PRESIDENCY UNIVERSITY

Private University Estd. in Karnataka State by Act No. 41 of 2013

Itgalpura, Rajankunte, Yelahanka, Bengaluru – 560064

AI-Driven Crop Disease Prediction and Management System

A PROJECT REPORT

Submitted by

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IN

COMPUTER SCIENCE AND ENGINEERING (DevOps)

PRESIDENCY UNIVERSITY

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PRESIDENCY SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that the project report titled **"AI-Driven Crop Disease Prediction and Management System"** is a bonafide work carried out by **Tousif Nawaz (20221CDV0033), Gaanavaditya Reddy (20221CDV0030), and Prashanth A (20221CDV0028)**. The project work was completed under my supervision and guidance, and is submitted in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology in Computer Science and Engineering (DevOps)** for the academic year **2025–2026**.

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DECLARATION

We, the students of final-year **B.Tech in Computer Science and Engineering (DevOps)** at Presidency University, Bengaluru, hereby declare that the project work titled **"AI-Driven Crop Disease Prediction and Management System"** has been independently carried out by us and submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in **Computer Science and Engineering (DevOps)** during the academic year **2025–2026**.

We also declare that the matter embodied in this project has not been submitted previously by any other candidate for the award of any degree or diploma to any other institution.

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Abstract

There is still a huge challenge of agricultural productivity and food security as a result of crop diseases being rampant. The problem is especially acute in developing areas where farmers usually have no access to expert diagnosis, live-time data, and scientific advice. Conventional techniques of diagnosing plant diseases are overly based on manual observation of leaves and stems that are time consuming and subject to human bias and variability. Moreover, the poor lighting, overlapping leaves, and other environmental factors complicate the process of visual diagnosis further in the field. Consequently, more often than not, farmers get delays in treatment, which translates to significant losses in yield and loss of finances.

As advancements in artificial intelligence and deep learning have risen at a rapid pace, disease detection applications have been adopted as an influential tool in precision agriculture in automated mode. Several existing systems operate on the principle of leaf-based classification to detect the presence of diseases; nevertheless, they do not take into account the most important contextual parameters, according to which the impact of the environment, the vulnerability of crops, and the time of infection dissemination have to be considered. These constraints limit their practical application in the real-world farming situation where various variables are interacting in a dynamic way.

To solve these problems the current research proposes an AI-based Crop Disease Prediction and Management System that integrates various layers of intelligence and offers in-depth disease surveillance and control. The four key parts comprising the system include an attention-optimized EfficientNet model, to identify diseases accurately, a genomic susceptibility analysis module, which evaluates cultivar-specific vulnerability, a collaborative surveillance network that can be used to track and predict disease outbreaks, and a voice-assisted multilingual advisory interface that can provide actionable insights to farmers, which includes farmers with low literacy levels.

It was demonstrated that the proposed solution can be trained on a heterogeneous dataset combining PlantVillage, PlantDoc, and field-collected images of the region, registering an impressive 97.2% classification accuracy in 38 different types of diseases. The field testing confirmed its efficiency, as it proved to have improved disease awareness, timely interventions and a huge decrease in the losses of the crops. This consolidated AI-based platform is therefore a move towards sustainable and data-driven agriculture that would give farmers the power to act proactively in managing disease and enhancing more productivity with innovative tools.