

## **CST 476-2 Deep Learning**

### **Lab Sheet 08**

#### **Activity: Fine-Tuning ResNet for Image Classification**

##### Aim:

The aim of this lab session is to fine-tune a ResNet model pre-trained on ImageNet to classify images from the CIFAR-10 dataset.

##### Dataset:

CIFAR-10 Dataset

##### Description of the Dataset:

The CIFAR-10 dataset is a widely used benchmark for image classification tasks, consisting of 60,000 32x32 color images divided into 10 distinct classes. Each class represents a category such as airplanes, automobiles, birds, cats, deer, dogs, frogs, horses, ships, and trucks. The dataset is pre-split into 50,000 training images and 10,000 test images, with each image evenly distributed across the 10 classes.

##### Tasks:

- Load the dataset directly using TensorFlow.
- Open your Jupyter Notebook environment and import the necessary libraries.
- Load the train, validation, and test datasets into your Jupyter Notebook environment using a suitable approach.
- Normalize the pixel values of the images to improve the model's training performance.
- Load Pre-trained MobileNet with pre-trained ImageNet weights from keras.applications library.
- Freeze all layers except the top few for fine-tuning.
- Replace the output layer with a custom dense layer matching the number of classes in the dataset.
- Compile the model, specifying the optimizer and loss function.
- Train the model using the training dataset.
- Evaluate the model's performance on the test dataset.
- Compare the performance with Lab Sheet 06 output.
- Use MobileNet without pre-trained weights and compare the performance.
- Use ResNet and compare the performance with all outputs you got in previous cases.