ECE 6397 – Introduction to Machine Learning

Assignment – 5

Part A

 # iNaturalist Dataset Fine-Tuning with CNN and Hyperparameter Sweep

This README file provides instructions on running the Google Colab notebook to fine-tune a custom Convolutional Neural Network (CNN) on the iNaturalist dataset using Weights & Biases (WandB) for hyperparameter sweeps.

- The dataset directory structure and paths need to be correctly specified for loading the data.

1. Download and Unzip Dataset

- Use the link found in the assignment document for the data set to download the dataset.

- Unzip the downloaded dataset and organize it into the appropriate directory structure.

2. Install Required Libraries

- Install necessary Python packages, including 'torch', 'torchvision', and 'wandb'.

3. Setup WandB for Hyperparameter Sweep

- Initialize a new WandB project.

- Define the hyperparameter sweep configuration, including parameters such as learning rate, batch size, and the number of epochs.

- Initialize the sweep using the WandB API.

4. Prepare Dataset and Dataloaders

- Define data augmentation and normalization transformations.

- Load the dataset using 'torchvision.datasets.ImageFolder'.

- Create data loaders for training and validation datasets.

5. Define CNN Model

- Define the architecture of the custom CNN model.

- Initialize the model, loss function, and optimizer.

6. Train the Model with WandB Sweep

- Define the training function to run the hyperparameter sweep.

- Implement the training loop, logging relevant metrics to WandB.

- Run the WandB agent to execute the hyperparameter sweep and find the best parameters.

7. Monitor Training

- Use WandB to monitor the training progress, visualize metrics, and compare different hyperparameter configurations.