**Forest Fire Detection**

# **Week 1**

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**Q1. What is DL?**

DL (Deep Learning) is a subset of machine learning (ML**)** that focuses on using neural networks with many layers to model and solve complex problems. It mimics the way the human brain works when processing data and creating patterns for decision-making.

The core of deep learning is the artificial neural network, especially deep neural networks with many layers (hence “deep” learning).

Deep learning algorithms improve automatically through experience by learning from large amounts of data.

**Q2. What is Neural Network and its types**

A neural network is a type of computational model inspired by the human brain. It consists of layers of neurons (also called nodes or units) that process data. These networks are the building blocks of deep learning.

Each neuron receives input, processes it using a weighted sum(when a neuron receives inputs, it multiplies each input by a weight (which shows how important that input is) and adds them up to get a single value), applies an activation function(This function decides whether the neuron should “fire” and how much signal it should pass on), and passes the result to the next layer.

Basic structure of Neural Network:

1. Input Layer: Takes the input features
2. Hidden Layers: Perform Computations
3. Output Layer: Produces the result (i.e. classification or prediction)

Types of Neural Networks:

1. **ANN (Artificial Neural Network):**

* Used for processing data
* Can’t capture unstructured data or patterns in images/videos

1. **RNN (Recurrent Neural Network):**

* Used to understand language, emotions, sentiments
* Eg: NPL (Natural Language Processing)

1. **CNN (Convolutional Neural Network):**

* Used to identify someone/something by looking at it, i.e. mimicking vision

**Q3. What is CNN in simple words?**

A Convolutional Neural Network (CNN) is a specialized type of deep learning algorithm used for analyzing visual data such as images and videos. CNNs are designed to automatically extract and learn important features from input data without requiring manual feature engineering.

The architecture of a CNN consists of several key layers:

* **Convolutional layers**, which apply filters to the input to detect local features like edges, corners, and textures.
* **Activation functions** (typically ReLU) that introduce non-linearity into the model.
* **Pooling layers**, which reduce the spatial dimensions of the data and help in controlling overfitting.
* **Fully connected layers**, which perform the final classification or regression based on the features learned.

**Q4. Create short notes on Pipeline as discussed in the lecture.**

There are 4 steps in the Project Pipeline:

1. **Data Collection and Data Loading:**

Data Collection (done through Kaggle.com for this project) is a procedure of training, validating, and testing the model. Since there are 2 classes, this is a Binary Classification Image problem.

Data Loading is done through coding.

1. **Image Processing and Image Augmentation:**

Image Processing is applied when there are for example, two same types of images but with different dimensions. The model can only accept one type of dimension, so Image Processing converts the images into the same dimensions.

Image Augmentation is the process of creating multiple copies of images by applying different operations such as, flipping, zooming, shifting, rotating, etc to make the model more generalised.

1. **Build a CNN Model**
2. **Test and evaluate the Model**