Week-1

Assignment

Problem Statement

In farming, plant disease can harm crops significantly, resulting in lower yields and financial losses for farmers. It is important to detect these diseases early, but the conventional approach of manual inspection is frequently slow, imprecise, and not available to all, particularly in rural communities.

With the availability of low-cost smartphones and innovations in artificial intelligence, there is a good opportunity to make disease detection faster, simpler, and more precise. We aim to create a Plant Disease Detection System based on deep learning and image processing to detect plant diseases from leaf images automatically.

This system will enable farmers to easily snap a picture of a leaf and immediately be able to determine if the plant is healthy or diseased. By making it easier and more convenient to make early detection, we hope to

- Cut down on unnecessary pesticide usage
- Enable smarter farming decisions
- Encourage sustainable agriculture

Project Pipeline

In order to construct our Plant Disease Detection System, we implement a structured process that begins with data collection and organization. A dataset of images of plant leaves is collected, with each image labeled according to whether it contains a particular disease or a healthy plant. This data is split into three sets: the training set, where the model is taught; the validation set, which is utilized to refine and make the model better during training; and the test set, which is utilized to measure the performance of the model on novel, unseen data.

The dataset is then compressed and uploaded to Google Drive once it's prepared. We use Google Colab to mount the drive and create a small Python script to unzip the dataset so that it is available for use while developing the model. With the data available, we start image processing by resizing all images to a uniform size—typically 128×128 pixels—so that the model has uniformity. We also use image augmentation methods, including rotation and flipping, to enable the model to learn how to identify patterns under different conditions, such as different lighting and angles.

Secondly, we create a Convolutional Neural Network (CNN), a deep learning model specifically optimized for image classification. We train the CNN to recognize visible patterns in the leaf pictures that are characteristic of particular diseases. We then use the test set to test the model and measure how accurate and reliable it is in its predictions.

Finally, we integrate the trained model into a user-friendly application using Python. This allows users, such as farmers, to upload a photo of a plant leaf and receive an instant diagnosis. By doing this, we ensure that the system is not only technically effective but also practical and accessible for real-world use.