# Project Charter

## Project Name:

Tobacco Leaf Disease Detection Using Machine Learning

## Brief Summary:

This project focuses on developing a machine learning-based system to detect tobacco leaf diseases such as Tobacco Mosaic Virus (TMV), Frog Eye Leaf Spot, and Powdery Mildew. The system will leverage a labeled dataset of healthy and diseased leaf images, train models (CNN and traditional ML), and deploy the best-performing model into a farmer-friendly mobile/web application. The goal is to empower farmers with real-time, accurate, and accessible disease diagnosis to improve yield and reduce economic losses.

## Project Goals:

• Create a labeled dataset of tobacco leaf images (healthy and diseased).

• Develop and train ML models (CNN + baseline ML) for disease classification with ≥85% accuracy.

• Deploy the best-performing model in a mobile/web application.

• Validate the solution with agricultural experts and field testing.

## Deliverables:

• Annotated dataset of tobacco leaf images.

• Trained and evaluated ML models.

• Functional mobile/web prototype application.

• User testing and validation reports.

• Maintenance and scalability plan.

## Business Case / Background:

Tobacco is a major commercial crop in Karnataka and other regions of India. Its cultivation faces challenges from diseases that reduce both yield and quality. Current manual detection methods are slow and depend on expert availability, which rural farmers often lack. By using machine learning for automated disease detection, this project will provide farmers

with fast, accurate, and accessible tools to manage crop health, thereby reducing losses and ensuring sustainable farming practices.

## Benefits and Costs:

Benefits:

- Faster and accurate disease detection.
- Reduced crop losses and improved farmer income.
- Accessible solution for rural farmers via mobile/web.
- Foundation for future agricultural AI applications.

Estimated Costs:

- Data collection and labeling (field surveys, expert consultation).
- Computing resources for training ML models.
- Development of mobile/web application.
- Testing and validation with stakeholders.

## Scope and Exclusions:

In Scope:

- Dataset collection, preprocessing, augmentation.
- Design, training, and evaluation of ML models.
- Development of prototype mobile/web app.
- Validation through pilot field tests.

Out of Scope:

- Hardware-based solutions like drones and IoT sensors.
- Disease detection for non-tobacco crops.
- Large-scale nationwide deployment.

## Project Team:

- Project Manager: Mouna C
- Data Engineers: Dataset collection and preprocessing.
- ML Engineers: Model training and evaluation.
- Software Developers: Mobile/web application development.
- Agricultural Experts: Dataset validation and field testing.
- Testers/QA: Application and model testing.

## Success Criteria:

• ML model achieves ≥85% accuracy and F1-score ≥0.80.

• App provides real-time disease classification to farmers.

• 70%+ positive feedback from farmers in pilot testing.

• Project milestones delivered on time and within scope.

## Risks and Constraints:

• Limited availability of labeled datasets → Mitigation: Field data collection + augmentation.

• Low real-world accuracy → Mitigation: Transfer learning and model tuning.

• Adoption challenges by farmers → Mitigation: Offline-capable lightweight app.

• Resource and time limitations → Mitigation: Phased delivery and scope control.

## Schedule / Timeline (3 Months):

• Month 1: Project planning, dataset collection, and preprocessing.

• Month 2: Model design, training, and evaluation.

• Month 3: App development, deployment, and pilot testing.

## OKRs (Objectives and Key Results):

Objective 1: Build a reliable ML model for disease detection.

- Key Result 1.1: Collect 2,000+ labeled images of tobacco leaves.
- Key Result 1.2: Achieve ≥85% accuracy and F1 ≥0.80 on test data.
- Key Result 1.3: Complete model training by end of Month 2.

Objective 2: Deliver a functional prototype app.

- Key Result 2.1: Integrate ML model into mobile/web app by Week 8.
- Key Result 2.2: Enable offline functionality for low-connectivity use cases.
- Key Result 2.3: Conduct pilot testing with at least 10 farmers by end of Month 3.