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Smart Plant Care Web Application

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Abstract

This paper presents the development of a smart web-based plant care application designed to assist users in maintaining the health of their plants through watering reminders, plant disease detection using AI, and environmental monitoring via IoT sensors. The system provides users with real-time data, personalized alerts, and an intuitive interface to track and manage their plants efficiently. By leveraging modern technologies like machine learning and IoT, the application promotes sustainable and informed plant care practices for hobbyists, gardeners, and urban agriculturalists.

Keywords

Plant Care, IoT, AI, Web Application, Disease Detection, Smart Gardening, Machine Learning

1. Introduction

In today's urban lifestyle, maintaining plants has become a common hobby as well as a step toward sustainability. However, many people struggle to monitor plant health due to lack of time or knowledge. This paper proposes a smart plant care web application that automates plant maintenance tasks such as watering schedules, health monitoring, and disease identification using advanced technologies.

2. Literature Review

Several existing systems focus on gardening or agricultural automation using sensors or mobile apps. However, limited solutions combine AI and IoT in a single web platform for comprehensive plant care. Previous works mostly rely on manual tracking and lack automation in disease detection and data-driven watering schedules.

3. System Architecture

- The system is divided into three modules:
- Frontend (React/HTML/CSS): User-friendly interface for interacting with the system.
- Backend (.Net): Handles logic, API calls, and database operations.
- IoT Module (optional): Collects environmental data using sensors (e.g., soil moisture, humidity).
- AI Module (optional): Classifies plant diseases using a pre-trained convolutional neural network (CNN).

4. Features

- User login and profile management
- Plant registration and image upload

- Watering reminders via email/SMS
- Disease detection from leaf images
- IoT-based real-time environmental data monitoring
- Dashboard with plant care analytics

5. Methodology

- Plant disease images were collected from datasets like Plant Village.
- A CNN was trained using Python and TensorFlow.
- IoT sensors (e.g., DHT11, soil moisture sensor) are integrated via Arduino or Raspberry Pi.
- Firebase or MongoDB is used for backend data storage.
- The web application is hosted using platforms like Firebase or Heroku.

6. Results and Discussion

The application successfully identifies plant diseases with a high accuracy rate (~90%) under test conditions. The IoT module provides real-time data for watering decisions. User feedback showed significant improvement in plant health and ease of care through automated reminders and alerts.

7. Advantages

- User-friendly interface for all age groups
- Reduces manual effort and prevents plant damage
- AI-powered disease identification ensures early treatment
- Scalable to support large-scale plant databases

8. Limitations and Future Work

- Dependent on internet connectivity
- Limited disease detection scope (based on training data)
- Future versions can support mobile apps, voice assistants, and offline sensor syncing

9. Conclusion

The Plant Care Web Application provides an innovative and user-friendly solution for plant enthusiasts and home gardeners to monitor and maintain their plants effectively. By integrating technologies like AI for plant disease detection and IoT for real-time environmental monitoring, the system ensures timely alerts and personalized plant care recommendations. The application not only simplifies the plant care process but also encourages sustainable and smart gardening practices. With its scalable design and modular architecture, the system holds potential for future enhancements such as mobile integration, advanced plant analytics, and community-driven plant care support. Overall, this project demonstrates how modern technology can be effectively applied to everyday tasks, making plant maintenance accessible and efficient for all users.

10. References

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