**Name: Krushna aware PRN No: 202201040125**

**ROLL No: 51**

**Batch: A3**

Date of Submission: 16/01/2025

# Title: Image Classification Using a Pretrained Model on Fashion-MNIST Dataset

1. **Objectives**

To implement an image classification model using a pretrained deep learning model and evaluate its performance on the Fashion-MNIST dataset. The goal is to leverage transfer learning to classify clothing images into their respective categories.

# Problem Definition

Dataset: The Fashion-MNIST dataset contains 60,000 training and 10,000 testing grayscale images of clothing items across 10 categories, such as T-shirts, trousers, coats, sandals, etc. Each image is 28x28 pixels.

Task: Use a pretrained model (e.g., ResNet, VGG16, or MobileNet) to classify images from the Fashion-MNIST dataset into their correct clothing categories.

# Methodology

Pretrained Model Selection:

* + A model such as ResNet50 or MobileNetV2 is chosen, pretrained on ImageNet.
  + Since pretrained models expect 3-channel images (RGB), Fashion-MNIST images are converted to RGB and resized to 224x224.

Preprocessing:

* + Normalize pixel values to the [0, 1] range or use ImageNet mean-std normalization.
  + Use transforms in PyTorch or ImageDataGenerator in Keras for preprocessing and augmentation.

Prediction:

* + Forward pass each image through the pretrained model.
  + Retrieve top predictions and map the output to the correct label.

Transfer Learning (Optional):

* + Freeze initial layers of the pretrained model.
  + Replace the final classification layer with one having 10 outputs.
  + Fine-tune on Fashion-MNIST for improved accuracy.

Evaluation:

* + Evaluate the model using accuracy, confusion matrix, precision, recall, and F1-score.

# Advantages of Using Pretrained Models

* + Saves time by not training from scratch.
  + Leverages powerful features already learned from large datasets like ImageNet.
  + Works well even with grayscale or limited data when properly adapted.
  + Greatly improves performance when combined with fine-tuning on task-specific data.

# Declaration

I Am krushna aware, confirm that the work submitted in this assignment is my own and has been completed following academic integrity guidelines. The source code is uploaded to my GitHub repository, accessible via the link below:

GitHub Repository: <https://github.com/Krushna178/dl-lab-2.git>

Signature: Krushna aware