Project Proposal

Introduction and problem statement

The End Hunger Sustainable Development Goal aims to achieve food security, improve nutrition, and promote sustainable agriculture. According to the United Nations (2025), about 600 million individuals will face hunger in 2030. Currently, one in three people globally struggles with moderate to severe food insecurity. Regarding agriculture-dependent countries like Kenya, food prices and insecurity are real crises that are increasing due to rising cost of living, drought, floods, and disease outbreaks. Based on IPC, currently in Kenya, about 1.9 million individuals are classified in IPC (Integrated Food Security Phase Classification). Emangor (n.d) highlights that issues in demand and supply fuel the food prices and insecurity crises in Kenya. Demand issues result from increasing population, low income, rapid urbanization, poverty, and growing demand for food products for biofuel production in developed countries. On the other hand, supply problems are fueled by declining agricultural activity, climate change, high input prices, poor market access, prices for smallholder farmers, and animal and plant diseases (Emangor, n.d).

To address zero hunger, it is essential to develop technological innovations that improve crop health and yields, empower small-scale farmers to address challenges such as diseases with accessible mobile technologies, reduce economic losses, increase income, promote sustainable agriculture, and strengthen food security at scale. Therefore, group 43 developed a project focusing on a plant disease detection app for farmers. The project aims to help farmers identify and address crop diseases early. This technology will reduce yields and crop loss through timely and accurate disease detection to help improve farm yields. AI-powered plant disease detection app will help achieve zero hunger by reducing losses, improving productivity, empowering

farmers, making agriculture more sustainable, and enhancing resilience to pests and climate change.

Data Collection and Processing

The project is based on data from Kaggle's PlantVillage dataset, which contains labeled images of healthy and diseased plant leaves.

Data Preprocessing

- Resize images, normalize
- Apply augmentation (rotation, flip, zoom)
- Train-test-validation split

Technologies used

- Python, TensorFlow/Keras, Streamlit/Flask, Git, OpenCV

Model Training

- Use a CNN (e.g., MobileNet, ResNet or EfficientNet) with transfer learning
- Evaluate using accuracy, F1-score, and confusion matrix

App Development

- Build a user interface with Flask or Streamlit
- Users upload leaf images and get disease prediction + treatment info

App features and functionality

- Upload a leaf image and get the predicted disease class
- Shows disease description, symptoms, causes, severity
- Provides treatment recommendations (preventive, organic, chemical)
- Trained on the PlantVillage dataset
- Flask web interface with file upload

References

Emongor, R. (n.d.). *FOOD PRICE CRISIS AND FOOD INSECURITY IN KENYA*. https://elibrary.acbfpact.org/acbf/collect/acbf/index/assoc/HASH01b5/cd96f147/6ca2937f/79e1.dir/Food%20crisis%20and%20food%20insecurity%20in%20Kenya.pdf

IPC. (2025). *IPC Country Analysis | IPC - Integrated Food Security Phase Classification*. Ipcinfo.org. https://www.ipcinfo.org/ipc-country-analysis/en/?country=KEN

United Nations. (2025). *Goal 2: Zero Hunger - United Nations Sustainable Development*. United Nations Sustainable Development; United Nations. https://www.un.org/sustainabledevelopment/hunger/