# Plant Disease Detection System for Sustainable Agriculture

## Problem Statement:

Develop a CNN-based model capable of detecting and classifying plant diseases from images of leaves of various crops such as apple, cherry, grape, and corn. The model should accurately identify both healthy and diseased leaves while predicting the specific type of disease. This system will aid in precision agriculture by enabling early detection and effective disease management.

### Pipeline:

### 1. Data Collection & Data Loading:

Collect images of healthy and diseased plant leaves.

Organize the dataset into folders:

* **train:** used to teach the model.
* **valid:** used to check how well the model is learning.
* **test:** used for final evaluation after training.

### 2. Dataset Preparation:

* Use categorized folders (e.g., “healthy”, “disease1”, “disease2”) for the images.
* Upload this dataset (as a .zip file) to Google Drive.
* Mount Google Drive in your Python notebook (e.g., Google Colab).
* Unzip the dataset and make it accessible for the model.

### 3. Image Processing & Augmentation:

* Resize images to a standard size (e.g., 100x100 pixels).
* Apply transformations (like flipping, rotating) to generate more training images, which helps improve accuracy.

### 4. Building CNN Model:

* Use a Convolutional Neural Network (CNN) to extract patterns from leaf images.
* The CNN model processes images and learns to classify them into healthy or diseased categories.

### 5. Model Evaluation:

* After training, test the model on new images to see how accurately it can detect diseases.
* Output shows the predicted class (e.g., “healthy”, “bacterial spot”).