

Harvest Guardian: A Mobile Toolkit for AI-Based Crop Disease Diagnosis and Farmer Decision Support

V. Thivakaran and R. Thisakaran

Department of ICT, Faculty of Technological Studies, University of Vavuniya, Sri Lanka

Abstract

Agriculture in Sri Lanka is predominantly driven by smallholder farmers who face challenges in timely disease detection, access to localized expert advice, and planning around weather conditions. These issues contribute to significant crop losses and reduced household income, highlighting the need for accessible, technology-driven solutions. This paper presents Harvest Guardian, a mobile toolkit designed to support farmers through integrated, user-friendly features. The system incorporates a pretrained TensorFlow Lite model for offline crop disease detection across 30 classes, supported by a multilingual disease wiki with text-to-speech functionality. Additional modules include a peer-based community forum, a localized weather forecasting service, and a marketplace for trading agricultural goods. Firebase services provide secure authentication, media handling, and real-time data synchronization. Internal validation demonstrated that all core modules operated stably across multiple Android devices, with the disease detection component offering reliable offline functionality. While the model has not been retrained with local datasets and field testing remains pending, the architecture establishes a strong foundation for future expansion. Planned improvements include dataset localization, structured usability testing, and wider deployment, positioning Harvest Guardian as a scalable and practical solution for enhancing farmer decision-making in low-resource environments.

Keywords: Crop Disease Detection, Mobile Computing, Smart Agriculture, Farmer Support, Agricultural Support