Supervised Learning Workflow

This document explains the code and provides the reported best validation accuracy and test accuracy.

Dataset Preparation

1. Three datasets (`data0`, `data1`, `data2`) and their labels (`lab0`, `lab1`, `lab2`) are loaded using `numpy`.
2. All datasets are concatenated to form a single dataset `data` and labels `labels`.
3. The dataset is split as follows:
    - 80% of the data is used for training and validation.
    - The remaining 20% is used as the test set.
    - Of the 80% training data, 90% is used for training and 10% for validation.

Model Architecture and Training

1. A pre-trained ResNet-50 model is loaded, and the final fully connected layer is replaced to output number of classes as in dataset.
2. The loss function used is cross-entropy loss, and the optimizer is Adam with a learning rate of 0.001.
3. The training loop performs forward and backward propagation to minimize the loss.
4. Validation is conducted after each epoch, and the best model (based on validation accuracy) is saved.

Evaluation and Results

1. The best validation accuracy achieved during training is **92.75%**.
2. The test accuracy achieved is **90.30%**.