

# **AgroAI-Smart Farming Assistance System**

**Mrs. Sanika Pravin Shinde<sup>1</sup>, Mrs. Siddhi Dattatray Khose<sup>2</sup>, Mrs. Sakshi Balu Khade<sup>3</sup>**

**Mr. Mithun Mhatre<sup>4</sup>**

Students, Department of Computer Technology<sup>1,2,3</sup>

Guide, Department of Computer Technology<sup>4</sup>

Bharati Vidyapeeth Institute of Technology, Kharghar, Navi Mumbai, Maharashtra, India.

**Abstract:** *Smart Farming Assistance System is an AI-based web application developed to assist farmers in making intelligent and data-driven agricultural decisions. Traditional farming practices often rely on manual estimation and experience-based judgment, which may lead to improper fertilizer usage, inaccurate yield prediction, and reduced productivity. The proposed system integrates soil nutrient analysis, fertilizer recommendation, yield prediction, chatbot assistance, and voice interaction into a single smart platform. It analyzes key parameters such as Nitrogen (N), Phosphorus (P), Potassium (K), rainfall (mm), land area (acres), seed quality (%), and fertilizer usage (kg) to classify agricultural conditions into Low, Moderate, and High levels and estimate crop yield in quintals. Additionally, the integrated chatbot and voice assistant provide real-time guidance to farmers, improving accessibility and usability. The system promotes sustainable farming practices, enhances productivity, and demonstrates the effective application of artificial intelligence in modern agriculture..*

**Keywords:** Artificial Intelligence, Smart Farming, Yield Prediction, Soil Health Analysis, Fertilizer Recommendation, Chatbot System, Voice Assistant, Precision Agriculture, Sustainable Agriculture, Web-Based Application

## **I. INTRODUCTION**

Agriculture plays a crucial role in economic growth and food security, yet traditional farming methods often depend on manual judgment and experience-based decisions, which can result in inefficient resource usage and unpredictable crop yields. With the advancement of artificial intelligence and digital technologies, smart farming solutions are emerging to improve productivity and sustainability. AgroAI – Smart Farming Assistance System is developed as an AI-based web platform that assists farmers in making data-driven decisions through soil nutrient analysis, fertilizer recommendation, yield prediction, chatbot support, and voice interaction. The system evaluates key agricultural parameters such as Nitrogen (N), Phosphorus (P), Potassium (K), rainfall (mm), land area (acres), seed quality (%), and fertilizer usage (kg) to classify soil conditions and estimate crop yield in quintals. By integrating intelligent automation with real-time guidance, AgroAI enhances decision accuracy, optimizes resource management, and promotes sustainable agricultural practices.

## **II. LITERATURE SURVEY**

Several researchers have proposed intelligent farming systems using artificial intelligence, machine learning, and data analytics to improve agricultural productivity. Studies show that AI-based models can predict crop yield based on environmental and soil parameters. Existing research highlights the following:

- Use of machine learning algorithms for crop yield prediction
- Soil nutrient analysis using NPK-based classification methods
- Weather-based advisory systems for rainfall prediction
- Fertilizer recommendation systems using rule-based logic
- Mobile applications for farmer guidance and digital advisory
- Chatbot-based assistance systems for agricultural queries



Therefore, there is a need for a smart, integrated, and user-friendly farming assistance system that combines soil health analysis, yield prediction, chatbot guidance, and voice interaction into a single web-based solution. The proposed AgroAI system addresses these limitations by providing a comprehensive digital farming platform.

### III. EXISTING SYSTEM

The current agricultural support process in most farming practices includes:

- Manual soil testing
- Traditional fertilizer estimation
- Experience-based decision making
- Weather information from basic sources
- Separate mobile apps for advisory services

Limitations of existing systems:

- Inaccurate yield estimation
- Improper fertilizer usage
- Lack of integrated platform
- No real-time intelligent assistance
- Limited accessibility for rural farmers
- Absence of voice-enabled support

These limitations demand a smart, integrated, and AI-based farming assistance solution.

### IV. PROPOSED SYSTEM

The proposed system introduces AgroAI – Smart Farming Assistance System, an AI-based integrated platform designed to support farmers with intelligent decision-making tools.

Key Features:

- Soil nutrient analysis using NPK values
- Fertilizer recommendation based on classification logic
- Yield prediction using rainfall, land area, seed quality, and fertilizer usage
- Classification of agricultural conditions into Low, Moderate, and High levels
- Integrated chatbot for real-time agricultural guidance
- Voice assistant for improved accessibility
- Historical yield data tracking and graphical analysis
- PDF report generation for soil analysis

The system combines soil analysis, yield estimation, and intelligent advisory support within a single web-based platform. By automating agricultural decision-making and providing real-time assistance, the proposed solution improves productivity, optimizes resource utilization, and promotes sustainable farming practices.

### V. SYSTEM ARCHITECTURE

The AgroAI system consists of the following main modules:

- User Module
- Soil Analysis Module
- Yield Prediction Module
- Chatbot & Voice Assistant Module
- Database & Report Module

Process Flow:

- User logs into the system.



- User enters soil nutrient values (N, P, K).
- System analyzes soil and generates fertilizer recommendation.
- User enters rainfall, land area, seed quality, and fertilizer data.
- System predicts yield in quintals using classification logic.
- Results are displayed with soil health score and graphical analysis.
- Chatbot and voice assistant provide additional farming guidance.
- Data is stored in the database for future reference and trend analysis.

The overall working flow of the proposed AgroAI system ensures intelligent analysis, real-time assistance, and structured data management for smart farming support.

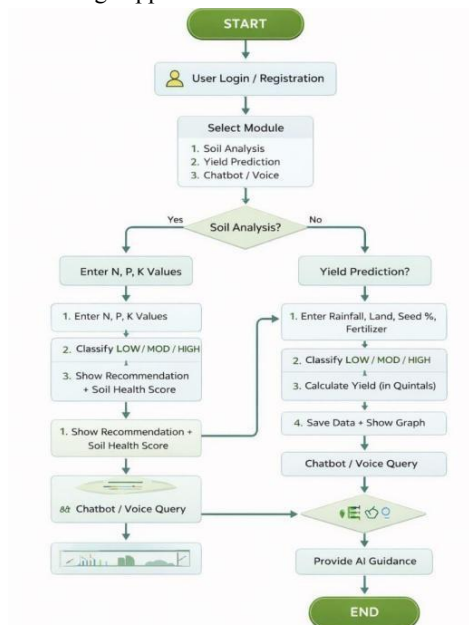


Fig. Agro-AI smart farming assistance system flow chart

## VI. METHODOLOGY

The proposed AgroAI system follows the below methodology:

- **Data Collection:**

User inputs agricultural parameters such as Nitrogen (N), Phosphorus (P), Potassium (K), rainfall (mm), land area (acres), seed quality (%), and fertilizer usage (kg).

- **Soil Nutrient Analysis:**

The system classifies NPK values into Low, Moderate, and High categories using predefined threshold logic.

- **Fertilizer Recommendation:**

Based on soil classification results, appropriate fertilizer suggestions are generated automatically.

- **Yield Prediction:**

The system analyzes rainfall, land area, seed quality, and fertilizer data to estimate crop yield in quintals.

- **Classification Process:**

Agricultural conditions are categorized into Low, Moderate, and High performance levels for better decision-making.



- Chatbot & Voice Assistance:

The intelligent chatbot and voice assistant provide real-time farming guidance and recommendations.

- Data Storage & Logging:

All analysis results and yield predictions are stored in the database for future reference and trend analysis.

- Result Visualization:

The system displays soil health score, fertilizer recommendation, yield output, and graphical trends for user understanding.

## VII. IMPLEMENTATION

The proposed AgroAI – Smart Farming Assistance System is implemented using the following technologies: Frontend:

- HTML
- CSS
- JavaScript

Backend:

- PHP

Database:

- MySQL

Key Functionalities Implemented:

- User registration and login system
- Soil nutrient (NPK) analysis module
- Fertilizer recommendation based on classification logic
- Yield prediction calculation in quintals
- Low, Moderate, High performance classification
- Chatbot assistance for agricultural queries
- Voice assistant integration for hands-free interaction
- Graphical trend visualization using charts
- PDF report generation for soil analysis
- Data storage and history tracking

## VIII. RESULTS

The implemented AgroAI system successfully achieved the following outcomes:

- Accurate classification of soil nutrients into Low, Moderate, and High levels
- Automated fertilizer recommendations based on NPK analysis
- Crop yield prediction generated in quintals
- Clear display of soil health score and performance level
- Real-time chatbot assistance for agricultural queries
- Voice-based interaction for improved accessibility
- Graphical visualization of yield trends
- Secure storage of user data and prediction history

Testing of the system demonstrated that balanced rainfall, good seed quality, and optimal fertilizer usage resulted in higher predicted yield, while low parameter values produced lower yield outputs. The system effectively supports data-driven farming decisions and improves overall agricultural productivity.



### **IX. CONCLUSION**

The AgroAI – Smart Farming Assistance System provides an intelligent and integrated solution for modern agriculture by combining soil nutrient analysis, fertilizer recommendation, yield prediction, chatbot support, and voice assistance into a single web-based platform. The system enhances decision-making accuracy by classifying agricultural parameters into performance levels and estimating crop yield in quintals based on real-time inputs. By promoting efficient resource utilization and data-driven farming practices, AgroAI improves productivity and supports sustainable agricultural development. The proposed system demonstrates the effective application of artificial intelligence and digital technologies in transforming traditional farming into smart farming.

### **REFERENCES**

- [1] R. Kumar and S. Sharma, “Smart Farming Using IoT and Machine Learning Techniques,” International Journal of Agricultural Research, vol. 8, no. 2, pp. 120–126, 2021.
  - [2] P. Singh and A. Verma, “Crop Yield Prediction Using Machine Learning Algorithms,” International Journal of Computer Applications, vol. 175, no. 10, pp. 15–20, 2020.
  - [3] S. Patel, M. Desai, and K. Shah, “Soil Nutrient Analysis and Fertilizer Recommendation System,” Journal of Smart Agriculture Technologies, vol. 5, no. 3, pp. 45–52, 2022.
  - [4] FAO, “Digital Technologies in Agriculture and Rural Areas,” Food and Agriculture Organization of the United Nations, Rome, 2019.
  - [5] A. Mishra and V. Tiwari, “Artificial Intelligence in Agriculture: A Review,” International Journal of Advanced Research in Computer Science, vol. 9, no. 4, pp. 85–90, 2018.
- OpenAI, “GPT-Based Conversational AI Systems,” 2023

