Walchand College of Engineering, Sangli.
(An Autonomous Institute)

Department of Computer Science and Engineering

Mini-Project I (7CS345)

Synopsis on

Strengthening Farmer Advisory Systems Using Local-Scale Weather Data

by

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Problem statement:

Farmers often face severe losses due to sudden weather changes and unreliable generalized forecasts, which make farming decisions uncertain and risky. Traditional forecasts are region-wide, failing to capture hyper-local conditions that directly impact crops. Consequently, improper sowing, harvesting, and irrigation timing leads to reduced yields, wasted resources, and financial stress. There is a pressing need for a smart digital system that provides precise local weather forecasts, real-time alerts, and intelligent farming advisories to empower farmers with actionable insights.

Abstract:

This project introduces the Agile Agro-Advisory System, a web application designed to provide farmers with data-driven tools for informed decision-making. The system delivers hyper-local weather forecasts by integrating data from multiple reliable sources. It includes a real-time alert system for immediate threats like storms, and provides data-driven guidance on optimal sowing, harvesting, and irrigation schedules. By converting complex meteorological data into simple, actionable advice, this system aims to reduce the risks in farming and promote a more sustainable and profitable agricultural practice.

Problem Domain:

- **Agriculture and Agrotechnology:** This project applies technology to farming for data-driven decision-making. The goal is to improve crop yield, manage resources efficiently, and reduce losses by providing timely advice on sowing, harvesting, and irrigation.
- **Meteorology and Climate Science:** The system relies on meteorological data from various weather APIs to generate hyper-local forecasts. It helps farmers adapt to climate change and unpredictable weather patterns.
- **Information Technology (IT) and Data Science:** The core of the project involves a full IT stack, including web development, database management, and API integration. Data science techniques will be used to process raw weather data into actionable farming advice.
- **Environmental Science and Sustainable Resource Management:** The project promotes sustainability by providing intelligent irrigation advice to conserve water and prevent soil degradation, encouraging the efficient use of natural resources.
- **Rural Development and Food Security:** By improving farm productivity and reducing losses, the project supports the economic well-being of farmers in rural areas and

Customer Identification/Sponsorship Details:

This project is primarily aimed at small to medium-scale farmers who lack access to advanced agrotechnological tools. Potential customers also include agricultural cooperatives, government agricultural departments, and NGOs working in the rural development sector. (Sponsorship details can be added here if applicable).

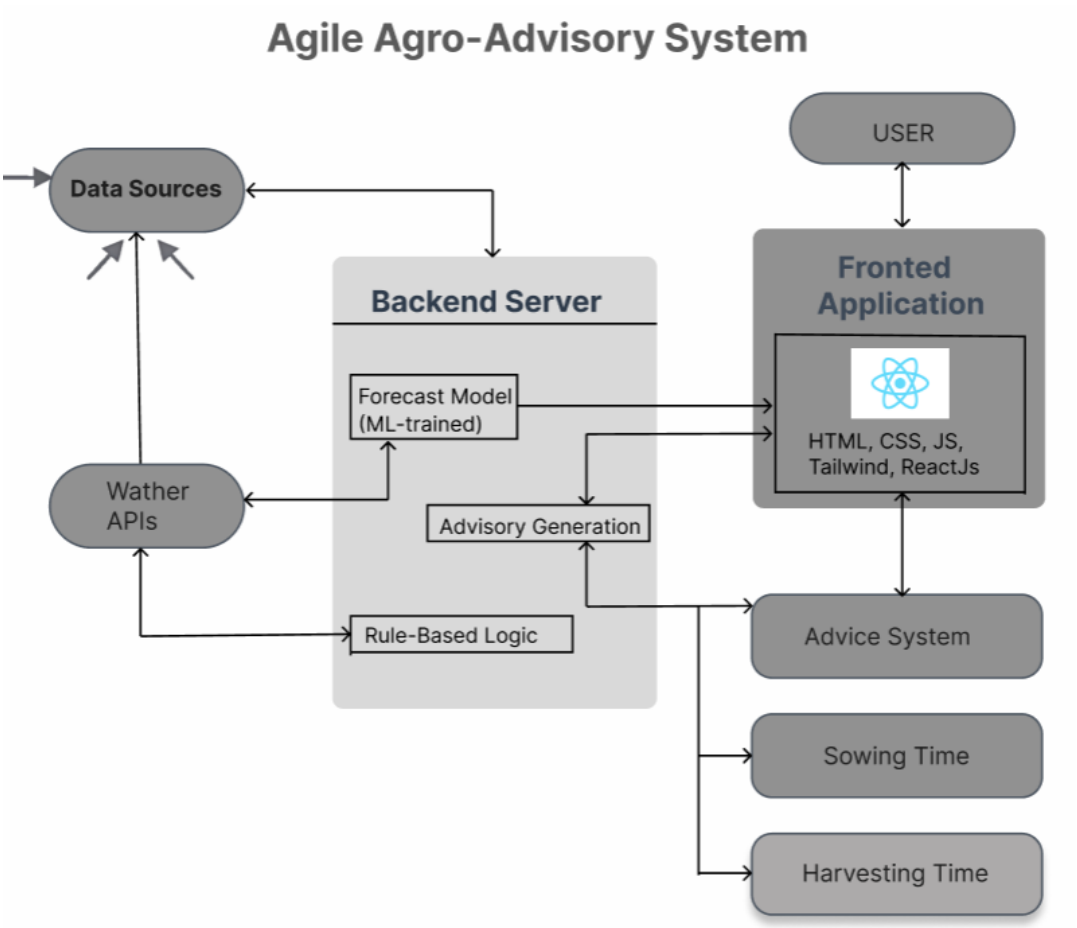
Literature Survey / Prior Search carried out for Problem Identification:

Research in precision agriculture highlights the critical role of IT in enhancing crop yield. Prior works have shown that hyper-local weather prediction can drastically reduce crop losses, yet existing advisory systems often lack personalization and real-time responsiveness. Studies on climate change adaptation emphasize the need for such farmer-centric tools. While machine learning models for yield prediction show promising results, they often lack accessible platforms for small-scale farmers. This project aims to fill this gap by integrating reliable meteorological APIs with modern web technologies to create a cost-effective and accessible solution. (6 to 8 relevant research papers will be cited in the final report).

Objectives:

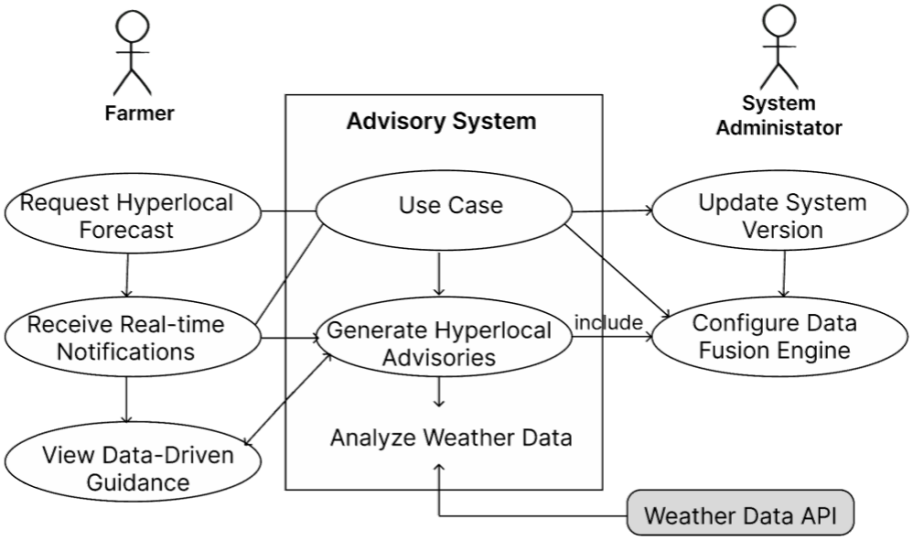
- To provide accurate local weather forecasts for better farming decisions.
- To deliver real-time weather alerts for timely preventive action.
- To recommend the best sowing and harvesting times based on weather conditions.
- To provide intelligent irrigation advice to ensure water optimization.
- To develop a user-friendly web application integrating weather data, predictive models, and advisory services.

Functional Block Diagram:

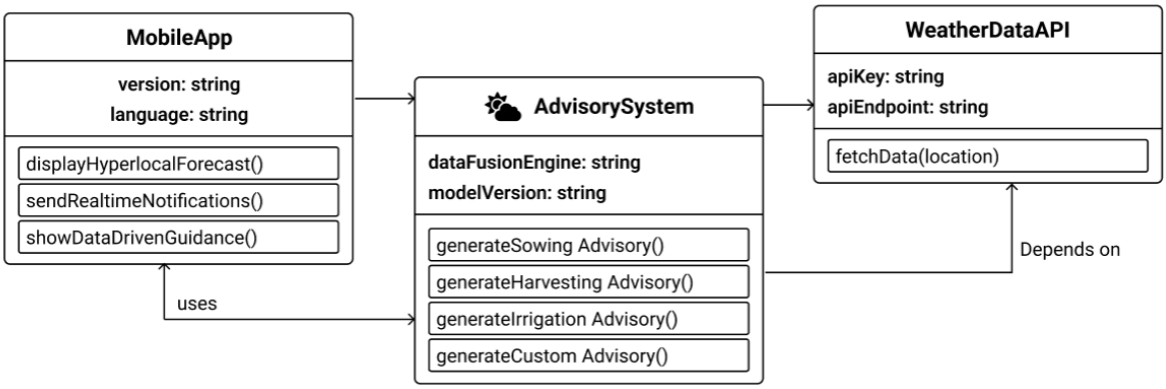


UML Diagram:

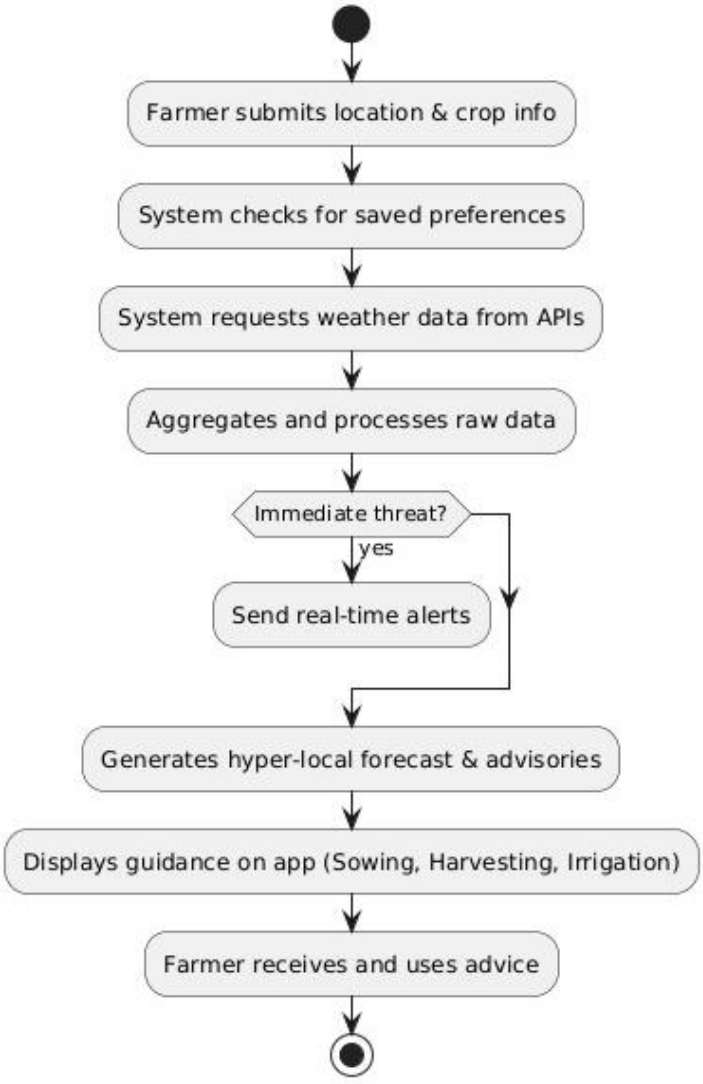
1) Use Case Diagram:



2. Class Diagram:



3. Activity Diagram:



Methodology:

The project will follow an agile development process. Key steps include Requirement Analysis to identify farmer needs; System Design to create modules for data collection and advisory logic; integration of weather APIs like OpenWeather; development of core algorithms for prediction and rule-based advice; and implementation using a tech stack of React, Node.js, and a suitable database. The final phase will involve rigorous testing to validate accuracy and usability.

Outcomes / Deliverables

- A working web application delivering hyper-local weather forecasts & advisories.
- A research paper on precision agriculture through IT integration.
- The complete source code and technical documentation for the project.

Project Potentials

- IoT Integration: Connect with soil moisture sensors for more accurate data.
- Machine Learning: Implement ML models to predict crop diseases.
- Market Integration: Provide information on current market prices for crops.
- Multi-language Support: Expand the application to support regional languages.

Project plan

Phase	Duration	Deliverables
Requirement Analysis	2 Weeks	Requirement specification document
System Design	2 Weeks	Architecture & UML diagrams
API Integration	3 Weeks	Weather API connectivity
Advisory Module Dev	3 Weeks	Logic for sowing, harvesting, etc.
Web / App Development	4 Weeks	Functional prototype
Testing & Validation	3 Weeks	Usability and accuracy test report
Final Deployment	2 Weeks	Stable, deployed web application

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