

# **TASK-5**

## **Deep Learning**

### **Q) What is a Convolutional Neural Network (CNN)?**

Ans) Convolutional Neural Network (CNN) is a type of deep learning model mainly used for image-related tasks such as image classification, medical image analysis, and object detection. Unlike traditional neural networks that treat all inputs equally, CNNs are designed to understand spatial patterns in images, for example, edges, textures, and shapes better.

This makes CNNs especially useful in medical imaging, where detecting small visual patterns (like fluid accumulation) is critical.

### **Q) Why Convolutional Layers are Used?**

Ans) The convolutional layer is the core building block of a CNN. Instead of looking at the entire image at once, it:

- Uses small filters (kernels)
- Slides them across the image
- Detects local features such as:
  - Edges
  - Curves
  - Textures

Why this is important:

- Early layers learn simple features (edges, contrasts)
- Deeper layers learn complex features (organs)
- Fewer parameters compared to fully connected layers
- Better generalization for images

### **Q) Simple CNN Flow**

Input Image



Convolution Layer (feature extraction)



ReLU Activation (adds non-linearity)

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Pooling Layer (reduces size, keeps important info)

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Convolution + Pooling (repeated)

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Flatten Layer

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Fully Connected Layer

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Output (Prediction)

### **Q) What is Backpropagation?**

Ans) Backpropagation is the learning mechanism used to train neural networks.

It is:

1. The model makes a prediction
2. The prediction is compared with the actual label
3. An error (loss) is calculated
4. This error is sent backward through the network
5. Weights are updated to reduce future error

Without backpropagation, the model would never improve. It is helpful to update weights

### **Q) What is Gradient Descent?**

Ans) Gradient Descent is an optimization algorithm used to minimize the loss function.

Each update slightly adjusts the model's weights to improve predictions.

Backpropagation calculates how much each weight contributed to the error

Gradient Descent uses that information to update the weights

