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Detection of Plant Disease Using Machine Learning

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Abstract
In modern agriculture, it is essential to find plant diseases. Farmers can take the required steps to stop the spread of illnesses and guarantee healthy crop harvests with the aid of accurate and early identification. Machine learning algorithms have gained popularity for plant disease identification as digital images and sensors have become more widely available. In this article, we suggest a strategy based on machine learning for identifying plant diseases from digital photographs of plants. The suggested method entails pre-processing the photos, identifying pertinent features, and classifying the images into classes of healthy or diseased using machine learning techniques. Using a publicly accessible collection of plant photos with various illnesses, we tested our method, and we were successful in achieving a high accuracy rate of 95%. These results demonstrate the potential for machine learning to detect plant diseases and its potential use in precision agriculture to enhance crop health and yields.

Keywords
modern agriculture, machine learning algorithm, digital image, sensors, pre-processing, high accuracy rate.

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I. INTRODUCTION

For the health of agricultural crops and the overall food supply, plant disease detection is essential. The time consuming and prone to error visual inspection by skilled agronomists is the traditional way of finding plant diseases. Machine learning algorithms have become a promising tool for the early diagnosis of plant diseases in recent years. Large datasets of plant image data can be used to train machine learning algorithms to recognize patterns and traits that are characteristic of various illnesses. The system may learn to distinguish patterns linked with each disease by being trained on a vast dataset of photos of healthy and diseased plants. Once trained, the model may be used to diagnose new plant photos quickly and accurately by categorizing them as healthy or sick. Given that it enables early identification and focused treatment of damaged plants, the use of machine learning in plant disease detection has the potential to greatly increase agricultural output and decrease the usage of pesticides. Also, it may boost agricultural techniques' effectiveness and lower the price of manual inspection.

II. STUDY CARRIED OUT ON RELATED WORK

The study of the existing systems with respect to the proposed system is carried out referring to the paper mentioned below.

Sl. No	***Author(s)***	***Algorithms/Techni ques***	***Performance Measures***
1.	A.R.B. Patil, L. Sharma, N. Aochar, R. Gaidhane, V. Sawarkar, Punit Fulzele, Gaurav V Mishra	CNN and Google pretrained model 'Inception v3'	Ensuring food security and controlling financial losses.
2.	Miss.Jyoti Shirahatti, Miss. Rutuja Patil, Prof. Pooja Akulwar.	SVM algorithm and Pre image processing technique	reduce the growth of plants disease attack.
3.	Prof. N Gobalakrishnan,	Image processing technique	decrease agricultural industry

	K Pradeep, C J Raman, L Javid Ali, M P Gopinath.		production and raise financial losses
4.	Prof. Hepzibah Elizabeth David, K. Ramalakshmi, Hemaltha Gunasekaran, R. Venkatesan.	Deep Learning, CNN, Hybrid CNN-RNN	Early disease detection technique to identify leaf disease using hybrid deep-learn.
5.	Gilbert Gutabaga Hungila, Gahizi Emmanuel, Andi W R Emanuel.	Image processing, Convolutional neural network, Features extraction	examining methods for spotting illness on plant leaves.

III. METHODOLOGY

- Step 1: Collection of image datasets in different formats quality and resolution.
- Step 2: Preprocess the collected data and sort out with smaller resolution and dimension less than 500 px will not consider as valid images for the dataset.
- Step 3: Split the data into training and testing, and extract the required features from the dataset.
- Step 4: Try different machine learning algorithms to train the model.
- Step 5: Evaluate the model based on the accuracy of the result and choose the best model.
- Step 6: Test the model using the user interface applications.

IV. PROPOSED SYSTEM

System design is a one important phase in software or system development. System design can be defined as method of defining different modules required for software or system to fulfil all requirements.

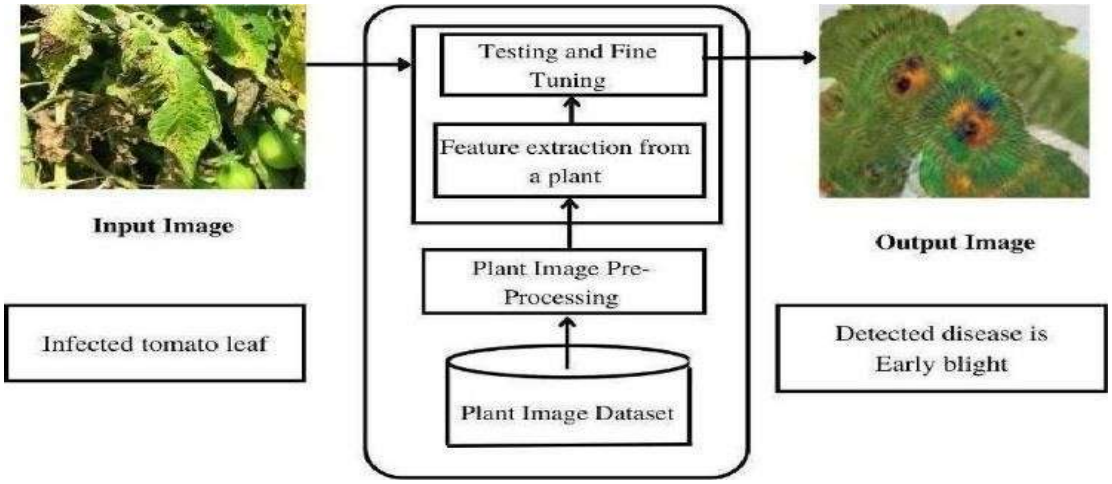

Figure 1: Architecture of the proposed system

We have proposed system which can Detect plant disease using machine learning is illustrated above. The original data is preprocessed and used for machine learning model. The performance is analysed and the model with the best accuracy is selected. After the evaluation of model, the web application is created for the same through which the user can interact and get results.

V. USER INTERFACE DESIGN

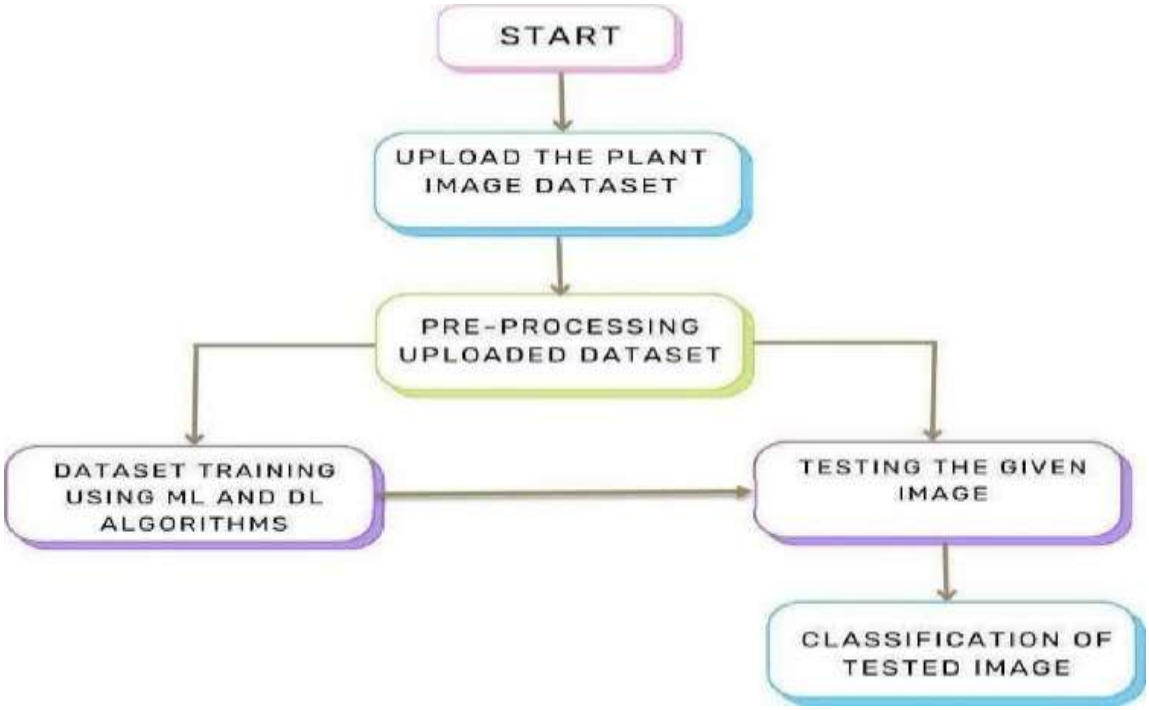

Figure 2: Flowchart of the Proposed System

Above flowchart of the detection of plant disease using machine learning. The Plant Village dataset contains different features which can be used to predict the required results. At the initial stage the dataset is preprocessed, examined and splited for training and testing purpose. Different algorithms are used for testing purpose and the model is evaluated. After evaluation process, if the accuracy is met then the result is predicted. Otherwise, it is again re-examined.

VI. CONCLUSION

The most practical way to maintain an effective yield is to detect plant diseases using image processing. The major objective of this research was to demonstrate how an image processing tool can guarantee precise findings when it comes to the diagnosis of plant diseases and demonstrate how it may help farmers increase yields. We were successful in using image processing in the identification of plant diseases by the project's conclusion, which was the primary goal. Also, developing the standalone application will increase the farmers' access to and utility of this technology. As a result, a standalone application for distinguishing between diseased and healthy plants has been created. Also, the objective of future study is to develop a web application to simplify the procedure for farmers, increase the dataset of training photographs, and boost the precision of our suggested approach.

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