

- Application in Plant Disease Detection:- Targets specific plant diseases (labeled as D1, D2, D3, D4).
- Dataset is split into training, testing, and validation sets for efficient processing.