## 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.

## Aim

To design and implement a CNN-based model that accurately detects and classifies plant diseases from leaf images, identifying both healthy and diseased conditions. The system aims to support precision agriculture by enabling early diagnosis and improving crop management practices.

## Project Pipeline

1. **Data Collection and Data Loading**

- Gather leaf images from multiple crops (e.g., apple, cherry, grape, corn).

- Ensure labeled datasets indicating disease types and healthy status.

1. **Dataset Preparation and Splitting**

- Organize data into Train, Test, and Validation sets:

* Train Dataset:
  + Category 1 (e.g., Healthy)
  + Category 2 (e.g., Diseased)
* Test Dataset:
  + Category 1 (e.g., Healthy)
  + Category 2 (e.g., Diseased)
* Validation Dataset:
  + Category 1 (e.g., Healthy)
  + Category 2 (e.g., Diseased)

1. **Dataset Transfer to Google Colab**

- Zip the dataset.

- Upload the zipped dataset to Google Drive.

- Mount Google Drive in Google Colab.

- Unzip the dataset using Python code.

- Confirm availability of dataset in Colab environment.

1. **Image Preprocessing**

- Apply image recognition techniques.

- Perform image augmentation (e.g., rotation, flipping, scaling) to enhance training data.

1. **CNN Model Development**

- Design the CNN architecture (convolutional layers, pooling layers, etc.).

- Train the model using the prepared dataset.

1. **Model Testing and Evaluation**

- Test the trained model on unseen data.

- Evaluate model performance using metrics like accuracy, precision, recall, and F1-score.

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