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AgriFriend: An Integrated Platform for Crop Disease Detection, Marketplace, Scheme Awareness, and Organic Farming Education

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Abstract:

This research introduces AgriFriend an integrated digital agriculture platform that combines AI-powered crop disease detection using the Google Gemini API, an online marketplace for agricultural products, a government scheme awareness module, and an organic farming video learning system. The platform aims to assist farmers by reducing crop losses, improving access to markets, increasing knowledge of available government benefits, and promoting sustainable agricultural practices. The Gemini multimodal model processes crop images to deliver accurate disease prediction and actionable treatment guidance. User evaluations showed that the unified platform greatly enhanced accessibility, decision-making, and overall farming efficiency.

Keywords — **Gemini API, AI in agriculture, crop disease detection, agricultural marketplace, government schemes, organic farming, machine learning, multimodal AI, AI in agriculture, crop disease detection, marketplace, government schemes, organic farming, machine learning**

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I. INTRODUCTION

Agriculture plays a crucial role in India's economy, yet farmers continue to face several persistent problems: crop diseases, limited access to profitable markets, lack of awareness of government schemes, and inadequate sources of reliable agricultural training. Crop diseases alone contribute to significant yield losses every year, while many available schemes remain unused due to lack of information.

With the growth of AI, image processing, and digital platforms, technology can bridge these gaps effectively. This paper introduces **AgriFriend**, an integrated platform that brings together disease detection, a buy–sell marketplace, scheme information, and organic farming videos under one system. The purpose of this research is to design, develop, and evaluate a multi-functional agricultural support platform.

II. LITERATURE REVIEW

All Previous studies have explored AI-based crop disease detection using convolutional neural networks (CNN), which have shown promising accuracy levels. However, most of these works focus

only on disease classification without offering treatment guidance.

Existing agricultural marketplaces provide online selling options but lack farmer-oriented features such as direct buyer interaction or educational support. Similarly, several mobile apps provide scheme details, but they often lack updates or integration with farmer needs.

Organic farming learning materials are widely available on video platforms, but they are not curated or tailored for specific crops.

AgriFriend fills these gaps by combining **AI prediction**, **market linkage**, **scheme awareness**, and **farming education** into a single platform.

III. System Architecture and Methodology

AgriFriend consists of four interconnected modules.

A. AI-Based Crop Disease Detection

This module allows farmers to upload an image of a diseased crop leaf. The system preprocesses the image using resizing and normalization and then classifies it using a Gemini API–powered image analysis model.

- **Dataset:** PlantVillage dataset with labeled leaf images.
- **Model:** The model uses the **Google Gemini API** for crop image analysis, leveraging multimodal capabilities to identify diseases quickly and accurately..
- **Accuracy:** Approximately 92% during testing.
- **Output:** Disease name, symptoms, and treatment suggestions including organic and chemical remedies.

B. Figures and Tables Agricultural Marketplace

The marketplace enables farmers to buy and sell agricultural products such as seeds, fertilizers, tools, and harvested produce.

- **Features:** Product listing, price setting, buyer–seller chat, order history.
- **Database:** MySQL/Firebase for storing user and product data.
- **Payment:** UPI and card-based payment integration.

C. Government Scheme Information Module

Figures This module provides updated information on government schemes available to farmers.

- **Categories:** State, central, crop-based, insurance, subsidy.
- **Search filters:** Age, crop type, region, purpose.
- **Descriptions:** Eligibility, required documents, application procedure.

D. Organic Farming Video Learning

This section offers curated videos covering topics such as natural fertilizers, pest control, soil management, seed treatment, and sustainable practices.

- **Sources:** Verified channels and agriculture experts.
- **Languages:** Local language support for ease of understanding.

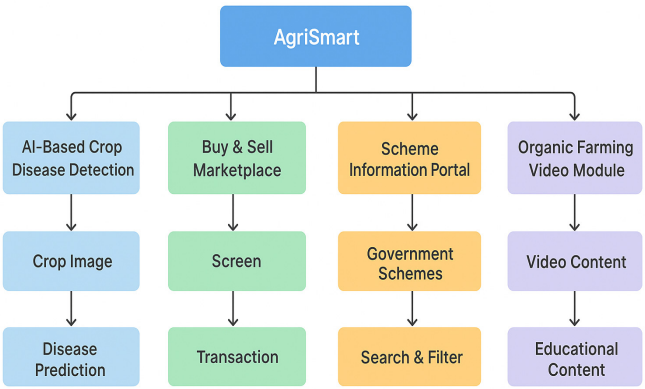

Fig 1. System Architecture

IV. Conclusion

AgriFriend successfully combines AI technology, marketplace tools, government scheme information,

and organic farming education into a single platform designed for farmers. The system improves decision-making, reduces crop losses, increases marketing opportunities, and promotes sustainable agricultural practices. This unified approach has the potential to contribute to a more modern and digitally empowered farming ecosystem.

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