**PLANT DISEASE DETECTION 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:**

**- The dataset consists of images categorized into multiple classes (e.g., healthy, diseased categories).**

**- It is split into three subsets:**

**- Train**

**- Validation**

**- Test**

**2. Upload to Google Drive:**

**- The dataset is zipped and uploaded to Google Drive.**

**- In Google Colab, the Drive is mounted to access the data.**

**- The zipped file is unzipped in the Colab environment to make the dataset available for processing.**

**3. Image Processing & Image Augmentation:**

**- Input images are resized (e.g., 180x180 pixels).**

**- Image augmentation techniques (e.g., rotation, flipping, zooming) are applied to enhance dataset variety.**

**- Preprocessing helps normalize and prepare data for training.**

**4. CNN Model Development:**

**- A Convolutional Neural Network (CNN) is developed to learn features and classify images.**

**- The model processes input images through convolutional layers, pooling layers, and fully connected layers.**

**5. Model Training:**

**- The CNN is trained using the training dataset.**

**- Validation data is used to monitor performance and adjust parameters.**

**6. Testing & Evaluation:**

**- The trained model is evaluated on the test dataset.**

**- Accuracy, loss, and possibly confusion matrix are used to measure model performance.**