**Week 1 : Forest Fire Detection Assignment**

1. **What is Deep learning?**

**Deep learning** is a type of computer learning that tries to mimic how our brains work. Just like we learn from experience like recognizing a friend’s face or understanding speech a deep learning system learns by looking at lots of examples. It uses layers of artificial “neurons” to slowly figure things out, improving over time. The more data it sees, the better it gets at tasks like recognizing objects in photos, translating languages, or even talking like a human.

**Ex:** Face Recognition on Your Phone

When you unlock your smartphone with your face, deep learning is working behind the scenes. The system has been trained on thousands (or millions) of faces. It doesn’t just memorize your face it learns patterns, like the distance between your eyes, the shape of your jaw, and other subtle features. Even if you get a haircut or put on glasses, the system still recognizes you because it understands the deeper patterns in your appearance.

1. **What is Neural Network and its types ?**

A neural network is a kind of computer system that’s designed to work like the human brain. It’s made up of simple processing units called neurons, which are connected in layers. These neurons work together to solve problems, like recognizing a voice, reading handwriting, or making predictions.

***Main Types of Neural Networks***

1. **Neural Network (FNN)**

* The most basic type.
* Information flows in one direction from input to output.
* Example: Recognizing handwritten digits.

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

* Specially designed for images.
* It focuses on patterns like edges, colors, and shapes.
* Example: Identifying objects in photos (like cats or cars).

1. **Neural Network (RNN)**

* Good at handling sequences things that come in order.
* It remembers what it saw earlier.
* Example: Predicting the next word in a sentence or recognizing speech.

1. **Long Short-Term Memory (LSTM)**

* A special kind of RNN that remembers things for longer.
* Useful for long conversations, videos, or long-term patterns.
* Example: Language translation apps.

1. **Adversarial Network (GAN)**

* Made of two networks that compete with each other.
* One creates things (like fake images), and the other checks if they’re real or fake.
* Example: Creating realistic faces that don’t actually exist.

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

A CNN, or Convolutional Neural Network, is a special type of deep learning model that’s really good at looking at images and figuring out what’s in them.

CNNs are like a robot’s pair of eyes and brain. When you show it a picture, it doesn’t look at the whole image at once it scans it in small parts, kind of like how you might look at a puzzle piece by piece. It looks for simple things first like edges or colors then builds up to more complex shapes like eyes, wheels, or faces.

**Ex** : If you upload a photo to social media and it suggests tagging a friend’s face, that’s a CNN in action. It’s learned what faces look like by looking at thousands or millions of examples.

1. **Create short notes about the pipeline we have discussed in a lecture.**

**1. Input Image**  
The computer gets an image like a photo of a dog. It sees it as a grid of numbers (pixels).

**2. Convolution Layer**  
The network uses small filters (like tiny windows) to scan over the image and look for patterns edges, lines, textures.

**3. ReLu (Activation)**  
Adds life to the image by keeping only the important information (non-negative values), kind of like highlighting what's useful.

**4. Pooling Layer**  
Shrinks the image by keeping only the most important details. This makes the process faster and helps the network focus on big-picture features.

**5. More Convolution + Pooling Layers**  
The network repeats the above steps to find more complex patterns like eyes, ears, or shapes.

1. **Flattening**  
   Turns all the data into a single long list so it can be fed into the final part of the network.
2. **Fully Connected Layer**  
   This is like the brain’s decision-making part. It uses all the info gathered to figure out what’s in the image (like “That’s a dog”).
3. **Output Layer**  
   Gives the final answer usually a label (like “dog” or “cat”) along with a confidence score.