Project Proposal: **Plant Disease Detection Using Deep Learning**

Group Member Names

Group4		
Member 1	**Dawit Tadesse**	**Hailu**
Member 2	**Chol Moses**	**Malueth**
Member 3	**Fahadi**	**Mugigayi**

Project Idea:

The proposed project aims to utilize deep learning techniques for the detection of plant diseases. This project will focus on developing a model that can accurately identify diseases from images of plant leaves, thereby enhancing agricultural productivity and reducing losses due to diseases. The specific goal is to create a scalable, accurate system for early disease detection that can be adapted for use in various agricultural contexts, particularly in developing regions like Ethiopia, Africa.

Relevance to Sustainable Development Goals (SDGs):

This project is primarily aligned with **Goal 2: Zero Hunger**. By employing deep learning for effective and early detection of plant diseases, the project directly contributes to increased agricultural productivity and reduced food losses. Early and accurate disease detection is crucial in preventing widespread crop damage, thereby ensuring that food supplies are stable and abundant. This not only helps in directly feeding more people but also stabilizes food prices, making nutrition more accessible and affordable. Furthermore, the project indirectly supports several other SDGs such as Goal 3, Goal 12 and Goal 15.

Literature Examples:

Example 1: A study published in the International Journal of Intelligent Systems and Applications discusses the use of pre-trained CNN models to detect plant diseases in low-resolution images, addressing challenges like varied image backgrounds and lighting conditions.

Plant Disease Detection Using Deep Learning
December 2023 International Journal of Intelligent Systems and Applications 15(6):38-50
DOI:10.5815/ijisa.2023.06.04

Example 2: Research presented at the 2021 International Conference for Convergence in Technology compares traditional CNN approaches with transformer networks for plant disease detection, achieving high accuracy and showcasing the effectiveness of advanced computational models.

E. Hirani, V. Magotra, J. Jain and P. Bide, "Plant Disease Detection Using Deep Learning," 2021 6th International Conference for Convergence in Technology (I2CT), Maharashtra, India, 2021, pp. 1-4, doi: 10.1109/I2CT51068.2021.9417910.

Describe Your Data:

The primary dataset will be sourced from PlantVillage, containing over 50,000 images of healthy and infected crop leaves. Additional crop data from Ethiopia as well as other african countries will be collected to tailor the model to local agriculture. Data augmentation techniques such as scaling, rotation, and quality reduction will simulate various capture conditions, enhancing the model's robustness and generalizability. Other variants of this dataset hosted on Kaggle that have ongoing community support will be utilised alongside this original dataset.

An open access repository of images on plant health to enable the development of mobile disease diagnostics
David. P. Hughes, Marcel Salathe ·

Approach (Machine Learning or Deep Learning):

The project will begin with a deep learning model using the TensorFlow Keras framework, leveraging a simple neural network architecture initially. Depending on initial results, the model may evolve to include more complex structures or shift to transformer-based architectures. Key focus areas will include tuning network parameters and employing strategies to minimize bias and maximize accuracy. Experimentation will guide the development to ensure optimal performance across diverse scenarios.