**What is Deep Learning:**

Deep Learning is a subset of Machine Learning that mimics the human brain using Artificial Neural Networks to learn from large amounts of data. It is used for:

Data processing → with ANNs (Artificial Neural Networks)

Language and emotions → with RNNs (Recurrent Neural Networks) or NLP (Natural Language Processing)

Vision tasks → with CNNs (Convolutional Neural Networks)

**🧠 What is a Neural Network?**

A Neural Network is a type of machine learning model designed to mimic how the human brain works. It consists of layers of interconnected nodes (called neurons) that process input data, learn patterns, and make predictions. Neural networks are the foundation of deep learning and are widely used in tasks like image recognition, language translation, and speech processing.

**🔍 Types of Neural Networks (in brief):**

**Artificial Neural Network (ANN):**

The most basic type, used for general tasks like classification and regression.

**Convolutional Neural Network (CNN):**

Specialized for processing images and videos by detecting patterns like edges, shapes, and textures.

**Recurrent Neural Network (RNN):**

Designed for sequence data such as text or speech. It remembers past inputs to handle time-based or ordered data.

**Long Short-Term Memory (LSTM):**

An advanced form of RNN that can remember information for long periods, useful in tasks like language translation or time-series prediction.

**Generative Adversarial Network (GAN):**

A model that generates new data (like images) by learning from real examples — used in art, design, and deepfakes.

**Transformer:**

A powerful architecture used in Natural Language Processing (NLP), behind models like ChatGPT and BERT. It handles long-range dependencies in text efficiently.

**🧠 What is CNN?**

A Convolutional Neural Network (CNN) is a type of deep learning model used mainly for image and video processing.

It works by automatically detecting features in images — like edges, shapes, or objects — and uses them to recognize patterns.

**project pipeline:**

In this forest fire detection system, the project begins with data collection and loading, where a dataset is taken from Kaggle.com consisting of images labeled as fire and non-fire, making it a binary classification problem. Since CNN models require all input images to be of the same size and resolution, image preprocessing is done to resize and normalize them. Image augmentation techniques like rotation, flipping, and zooming are applied to increase the diversity of training data and improve the model's robustness. A Convolutional Neural Network (CNN) is then built using TensorFlow, which is specifically designed to extract visual patterns from images. Finally, the model is trained on the processed dataset so it can learn to accurately detect the presence or absence of fire in new images.