**Problem Statement:**

Develop a CNN-based image classification model capable of identifying plant leaf diseases from high-resolution images. The model will classify leaves from various crops - such as apple, cherry, grape, and corn—into healthy or diseased categories, and further specify the type of disease, enabling automated disease detection for agricultural applications.

**Pipeline:**

Plant Disease Classification Pipeline

1. **Data Collection**

The Dataset is organized into three subsets: training, validation, and testing. Each subset contains images labeled by category, representing different plant diseases and healthy leaves. These datasets are loaded using appropriate data loaders to prepare for model training and evaluation.

1. **Dataset Upload**

The dataset is compressed into a ZIP file and uploaded to Google Drive. In Google Colab, Google Drive is mounted, and the dataset is extracted using Python to make it accessible within the Colab environment.

1. **Image Processing and Augmentation**

All images are resized to a uniform dimension (e.g., 128×128 pixels) to ensure consistency. Image augmentation techniques such as rotation, flipping, zooming, and brightness adjustments are applied to increase data diversity and enhance model generalization.

1. **Model Development**

A Convolutional Neural Network (CNN) is constructed and trained using the pre-processed training images. The model learns to extract visual features and classify the images into their respective disease or healthy categories.

1. **Model Evaluation and Testing**

The trained model is evaluated on the test dataset using metrics such as accuracy, precision, recall, and F1-score. This step assesses the model’s performance and its ability to generalize to unseen data.