**Plant Disease Detection System for Sustainable Agriculture**

**Problem Statement**

This project aims to develop a deep learning-based system capable of detecting and clasifying plant diseases from the leaves of plants using CNN-based models and image processing. By identifying diseases early, farmers can take timely action to protect crops, thus enhancing agricultural sustainability and productivity.

**Project Pipeline**

**1. Data collection and Data loading**

- Collect images of healthy and diseased plant leaves.

- Upload the dataset to Google Drive.

**2. Dataset Preparation**

Organize the dataset into train, valid, and test folders with appropriate categories.

Each folder is divided into category-1, category-2 and so on.

**1. Train**

Train the model by giving images of healthy and diseased leaves.

**2. Valid**

When the model is learning, validate the model by giving data from the valid folder.

**3.Test**

After completion of model training, we check the accuracy of the model by giving data from test folder.

**3. Zip and Upload**

- Zip the dataset and upload it to Google Drive and mount it in Google Colab.

- Use Python code to unzip and access the dataset.

**4. Image Processing & Image Augmentation**

Images are resized to uniform dimensions (e.g., 128x128) for model consistency.

By using Image Augmentation Techniques such as Rotating, Shifting, Flipping, Zoomed in/out and Color shifting to create new variations of existing images to improve model robustness and reduce overfitting.

**5. CNN Model**

A Convolutional Neural Network (CNN) is trained on the processed images to classify plant diseases.

**6. Testing & Evaluation**

The trained model is evaluated using the test dataset to assess its accuracy, precision, and recall in detecting healthy and diseased leaves.