Assignment 4: Convolutional Neural Networks (CNN) for FashionMNIST

Objective: The goal of this assignment is to implement a Convolutional Neural Network (CNN) to classify images from the FashionMNIST dataset. You will learn how to preprocess the data, build and train a CNN, and evaluate its performance.

Dataset: FashionMNIST is a dataset of 60,000 training images and 10,000 test images, each of size 28x28 grayscale, categorized into 10 different fashion classes (e.g., T-shirt, dress, sneaker, etc.).

Part 1: Data Preprocessing

1. Load the FashionMNIST dataset using torchvision.datasets (for PyTorch) or tensorflow.keras.datasets (for TensorFlow).
2. Normalize the images to the range [0,1] and reshape them if necessary.
3. Split the dataset into training and validation sets.

Part 2: Building the CNN Model

1. You can try different CNN architectures (depth, kernel size) yourself
2. Pick appropriate loss function and optimizer

Part 3: Training & Evaluation

1. **Train the model**
    - Plot **loss curves**.
2. **Evaluate the model**:
    - Compute **test accuracy**.
    - Generate a **confusion matrix**

Part 4: Experimentation & Improvements

1. **Try at least two modifications** (e.g., adding more layers, changing filter size, adding dropout, batch normalization, or data augmentation).
2. **Compare results** with the baseline model.

Submission Requirements:

- Upload your Jupyter Notebook or Python script with code, comments to a GitHub repository.
- A report containing the GitHub link.