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Plant Disease Detection Using Machine Learning

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ABSTRACT

To detect the plant leaf disease and to recommend the crop using Machine and Deep learning. We use machine learning algorithm for crop recommendation and deep learning for plant disease identification. Leaf disease detection requires huge amount of work, knowledge in the plant diseases, and require the more processing time. Therefore, we can use image processing for identification of leaf disease. The system has been tested with the different numbers of test data set collected from different regions. We combine the both crop recommendation and plant disease identification.

1. INTRODUCTION

An installed application with the simulated algorithmic computer models, AI can guide farmers through the process of growing, suggesting suitable crops, detecting plant diseases. According to the report provided by the United Nations Food and Agricultural Organization (FAO), the global population will probably reach around 9.2 billion by the year 2050. With the available farming land estimated at just an additional 4%, it seems that it is no longer an option to simply plant more crops for feeding. So, what is needed is simply farming with greater efficiency than before. Michael Gomez Selvaraj et Al. have suggested model for banana disease and pest detection using AI.

2. EXISTING SYSTEM

In existing system, they have crop recommendation system and plant disease recommendation system separately. These two projects are in machine learning and deep learning. It hard to use one project for crop prediction and another one for plant disease recommendation. We want to make combine together for user friendly.

3. PROPOSED SYSTEM

Now a day's, dilettante farmers are hard to understand the plant disease, cultivation process, crop type, climate change, etc. Farming is that the spine for every nation's economy. Future agriculture depends on dilettante formers. But new farmers not so strong at farming, So Machine learning and deep learning help to solve their problems. We combine plant disease identification and Crop recommendation system in this single project to make it user friendly.

We use machine learning algorithm for crop recommendation. Here we use random forest algorithm. And we use Convolutional neural network for plant disease identification. And we did it by the web app. That was created by flask.

4. MODULE DESCRIPTION

SYSTEM MODULES:

Module 1: plant disease detection
Module 2: crop recommendation
Module 3: user interface

Module 1: plant disease detection **:**
Purpose: to detect disease in plant leaves using image processing and deep learning.
Features: This module uses a deep learning model, typically a Convolutional Neural Network (CNN), to analyze leaf images and classify them as healthy or diseased. If diseased, it identifies the specific disease.

Module 2: crop recommendation**:**
Purpose: To recommend the most suitable crop to plant based on soil and environmental parameters.
Features: This module uses a machine learning model trained on agro-environmental data (e.g., nitrogen, phosphorus, potassium, pH, rainfall, temperature) to suggest the best crop for a particular region.

Module 3: user interface**:**
Purpose: To provide a seamless and interactive interface for disease detection and crop recommendation.

Features: This module connects Modules 1 and 2 in a single platform (web or mobile app) where users can upload leaf images, input soil/environment data, and receive real-time results.

5. LITERATURE SURVEY

1. Title: " AI-powered banana diseases and pest detection. "

Author: lvaraj, M.G., Vergara, A., Ruiz, H .

2. Title: “Artificial Intelligence Based Recommendation System for Farmers”

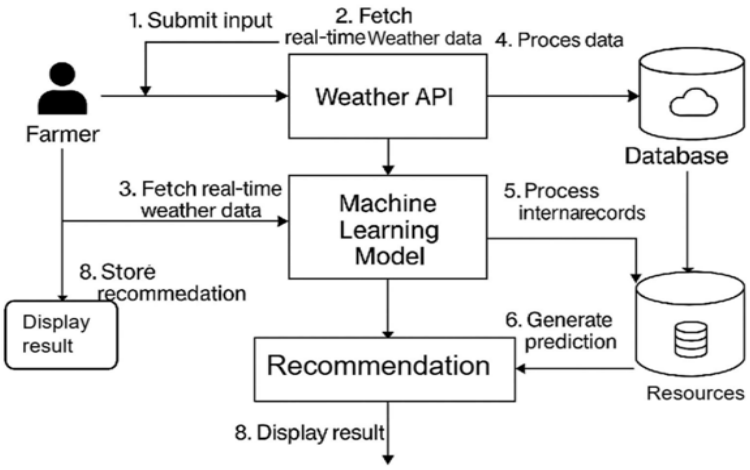
Author: G.Ramyalakshmi, A.Deeksha, M.Sumana.M.E

3.Title: " A Recommended System for Crop Disease Detection and Yield Prediction Using Machine Learning Approach. Recommender System with Machine Learning and Artificial Intelligence "

Author: Akulwar, P.

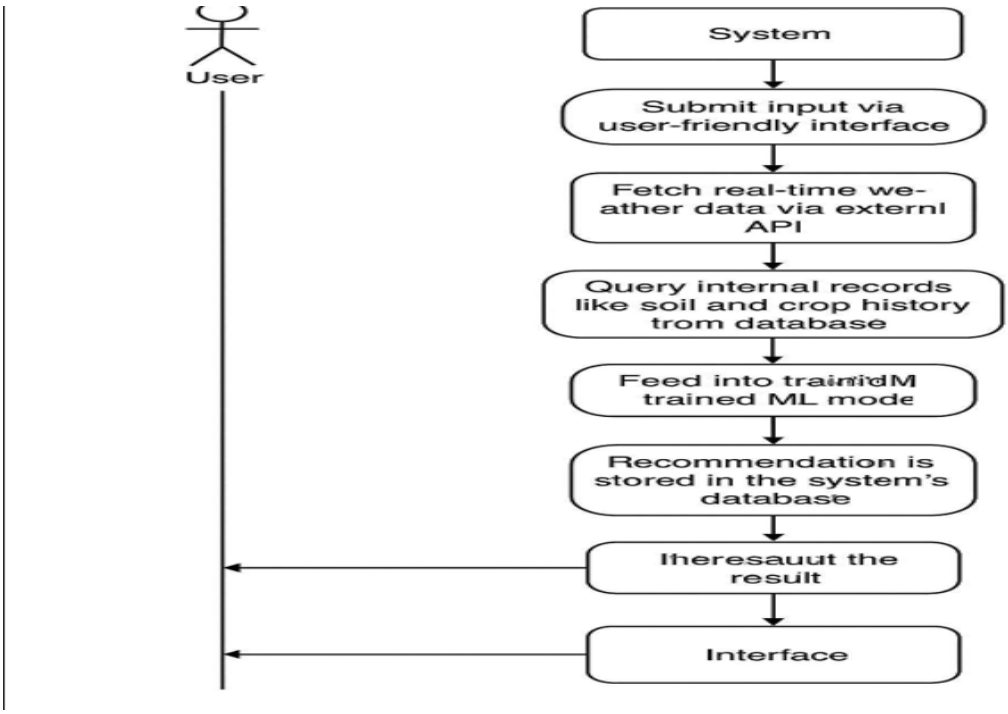
6. DESIGN AND IMPLEMENTATION

1. ARCHITECTURE DIAGRAM:



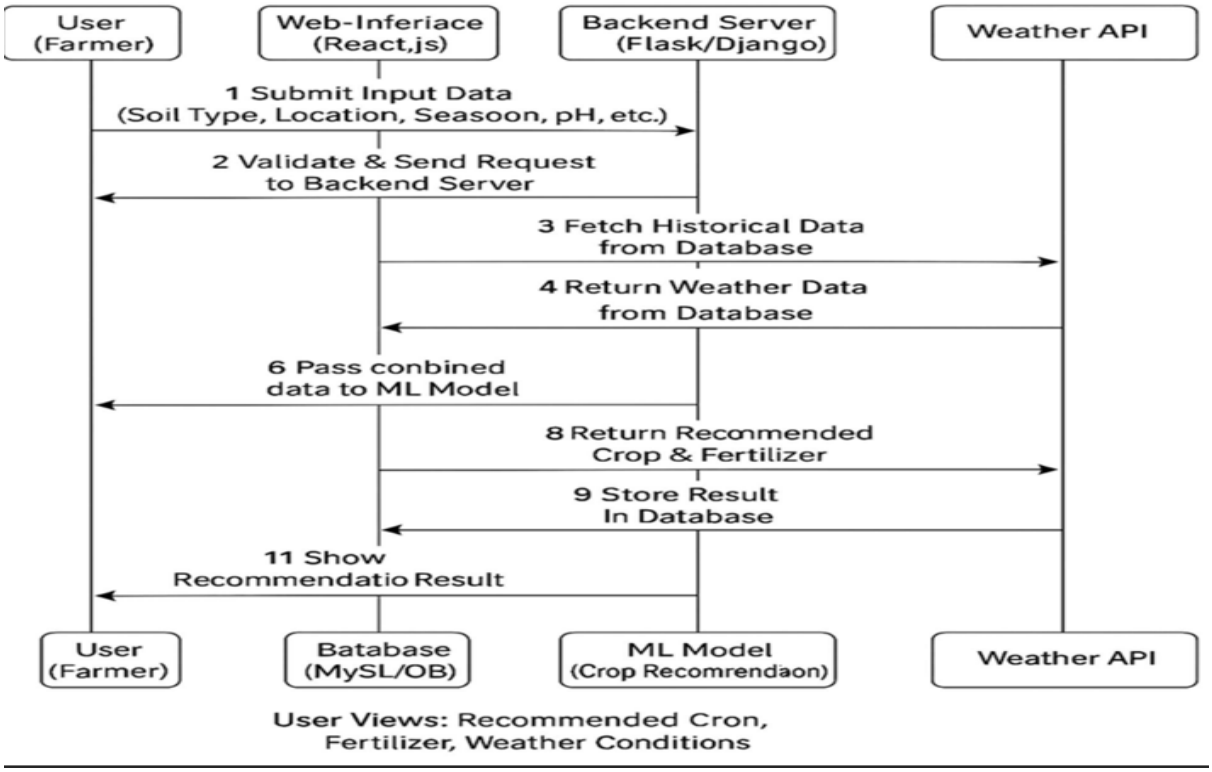
Architecture Diagram

2. DATAFLOW DIAGRAM



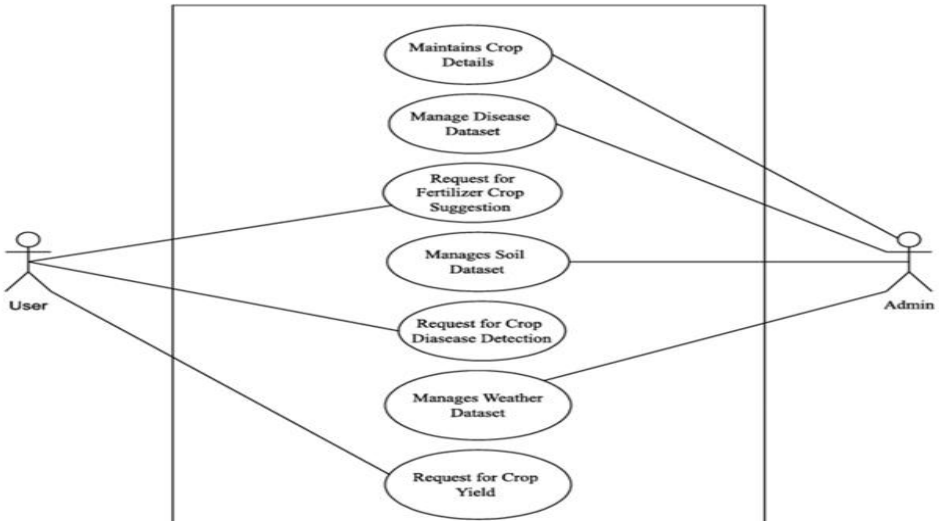
Dataflow Diagram

3. SEQUENCE DIAGRAM:



Sequence Diagram

4. USE CASE DIAGRAM:



Use Case Diagram

7. FUTURE ENHANCEMENT

Our recommendation system works by taking farmers location and season for cultivation as an input, as future work, we aim to address suggesting crops considering farmers budget, area of cultivation land, making this recommendation system more powerful and adaptable to every farming scenario. Currently in this system disease detection is done manually by clicking crop images using mobile cameras. But the system can be made more efficient with usage of cameras or drones to monitor real time crops.

8. CONCLUSION

Because of biological nature of agriculture, too much of uncertainty and risk involves in farming. So, our system provides a solution to above mentioned problem by assisting framers in order to reduce uncertainty in farming and improving productivity. By training 'Agricultural Production in India' dataset, which is classified region wise, we have built a recommendation system using Content based filtering technique which is a candidate generation System. To bring bknowledge to the farmers, his/her location and planting season play a vital role to suggest crops are to be sown in the cultivable land. The performance measure of CNN model for
plant disease detection models is based on parameters like accuracy.

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4. Mohanty, S. P., Hughes, D. P., & Salathé, M. (2016). Using Deep Learning for Image-Based Plant Disease Detection. Frontiers in Plant Science, 7. doi:10.3389/fpls.2016.01419 https://github.com/spMohanty/PlantV illage-Dataset