Krishi: A Web-Based Smart Farming Assistant for Crop Recommendation and Weather Forecasting

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***Abstract*— Agriculture remains the backbone of the Indian economy; however, farmers continue to face challenges related to unpredictable weather conditions, improper crop selection, and limited access to integrated digital tools. With the rapid growth of web technologies, there is a strong opportunity to support farmers through intelligent and accessible platforms. This paper presents** Krishi**, a web-based smart farming assistant designed to provide real-time weather forecasting and soil-based crop recommendations. The system integrates live weather data, seasonal crop information, and basic soil parameters to assist farmers in making informed agricultural decisions. The proposed solution focuses on simplicity, accessibility, and regional relevance, particularly for farmers in Maharashtra and central India. Krishi aims to reduce dependency on manual decision-making and traditional practices by offering accurate, timely, and user-friendly information through a browser-based interface. Experimental results and practical use cases demonstrate that the system can effectively support farmers in crop planning and agricultural productivity. The platform also lays a foundation for future integration of advanced technologies such as artificial intelligence, multilingual support, and mobile-based services.**

Keywords—Smart Farming, Crop Recommendation, Weather Forecasting, Agriculture Technology, Web Application

I. INTRODUCTION

Agriculture plays a crucial role in India’s socio-economic development, employing a significant portion of the population and contributing substantially to the national income. Despite technological advancements in various sectors, agriculture in many regions still depends on traditional practices and experience-based decision-making. Farmers often face difficulties due to unpredictable weather conditions, lack of accurate crop planning, and insufficient access to timely information.

Weather variability is one of the primary factors affecting crop yield and farm productivity. Sudden rainfall, droughts, and temperature fluctuations can lead to crop failure and economic losses. Additionally, improper crop selection without considering soil quality and seasonal suitability further increases risk for farmers. Although several digital agriculture platforms exist, many of them are either complex, expensive, or not region-specific.

To address these challenges, there is a need for a simple, integrated, and accessible smart farming solution. The **Krishi – The Farming Assistant** project is developed as a web-based application that combines real-time weather forecasting with crop recommendation logic. The system aims to assist farmers in making better agricultural decisions by providing relevant information at a single platform.

The key contributions of this paper are as follows:

- Design and development of a web-based smart farming assistant.
- Integration of real-time weather data using external APIs.
- Soil and season-based crop recommendation mechanism.
- User-friendly interface suitable for farmers with minimal technical knowledge.

II. PROBLEM STATEMENT AND OBJECTIVES

A. Problem Statement:

Agriculture in India is highly dependent on environmental conditions, particularly weather patterns and soil characteristics. Farmers often face significant challenges due to unpredictable weather, improper crop selection, and limited access to timely and reliable agricultural information. In many rural areas, farmers still rely on traditional knowledge, personal experience, or fragmented sources such as television, newspapers, and word-of-mouth for decision-making.

Existing digital agricultural solutions provide weather updates or crop-related information independently, but they often lack integration and regional relevance. Many platforms are complex to use, require paid subscriptions, or demand technical expertise, making them unsuitable for small and marginal farmers. The absence of a unified, user-friendly, and accessible system results in inefficient crop planning, reduced productivity, and increased economic risk.

Therefore, there is a critical need for an integrated smart farming solution that combines real-time weather forecasting and crop recommendation in a single platform, while maintaining simplicity and ease of use. The Krishi system is proposed to address these challenges by providing a web-based farming assistant tailored to the needs of farmers in Maharashtra and similar agricultural regions.

B. Objectives:

The primary objectives of the proposed Krishi system are as follows:

1. To provide real-time, location-based weather information to assist farmers in agricultural planning.

2. To recommend suitable crops based on soil type, seasonal conditions, and regional agricultural patterns.

3. To develop a simple and intuitive web-based interface that can be used by farmers with minimal technical knowledge.

4. To integrate multiple agricultural decision-support features into a single unified platform.

5. To improve crop planning efficiency and reduce risks associated with improper crop selection and weather uncertainty.

6. To ensure platform independence by enabling access through standard web browsers on various devices.

III. LITERATURE REVIEW

The application of information technology in agriculture has led to the development of various digital tools aimed at supporting farmers in decision-making and farm management. Several studies focus on weather-based advisory systems, crop information platforms, and web-based decision support systems that rely on predefined rules and external data sources rather than artificial intelligence or machine learning techniques.

Weather forecasting systems for agriculture are widely used to provide farmers with real-time information regarding temperature, rainfall, humidity, and climatic conditions. Many existing systems utilize meteorological data obtained through public weather APIs or government sources and present it through web or mobile interfaces. While these systems effectively inform farmers about weather conditions, they generally do not extend support toward crop planning or selection based on seasonal suitability.

Rule-based crop advisory systems have been proposed to recommend crops using predefined agricultural rules derived from expert knowledge, soil type, and seasonal patterns. Such systems offer simplicity and transparency, making them suitable for small-scale farmers. However, most existing rule-based systems operate independently and lack integration with live weather data, limiting their practical usefulness in dynamic agricultural environments.

Web-based decision support systems (DSS) have also been developed to assist farmers in agricultural planning by combining multiple data sources such as weather reports, crop calendars, and soil information. These systems emphasize accessibility and ease of use but often focus on specific functionalities rather than providing a unified solution. Additionally, many platforms are designed for institutional or commercial use and may not be easily adaptable for individual farmers.

Several agricultural information portals and mobile applications provide weather updates, crop guidelines, and advisory services using static or semi-dynamic data. Despite their availability, these platforms often suffer from issues such as complex user interfaces, lack of regional customization, and dependency on continuous internet connectivity.

From the review of existing non-AI agricultural systems, it is evident that there is a research gap in the development of a simple, integrated, and region-specific web-based farming assistant that combines real-time weather forecasting with rule-based crop recommendation. The proposed Krishi system addresses this gap by offering a lightweight, browser-accessible platform that delivers practical agricultural support without the complexity of artificial intelligence or machine learning models.

IV. PROPOSED SYSTEM ARCHITECTURE

The proposed system architecture of **Krishi – The Farming Assistant** is designed to provide a simple, efficient, and scalable web-based solution for agricultural decision support. The architecture follows a modular and rule-based approach, ensuring ease of use, maintainability, and accessibility without relying on artificial intelligence or machine learning techniques.

The system primarily consists of four main components: the User Interface Module, Weather Data Module, Crop Recommendation Module, and Data Processing Module. These components work together to deliver real-time weather information and crop recommendations to farmers through a unified web platform.

A. User Interface Module

The User Interface (UI) module serves as the interaction point between the farmer and the system. It is developed using standard web technologies such as HTML, CSS, and JavaScript. The interface allows users to enter basic information such as location and soil type. Output results, including weather conditions and crop recommendations, are displayed in a structured and visually clear format using cards, icons, and textual descriptions.

The UI module is designed to be responsive, enabling access from smartphones, tablets, and desktop devices through a standard web browser. This ensures platform independence and improves system accessibility in rural and semi-urban regions.

B. Weather Data Module

The Weather Data Module is responsible for retrieving real-time weather information from external weather service APIs. Based on the user-provided location, the module fetches parameters such as temperature, humidity, rainfall, and weather conditions. The retrieved data is processed and formatted before being displayed on the user dashboard.

This module ensures that farmers receive up-to-date and reliable weather information, which plays a critical role in crop planning, irrigation scheduling, and harvesting decisions.

C. Crop Recommendation Module

The Crop Recommendation Module operates using a predefined, rule-based logic derived from agricultural guidelines, soil characteristics, and seasonal crop patterns. Instead of predictive models, the system applies conditional rules to match user inputs such as soil type and season with suitable crop options.

This rule-based approach ensures transparency and simplicity, allowing the system to provide understandable and practical recommendations without requiring complex data or computational resources.

D. Crop Price Information Module

The Crop Price Information Module provides farmers with current market price details of major agricultural crops. The module collects crop price data from publicly available sources or predefined datasets related to agricultural markets (mandis). This information helps farmers understand price variations and make informed decisions regarding the sale of their produce.

Crop prices are displayed in tabular or card-based formats, allowing users to easily compare prices across crops or locations. By offering transparent and easily accessible market information, this module supports better economic planning for farmers

E. System Workflow

The working process of the Krishi system is summarized as follows:

1. The user accesses the Krishi web application through a browser.

2. The user selects a location to view weather and crop price information.

3. The Weather Data Module fetches real-time weather data using an external API.

4. The Crop Price Information Module retrieves current market price data.

5. The Data Processing Module processes and organizes the collected data.

6. The final weather and crop price information is displayed on the dashboard.

This structured workflow ensures efficient operation, quick response time, and reliable information delivery for farmers.

V. IMPLEMENTATION

The Krishi – The Farming Assistant system is implemented as a web-based application using standard front-end technologies. HTML and CSS are used to design a simple and responsive user interface, while JavaScript handles data fetching and dynamic content updates. The system is accessible through a web browser without requiring any software installation.

Real-time weather information is obtained using external weather service APIs based on the user's selected location. The retrieved data is processed and displayed in a structured and easy-to-understand format. Crop price information is provided using predefined datasets or publicly available market sources, allowing farmers to view current prices of major agricultural crops.

The application is deployed using GitHub Pages, ensuring platform independence, easy accessibility, and low maintenance. The overall implementation focuses on simplicity, usability, and efficient information delivery to support farmers in agricultural decision-making.

VI. RESULTS AND CONCLUSION

A. Results:

The Krishi web-based farming assistant was tested using different locations and crop data to evaluate its functionality and usability. The system successfully retrieved real-time weather information, including temperature, humidity, and rainfall, based on user input. Crop price data for major agricultural commodities was displayed accurately in a structured and readable format.

The results demonstrate that the application provides timely and relevant agricultural information with minimal user input. The responsive user interface functioned effectively across different devices such as smartphones and desktop systems. The system proved to be easy to use and suitable for farmers with limited technical knowledge, supporting better planning and market awareness.

B. Conclusion:

This paper presented **Krishi – The Farming Assistant**, a web-based agricultural support system designed to provide real-time weather information and crop price details through a unified platform. The system addresses the need for a simple, accessible, and integrated farming information solution without relying on artificial intelligence or machine learning techniques.

The proposed system enhances agricultural decision-making by reducing dependency on fragmented information sources and traditional practices. Future enhancements may include multilingual support, mobile application development, offline access, and the integration of additional agricultural advisory services to further improve system usability and impact.

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