Deep Learning Project Mini Project Phase - II

# *Topic:* Leaf Disease Detection

# Problem Statement:

Leaf Disease Detection using Deep Learning in Python

# Background:

Agriculture is a critical sector of the global economy, and the health of crops directly affects food production and livelihoods. One of the significant challenges faced by farmers and agricultural scientists is the early detection and management of diseases in plants. Plant diseases can lead to significant crop losses if not identified and treated promptly.

# Problem Description:

The problem at hand is to develop a deep learning-based solution for the detection and classification of diseases in plant leaves using Python.

Below are the steps to implement the deep learning model :

# Data Collection and Preprocessing:

Collect a diverse dataset of plant leaf images, including healthy leaves and leaves affected by various diseases.

Annotate the dataset to label each image with the corresponding disease category or healthy status.

Preprocessing the dataset to standardize image sizes, normalize pixel values, and augment the data to improve model generalization.

# Deep Learning Model:

Design and implementing a deep learning model (Convolutional Neural Network[CNN]) for image classification.

Exploring and experimenting with various architectures, including pre- trained models (Transfer learning).

Train the model on the labeled dataset for disease detection.

# Model Evaluation:

Evaluate the trained model's performance on a separate test dataset using appropriate metrics such as accuracy, precision, recall, and F1-score.

Investigate potential issues like overfitting or underfitting and apply techniques to mitigate them.

# Future Development :

Developing a user-friendly interface that allows users (e.g., farmers or agricultural experts) to upload images of plant leaves for disease detection.

Display the results indicating whether the leaf is healthy or diseased and, if diseased, provide information about the specific disease detected.

# Deployment:

For getting output in systematic manner we get trained model as a web application, mobile app, or on edge devices, depending on the target users' needs.

# Scalability and Generalization:

In this setup we should ensure that this deep learning classifiers large variety of diseases with good accuracy .

# Expected Outcomes:

A deep learning-based model capable of accurately detecting and classifying diseases in plant leaves.

An easy-to-use interface for end-users to access the disease detection system.

Improved disease management in agriculture, leading to increased crop yield and reduced economic losses.