

DEEP LEARNING PYTORCH PROJECT PROPOSAL

INFO 6147 – WINTER 2025 – LAM TRINH DINH

Topic: Plant Type Classification

Project Description

This project aims to develop a deep learning model for classifying different plant types using image data. The goal is to build and compare the performance of two different models:

- **A Customized Convolutional Neural Network (CNN):**
 - Designed and trained from scratch.
 - Optimized using various hyperparameters to achieve high accuracy.
- **A Fine-Tuned Pretrained CNN Model:**
 - Designed and trained from scratch.
 - Optimized using various hyperparameters to achieve high accuracy.

Dataset

- The dataset will consist of images of 30 plant species and each category will contain 1000 images of their type
- Source: <https://www.kaggle.com/datasets/yudhaislamisulistya/plants-type-datasets>

Methodology

- **Data Preprocessing:**
 - Apply normalization, regularization, images transformation, cropping
- **Model 1: Customized Convolutional Neural Network (CNN):**
 - Design with different layers: convolutional, pooling and fully connected.
- **Model 2: Fine-Tuned Pretrained CNN Model:**
 - Using a transfer learning approach with a pre-trained model
 - Freezing lower layers and fine-tuning upper layers.
- **Evaluation Metrics:**
 - Accuracy, Precision, Recall, F1-Score
- **Comparison Analysis:**
 - Comparing performance of traditional CNN vs fine-tuning CNN model

Project Outcomes

- Developed a customized CNN model from scratch to classify plant species with optimized hyperparameters.
- Fine-tuned a pre-trained CNN model using transfer learning for improved accuracy.
- Demonstrated feasibility for plant identification in agriculture, biodiversity studies, and conservation.