**TITLE:**

**AI-Powered Early Detection of Crop Diseases for Smallholder Farmers.**

**Group11 Members Name:**

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## **Problem Definition:**

Smallholder farmers often face significant challenges in detecting and managing crop diseases, leading to substantial yield losses and food insecurity. Many farmers lack access to expert agronomists or expensive diagnostic tools, resulting in delayed disease detection and ineffective treatments.  
**Goal**: Develop a lightweight, mobile-compatible AI model that can identify crop diseases from images of leaves, enabling farmers to take preventive measures early.

1. **Relevance to Sustainable Development Goals (SDGs)**

* **SDG 1 (No Poverty)**: By reducing crop losses, smallholder farmers can increase their income and economic stability.
* **SDG 2 (Zero Hunger)**: Enhancing agricultural productivity ensures food security and supports sustainable farming practices.
* **SDG 3 (Good Health and Well-being)**: Limiting the spread of plant diseases reduces reliance on harmful pesticides, improving environmental and human health.

1. **Literatures:**

**Title1:"Plant Disease Detection Using AI and Machine Learning" (Mohanty et al., 2016)**

* + Used a CNN-based model (AlexNet **and GoogleNet**) to classify 26 diseases across 14 crop species. Achieved 99% accuracy on lab-curated images but noted challenges with real-world field images.

**Title2:"A Real-Time Mobile App for Crop Disease Diagnosis" (Ferentinos, 2018)**

* + Developed a lightweight deep learning model for mobile deployment. Highlighted the importance of optimizing models for low-resource devices.

1. **Description of Data**

Data Sources: Publicly available dataset from Plant Village. The format of this dataset is JPG and we will perform different data preprocessing steps;Image resizing and normalization, Data augmentation (rotation, flipping, and brightness adjustment) etc…

1. **Approach**

A **deep learning** approach using Convolutional Neural Networks (CNNs) will be employed due to the complex nature of image-based disease detection. CNNs are highly effective in capturing spatial hierarchies and detecting patterns in images, making them well suited for this task.