Reading: Assignment Overview: PyTorch-Based Agricultural Land Classifier

Estimated time: 2 minutes

Welcome! In this lab, you'll implement and test a PyTorch-based Convolutional Neural Network (CNN) for classifying satellite images into agricultural and non-agricultural land categories. This lab will provide you with hands-on experience in deep learning for image classification on your domain-specific dataset.

By the end of this lab, you will:

1. Create a PyTorch-based CNN model for binary image classification
2. Train the model to distinguish between agricultural and non-agricultural land from satellite imagery
3. Evaluate the model's performance using standard metrics and visualizations

You'll work through four main sections:

1. Data preparation
2. Model architecture design
3. Model training
4. Model performance analysis

The dataset contains satellite images organized in subdirectories by class (agricultural/non-agricultural), and you'll build a complete deep learning pipeline from scratch using PyTorch framework. In order to complete this lab, you will complete the following tasks:

1. **Create training transformations:** Build a comprehensive data augmentation pipeline using "transforms.Compose()" for image augmentation.
2. **Create validation transformations:** Similarly, create the transformation pipeline for validation dataset. These tasks will help you understand the key differences between training and validation datasets.
3. **Build validation DataLoader:** Next, you will create the validation DataLoader using the "DataLoader" class.
4. **Customize model architecture and training:** Here, you will answer some questions related to model design and training. PyTorch, gives you the flexibility to customize each part of the model, thus enabling low-level fine-tuning of your model.
5. **Plot model training metrics:** Next, you will plot the metrics of model training. Visualizing the training metrics help you understand the model training, giving you ability to properly fine-tune the hyperparameters to create the best model for your dataset.
6. **Generate predictions for evaluation:** Finally, you will write the code to generate predictions using your trained model.

This lab uses only three epochs for demonstration purposes. In real-world applications, you might want to train for many more epochs, depending on convergence patterns and desirable model characteristics.

By the end of this lab, you will have hands-on experience in designing, training, and implementing a CNN model using PyTorch framework.

You will need to download and save the finished lab on your computer for final evaluation at the end of this course. Good luck!