# Week 1 Assessment - Forest Fire Detection

## 1. What is DL (Deep Learning)?

Deep Learning (DL) is a subfield of Machine Learning that uses algorithms called neural networks to learn from large amounts of data. These networks try to mimic the way the human brain processes information. Deep learning models can automatically extract features from raw data like images, text, or audio and make predictions or decisions based on that. It is especially powerful in tasks like image recognition, speech processing, and natural language understanding.

## 2. What is Neural Network and Its Types?

A Neural Network is a system of algorithms designed to recognize patterns by interpreting sensory data through a kind of machine perception. It consists of layers of interconnected nodes (neurons), where each connection has a weight that gets adjusted as the network learns.  
  
Types of Neural Networks:  
1. Feedforward Neural Network (FNN) – The simplest type; data moves in one direction from input to output.  
2. Convolutional Neural Network (CNN) – Mainly used for image and video recognition tasks.  
3. Recurrent Neural Network (RNN) – Used for sequence data like time series or natural language; can remember past data.  
4. Generative Adversarial Network (GAN) – Two networks (generator and discriminator) that work against each other to create realistic data.  
5. Radial Basis Function Network (RBFN) – Uses radial basis functions as activation functions; suitable for function approximation.

## 3. What is CNN in Simple Words?

A Convolutional Neural Network (CNN) is a type of neural network that is especially good at working with images. Instead of looking at the whole image at once, it looks at small parts (called patches) and learns to detect patterns like edges, colors, or textures. As you go deeper into the network, it combines these small patterns to recognize more complex objects like trees or fire. CNNs are commonly used in tasks like detecting objects in photos, classifying images, and recognizing faces.

## 4. Short Notes About the Pipeline (Forest Fire Detection Using Deep Learning)

The project pipeline for forest fire detection using deep learning is composed of the following steps:  
  
1. Data Collection and Data Loading:  
 Data is collected from sources such as Kaggle and then loaded using tools like Google Colab. The dataset typically contains images labeled as 'fire' or 'no fire'. These images are divided into training, validation, and testing sets.  
  
2. Image Processing and Image Augmentation:  
 Before feeding the data into a model, the images are preprocessed—resized to standard dimensions (e.g., 128x128) and normalized. Image augmentation techniques (e.g., rotation, flipping, zooming) are applied to increase the dataset’s variability and improve the model’s generalization.  
  
3. Build CNN Model:  
 A Convolutional Neural Network (CNN) is constructed using TensorFlow or similar libraries. The CNN automatically extracts features from the input images and learns to classify them into categories (fire or no fire).  
  
4. Model Training and Evaluation:  
 The model is trained using the training dataset. Its performance is validated and evaluated using separate validation and testing datasets. Accuracy and other metrics (like confusion matrix, loss curve) are used to check the model’s effectiveness.  
  
5. Prediction (Binary Classification):  
 The final model is used for binary classification: to detect whether a given input image contains a forest fire or not.