Week 1 Assignment

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# 1. Problem Statement

The project focuses on developing a Plant Disease Detection System for Sustainable Agriculture. In the agricultural sector, early identification of plant diseases is critical to reducing crop losses, enhancing productivity, and ensuring food security. However, many farmers, especially in rural areas, lack access to expert guidance for identifying and managing plant diseases.  
  
This system aims to leverage deep learning and computer vision to automatically detect diseases from images of plant leaves. By providing real-time feedback on potential plant diseases, this system will help farmers make timely decisions and adopt appropriate measures. This contributes to sustainable agricultural practices by minimizing pesticide misuse and maximizing healthy crop yields.

# 2. Project Pipeline (As Discussed in Lecture)

1. Data Collection and Data Loading:  
    - Collect images of healthy and diseased plant leaves from reliable sources.  
    - Load the data into the environment for further processing.
2. Dataset Splitting:  
    - Divide the dataset into three parts: training, testing, and validation sets.
3. Data Handling:  
    - Compress the dataset into a zip file.  
    - Upload the zip file to Google Drive.  
    - Mount Google Drive on Google Colab.  
    - Use Python code to unzip the dataset into the working directory.
4. Image Processing:  
    - Resize, normalize, and prepare images for input into the model.
5. Image Augmentation:  
    - Apply transformations like rotation, flipping, and scaling to increase dataset diversity and improve model generalization.
6. CNN Model:  
    - Build a Convolutional Neural Network (CNN) for classifying plant diseases based on leaf images.
7. Testing and Evaluation:  
    - Test the model using the test dataset.  
    - Evaluate the model's performance using metrics like accuracy, precision, recall, and confusion matrix.