Plant Disease Detection System for Sustainable Agriculture

WEEK 1

Problem Statement:

Develop a CNN-based model to automatically detect and classify plant diseases from leaf images of crops like apple, cherry, grape, and corn. The system should accurately identify both healthy and diseased leaves to support early diagnosis and sustainable agriculture.

Pipelines:

The pipeline for developing a Plant Disease Detection System is structured into the following stages:

**1. Data Collection & Loading**

* The dataset consists of plant leaf images categorized by disease type.
* The data is split into three categories:
  + **Training**
  + **Validation**
  + **Testing**
* Each of these subsets contains folders for each class (disease type).

**2. Uploading and Mounting Dataset**

* The dataset is zipped and uploaded to **Google Drive**.
* In **Google Colab**, the dataset is mounted from Drive using the mounting feature.
* The zipped file is then **unzipped** and loaded into the workspace.

**3. Image Processing and Augmentation**

* Images are resized to a consistent dimension (e.g., 128x128 or 600x600).
* Augmentation techniques such as rotation, zoom, and flipping are applied to increase diversity and robustness of the dataset.

**4. CNN Model Training**

* A **Convolutional Neural Network (CNN)** model is used to learn features from the processed image data.
* The model is trained using the training data and validated using the validation set.
* Architecture and hyperparameters are adjusted to improve performance.

**5. Testing and Evaluation**

* The trained model is tested on unseen images from the test dataset.
* Performance is measured using accuracy, confusion matrix, and other evaluation metrics.

**6. Prediction Flow (Visual Reference)**

* Input: Leaf image
* Step 1: Resize to 128x128
* Step 2: Processed and fed into CNN model
* Output: Disease classification with smart diagnosis