**Assignment No: 3**

**Problem Statement:-**

Implement image classification using **Convolutional Neural Networks (CNNs)** for multiclass classification.

**Theory:-**

A **Convolutional Neural Network (CNN)** is a deep learning architecture specifically designed for processing structured grid data like images. It is commonly used for tasks such as image classification and object recognition.

* **Convolutional Layers**: Extract features by applying filters over the image.
* **Pooling Layers**: Reduce the spatial dimensions of the feature maps.
* **Fully Connected Layers**: Make the final prediction based on the extracted features.

**Methodology:-**

1. **Dataset**:
   * Use a dataset like **CIFAR-10** which contains 60,000 32x32 color images across 10 classes.
2. **Model Architecture**:
   * Build a CNN with multiple convolutional layers followed by max-pooling layers.
   * Use **ReLU** activation in convolutional layers and **Softmax** in the output layer for multiclass classification.
3. **Training**:
   * Train the model on the dataset using an optimizer like **Adam** and a loss function such as **categorical\_crossentropy**.
   * Perform data augmentation to enhance generalization (e.g., random rotations, flips).
4. **Evaluation**:
   * Evaluate the performance of the model using accuracy, precision, and recall on the test set.

**Conclusion:-**

We successfully implemented a CNN for multiclass image classification using the CIFAR-10 dataset, achieving high accuracy in recognizing various classes of images.