**PROBLEM STATEMENT:**

The task is to develop a CNN-based model that can automatically detect and classifyplant diseases from leaf images of various crops. The model should be capable of distinguishing between healthy leaves and those affected by specific diseases, offering precise identification of the disease type in each diseased leaf.

The goal is to assist in early detection and accurate diagnosis of plant diseases, which can significantly help in managing crop health, reducing pesticide usage, and improving agricultural yields.

**PIPELINE:**

**Data Collection and Loading**:

* The first step in any machine learning project is data collection. A dataset is collected and divided into three parts:
  + **Training Set**: This is used to train the model.
  + **Validation Set**: This helps in tuning the model and validating its learning during the training process.
  + **Test Set**: After training, the test set is used to evaluate the model’s performance on unseen data.
* The model is initially trained using the training data, and once the learning is done, we use the validation data to tune the model and ensure it generalizes well. Afterward, the model's performance is evaluated using the test data.

**Uploading and Mounting Data on Google Drive**:

* Once the dataset is collected, it needs to be uploaded to Google Drive for easy access and sharing.
* After uploading, the data can be accessed in Google Colab. In Colab, we will mount your Google Drive to access the dataset and then unzip it using Python code to prepare it for use in your project.

**Image Processing and Augmentation**:

* If working with images, the images must be pre-processed to ensure they are in a suitable format for model training. A common requirement for CNNs is that the images have the same dimensions, so resizing may be necessary.
* **Image Augmentation** is applied to improve the model's ability to generalize. This process involves randomly transforming the images (e.g., rotations, flips, scaling) to artificially increase the size and variety of the training data.

**Building the CNN Model**:

* After the data is processed and augmented, the next step is to build the Convolutional Neural Network (CNN**)** model. A CNN is particularly effective for image-related tasks, as it uses convolutional layers to automatically detect features from the images.