Week 1 Assessment - Forest Fire Detection

# 1. What is Deep Learning (DL)?

Deep Learning is a subset of machine learning inspired by the structure and function of the human brain. It uses neural networks with many layers to learn and extract complex patterns from data. DL is highly effective for tasks like image classification, natural language processing, and speech recognition.

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

A Neural Network is a computational model that mimics the working of a human brain. It consists of layers of interconnected nodes called neurons that process data.

* Types of Neural Networks:
* Feedforward Neural Network (FNN): Basic form where data moves in one direction.
* Convolutional Neural Network (CNN): Specialized for image and video recognition.
* Recurrent Neural Network (RNN): Designed for sequential data (e.g., time series, language).
* Autoencoders: Used for unsupervised learning and dimensionality reduction.
* Generative Adversarial Networks (GANs): Used for image generation and synthetic data creation.

# 3. What is CNN in Simple Words?

A Convolutional Neural Network (CNN) is a type of neural network that can automatically learn features from images. It uses filters (kernels) to detect patterns like edges, textures, and shapes. CNNs are excellent at image classification, object detection, and facial recognition.

# 4. Short Notes About the Pipeline Discussed in Lecture

Project Pipeline for Forest Fire Detection:

1. 1. Data Collection & Loading:

* Gather data (e.g., forest fire images from Google, GitHub).
* Load and label the dataset (e.g., D1, D2, D3 for different classes).
* Split into training, validation, and testing sets.

1. 2. Image Processing & Augmentation:

* Resize and normalize images.
* Use augmentation techniques like rotation, zoom, shift to improve generalization.

1. 3. Build CNN Model:

* Construct the CNN architecture (input → convolution → activation → pooling → fully connected).
* Train the model using training data and validate using validation set.

1. 4. Test & Evaluate:

* Test the model on unseen data.
* Plot accuracy/loss graphs to compare training vs validation performance.
* Save the trained model for future predictions.

1. 5. Dataset Categories:

* Classes like: No Fire, Fire (Small), Fire (Dense), etc.