IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁙ Peer-reviewed & Refereed journal ⁙ Vol. 14, Issue 11, November 2025

DOI: 10.17148/IJARCCE.2025.141137

Review On- AI Farming Help and Advisory System

Ms. Priyanka Gawade[1], Ms. Mayuri Jadhav[2], Mr. Chetan Nehul[3], Mr. Sahil Gatkul[4], Prof. Salve S. S[5]

Student, Electronics and Computer Engineering, Dattakala Group Of Institution Faculty Of Engineering, Bhigwan

Associate Professor[5], Electronics and Computer Engineering,

Dattakala Group Of Institution Faculty Of Engineering, Bhigwan

Abstract: Agriculture is a vital sector that directly influ- ences a country's economy and food security. Crop pre- diction plays an important role in helping farmers make informed decisions about sowing, irrigation, and harvest- ing. Traditional prediction methods are often inaccurate due to changing weather, soil variations, and pest attacks. Artificial Intelligence (AI) techniques such as Machine Learning (ML) and Deep Learning (DL) provide new ways to analyze complex agricultural data for better yield prediction. This review paper discusses recent research developments in AI-based crop prediction systems, com- monly used algorithms, data sources, methodologies, and challenges. It also highlights the emerging trends such as IoT-based smart farming, real-time data processing, and the integration of AI with remote sensing technologies for more accurate and scalable prediction models

Keywords: Artificial Intelligence (AI), Machine Learning, Deep Learning, Crop Prediction, Precision Agriculture, Remote Sensing, IoT Sensors, Weather Data Analysis, Yield Forecasting, Smart Farming.

I. INTRODUCTION

Agriculture in India faces multiple challenges including unpredictable weather patterns, soil degradation, and water scarcity. Accurate crop prediction helps farmers to plan agri- cultural activities, reduce financial risk, and improve productivity. With the increasing availability of large datasets from satellites, sensors, and weather stations, AI provides advanced analytical tools for predictive modeling. Machine learning models such as Random Forest, Support Vector Machines, and Neural Networks are widely used to analyze complex and non- linear relationships between various environmental parameters and crop yield. The use of AI reduces dependency on manual observations and improves the accuracy of decision-making. This paper reviews the techniques, data sources, and AI models used in crop prediction and identifies future research opportunities to enhance agricultural intelligence and decision support systems. [1], [2].

II. LITERATURE SURVEY

Sr. No.	Title	Authors	Methodology	Findings
1	Crop Disease Prediction Using Deep Learning	A.Kamilaris, F.X.Prenafeta-Boldu´	Used Convolutional Neural Networks (CNNs) to classify plant leaf diseases from image datasets.	Achieved high accuracy (up to 99%) in classifying 38 crop diseases across 14 species.
2	Deep Learning for Image-Based Plant Disease Detection	S. Sladojevic et al.	Trained a deep CNN On publicly available Leaf images (PlantVillage dataset).	Achieved 96.3% Accuracy in predicting 13 types of plant diseases.
3	Smart Farming: Fertilizer Recommendation System Using Machine Learning	M. Anandaraj et al.	Used Decision Tree, Random Forest and SVM models based on soil nutrients (N, P, K), pH, temperature, humidity.	Random Forest provided 92% accuracy in recommending correct fertilizers.

4	Crop Yield Forecasting Using Hybrid AI Models	R. Patel, S. Desh- I. LITERATURE SURVEY mukh (2022)	Combined LSTMand Random Forest for temporal yield prediction using weather and soil parameters.	Hybrid model outperformed single algorithms with 95% accuracy for maize yield.
5	AI-Driven Preci- sion Agriculture for Smart Irriga- tion	K. Singh et al. (2023)	Integrated IoT sensor data with deep learning models to predict soil moisture and automate irrigation.	Reduced water usage by 20% and improved crop yield con- sistency.

III. METHODOLOGY

The general methodology of AI-based crop prediction in- volves several stages:

Data Collection:

Data is gathered from multiple sources including remote sensing satellites (Landsat, Sentinel), weather stations, and IOT-based soil sensors.Parameters such as temperature, rainfall, humidity, soil pH, nitrogen, phosphorus, and potassium content are collected.

Data Preprocessing:

Raw data is cleaned, normalized, and transformed. Missing values are handled using imputation techniques, and features are selected based on their correlation with crop yield.

Feature Engineering:

Vegetation indices (NDVI, EVI) and time-series features are extracted from satellite data.

Dimensionality reduction techniques like PCA are applied to simplify model training.

Model Training: Machine learning algorithms such as Lin- ear Regression, Random Forest, Decision Trees, and Support Vector Machines are trained on historical data.

Deep learning models like CNNs, LSTMs, and hybrid CNN- LSTM are used for spatio-temporal prediction.

Model Evaluation:

Metrics such as RMSE, MAE, and R^2 are used to measure performance. Cross-validation ensures the model's robustness and generalization.

Prediction and Decision Support:The trained model predicts the expected yield or best crop type.

Results are integrated into advisory platforms to guide farmers in crop selection and farm management.

IV.FINDINGS AND TRENDS

High Accuracy with Deep Learning: CNN and LSTM models show better performance for spatial-temporal data compared to traditional ML algorithms.

Integration of IoT and Cloud Computing: Smart farming systems use IoT sensors to collect real-time data and cloud platforms for large-scale processing.

Use of Remote Sensing Data: Satellite imagery provides continuous monitoring and supports large-scale yield forecasting.

textbfExplainable AI (XAI): Researchers are focusing on interpretable models to help farmers and policymakers understand the reasoning behind predictions.

Sustainability and Precision Agriculture: AI-based sys- tems are driving the shift toward precision agriculture, optimizing resource use (water, fertilizer) and reducing environmental impact.

V.CONCLUSION

High Accuracy with Deep Learning: CNN and LSTM models show better performance for spatial-temporal data compared to traditional ML algorithms.

Integration of IoT and Cloud Computing: Smart farming systems use IoT sensors to collect real-time data and cloud platforms for large-scale processing.

Use of Remote Sensing Data: Satellite imagery provides continuous monitoring and supports large-scale yield forecasting.

textbfExplainable AI (XAI): Researchers are focusing on interpretable models to help farmers and policymakers understand the reasoning behind predictions.

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 11, November 2025
DOI: 10.17148/IJARCCE.2025.141137

Sustainability and Precision Agriculture: AI-based sys- tems are driving the shift toward precision agriculture, optimiz-ing resource use (water, fertilizer) and reducing environmental impact.

References

1.Mukherjee, A., Sharma, R. (2020). Crop yield prediction using machine learning: A review. International Journal of Agricultural Informatics, 12(1), 45–60.
2.Li, X., Kumar, S. (2019). Deep learning for crop classification and yield prediction. Proceedings of the IEEE International Conference on Big Data, 123–130.
3.Gupta, P. (2018). Remote sensing data for agriculture: Opportunities and challenges. Remote Sensing Letters, 9(8), 789–798.
4.Patel, R., Deshmukh, P., Gaikwad, V. (2021). AI-based yield prediction using soil and weather data. International Journal of Computer Appli- cations in Agriculture, 5(2), 65–72.
5.Kumar, N., Singh, M. (2022). IoT and deep learning integration for real- time crop prediction. Journal of Intelligent Agriculture Systems, 7(3), 210–220.