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CROP DISEASE PREDICTION

Mr. Y. Nagendra Kumar [1], G N V B P LS Annapurna Kolachina [2], A. Poojitha [3], A. Sulthana[4], A. Anukeerthana [5]

[1] Assistant Professor, Department of CSE, Ramachandra College of Engineering, Eluru, A.P

[2,3,4,5] UG Students, Department of CSE, Ramachandra College of Engineering, Eluru, A.P

ABSTRACT

Indian economy greatly depends on Agriculture. Agriculture is the practice of cultivating plants and livestock. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. However, the diseases that influence the crops have impacted agriculture production. It is one of the issues that cause a reduction in the quality and quantity of crops. So, the detection and classification of crop diseases are necessary to increase crop productivity and economic process. This disease commonly gets infected by pathogens such as bacteria, fungi, and viruses. And also, it can be caused due to soil type, and environmental conditions like rainfall, humidity, temperature, and so on. Yet to our Knowledge, till now there is no complete solution to this crop disease. Design a disease prediction model as an additional feature that helps the farmers to identify if their crops are suffering from a disease. This will help the farmers to ensure that their crops stay healthy throughout their period of growth. Also, if the crops are suffering from a disease, we would be able to detect that and suggest what must be done to cure the disease and avoid it in the future. The project Aims to design a solution for crop diseases. In this, by analyzing various machine learning and image processing techniques applied to detect crop disease. In this, we will review different machine learning techniques, and Deep Learning to get better accuracy for the system. Here, crop leaf images are taken as input and after processing that image, it will detect whether there is any disease or not which will help to increase productivity and economic process

1. INTRODUCTION

Agriculture is the main occupation of India. It contributes about sixteen percent (16%) of the total GDP and ten percent (10%) of total exports in India. Either directly or indirectly around 60% of people in India depend on agriculture for livelihood. It falls under the primary sector of the Indian economy. It is the main source of food, fodder, and fuel. Over 60 % of India's land area is arable making it the second-largest country in terms of total arable land.

Agricultural systems are confronted not only with food production for humans and animals alike but also with environmental protection issues. This is why there is currently increasing pressure to reduce pesticide use in order to reduce possible production costs and environmental impact.

The presence of Crop diseases on an agricultural farm costs farmers a lot of money. Crop losses owing to animals, diseases, pests, and weeds account for 20 to 40 percent of the overall global agricultural productivity, according to IRJET research. The traditional method of physically analyzing particular aspects of leaves, such as texture, color, and form, to identify infections is not always efficient. As a result, most farmers throughout the world engage professional agriculturists to diagnose diseases in their crops on large farms. It is, however, a time- consuming and costly process. Crop Disease is one of

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the issues that cause a reduction in the quality and amount of plant production. This can lead to starvation of people. To increase plant productivity and economic process, the detection and classification of plant diseases are necessary tasks.

In recent years, with the development of artificial intelligence technology, machine learning algorithms have been widely used in crop disease identification and prediction. Through the analysis of a large number of crop disease data, the machine learning algorithms can adjust their models according to the characteristics of the data, and then accurately predict the occurrence of crop diseases. It is necessary to detect disease and spray pesticides properly on crops. When they are infected by diseases, there is a change in shape, size, and color.

These symptoms can be checked manually but not in the proper amount. Hence various image processing methods detect diseases on plant leaves and stem. Using image processing we can find the exact level of disease that can be identified based on the color, texture, or shape change of plants. And then using machine learning algorithms we can classify these diseases and provide a solution for that disease.

2. LITERATURE SURVEY

Yashpal Sen, Chandra Shekar Mithlesh, and Dr. Vivek Baghel [1] describe an approach for disease detection of the crop for economic growth of the rural area. This paper discussed an automated system for identifying and classifying different diseases of contaminated plants, an emerging research area in precision agriculture. This paper describes the approach to prevent the crop from heavy loss by careful detection of diseases. The region of the internet is leaf because most of the diseases occur in leaf only. Histogram equalization is used to pre-process the input image to increase the contrast in low-contrast images, K-mean clustering algorithm classifies objects. Diseases in crop leaves are detected accurately using an image processing technique it is used to analyze the disease which will be useful to farmers.

K. Elangoran, S. Nalini [2] presented a concept of plant disease classification using image segmentation and SVM techniques. This paper describes an image processing technique that identifies the visual symptoms of plant diseases using an analysis of colored images, the work of a software program that recognizes the color and shape of the leaf image. LABVIEW software was used to capture the image of the plant RGB color model and MATLAB software is used to enable a recognition process to determine the plant disease through the leaf images. The color model respectively was used to reduce the effect of illumination and distinguish between leaf colors efficiently and the resulting color pixels are clustered to obtain groups of color in the images.

Sandesh Raut, and Karthik Ingale [3] proposed a fast and accurate method for the detection and classification of plant diseases. The proposed algorithm is tested on the main five diseases on the plant they are Early Scorch, Cottony mold, Ashen Mold, Late scorch, and Tiny Whiteness. Initially, the RGB image is acquired then a color transformation structure for the acquired RGB leaf image is created. After that color value in RGB is converted to the space specified in the color transformation structure. In the next step, the segmentation is done by using the K-means clustering technique after that mostly green pixels are masked. Finally, the feature extracted was recognized through a pre-trained neural network. The result shows that the proposed system can successfully detect and classify diseases with a precision between 83%and 94%.

Sagar Patil, Anjali chandavale [4] This survey mainly concentrates on disease detection of dicot plants, here the image acquisition is done by taking RGB image pattern as input and transforming it into HSI form, after that texture analysis CCM and SGDM are used. In the
agricultural field, rice cultivation plays a vital role. But their growths are affected by various diseases. There will be a decrease in production if the diseases are not identified at an early stage. The main goal of this work is to develop an image-processing system that can identify and classify the various rice

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plant diseases affecting the cultivation of rice namely brown spot disease, leaf blast disease, and bacterial blight disease. This work can be divided into 2 parts namely-rice plant disease detection and recognition of rice plant diseases. In disease detection, the disease-affected portion of the rice plant is first identified using KNN and a clustering classifier. After that, in disease recognition, the rice plant disease type is recognized using classifiers namely KNN and SVM.

T. RUMPf, A-K , Mahlein, U.Steiner , E-C Oerke[5] Work expertise in plant diseases requires successive processing time hence image processing is used for the detection of plant diseases, this paper discuss the method used for the detection of plant diseases using the leaves images, and also various techniques to segment the disease part of the plant this paper also discussed some feature extraction and classification techniques to extract the features of infected leaf and the classification of plant diseases the accurately detection and classification of the plant diseases is very important for the successful cultivation of Crop and this can be done using image processing the use of an n methods for classification of disease in plant such as self organizing feature map block back propagation algorithm SVM excreta can be efficiently used from these methods we can accurately identify and classify various plant diseases using image processing techniques machine learning methods such as artificial neural network decision tree Cayman neighbour's and support vector machine have been applied in Agricultural Research this paper also discussed dichotomous classification between healthy leaves and leaves with disease symptoms the results showed that the specificity of the classification was always lower than the sensitivity the classification error range was 7% to almost 3% the classification accuracy increased with increasing disease severity the result showed that the classification accuracy was about to 65% for all diseases.

3. EXISTING SYSTEM

When plants and crops are affected by pests, it affects the country's agricultural production. Usually, farmers or experts observe the plants with the naked eye to detect and identify sense. But this method can be time processing, expensive and inaccurate. Existing systems use expert systems that contain many rules (business), leading to much coding. May not give more effective results. Most machine learning algorithms are on a statistical approach. These statistical approaches are used for textual and numerical data. They may not work heavy or large no of image inputs.

Disadvantages of the existing system

- Inaccurate
- Expensive
- It takes more time
- Much coding
- Mostly statistical approach

Inaccurate training

4. PROPOSED SYSTEM

A Novel way of Training and the Methodology used to facilitate a quick and easy system Implementation in Practice. All essential steps required for implementing this disease recognition model are fully described throughout the paper, starting from gathering images to creating a dataset, assessed by agricultural experts, and a deep learning framework to perform the deep CNN training.

This method paper is a new approach to detecting Crop diseases using the deep convolution neural network trained and fine-tuned to fit accurately to the database of a plant's leaves that was gathered independently for diverse plant diseases. The advance and novelty of the developed model lie in its simplicity; healthy leaves and background images are in line with other classes, enabling the model

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to distinguish between diseased leaves and healthy ones or from the environment by using deep CNN.

Advantages of the proposed system

- More Accurate
- Less time
- It gives more efficient results
- Meant for large data
- Heavy no images / large datasets
- More training
- Usage of hidden layers

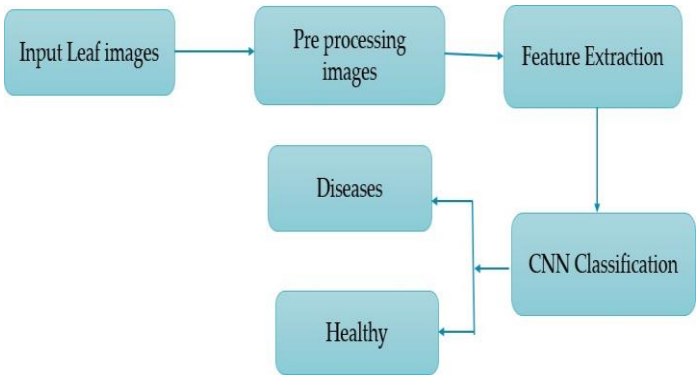

Fig 1 System Architecture

5. RESULTS

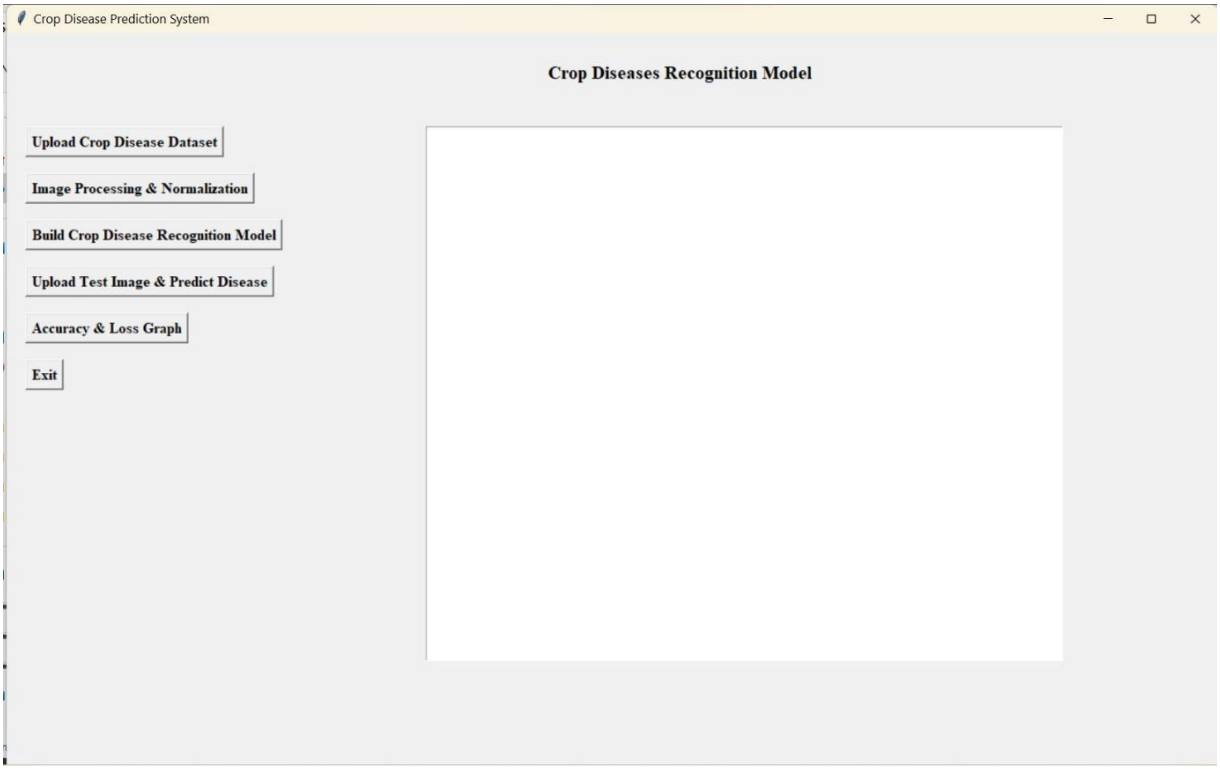

Fig:2 Crop Disease Prediction System Environment.

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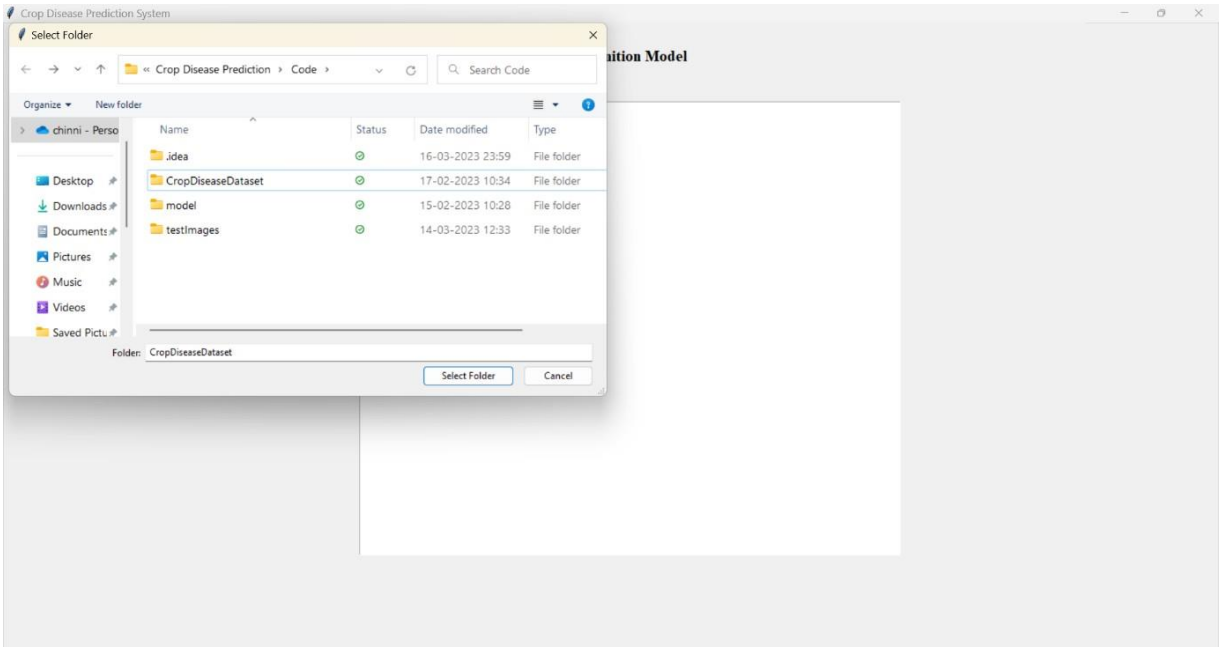

Fig:3 Uploading Crop Disease Dataset.

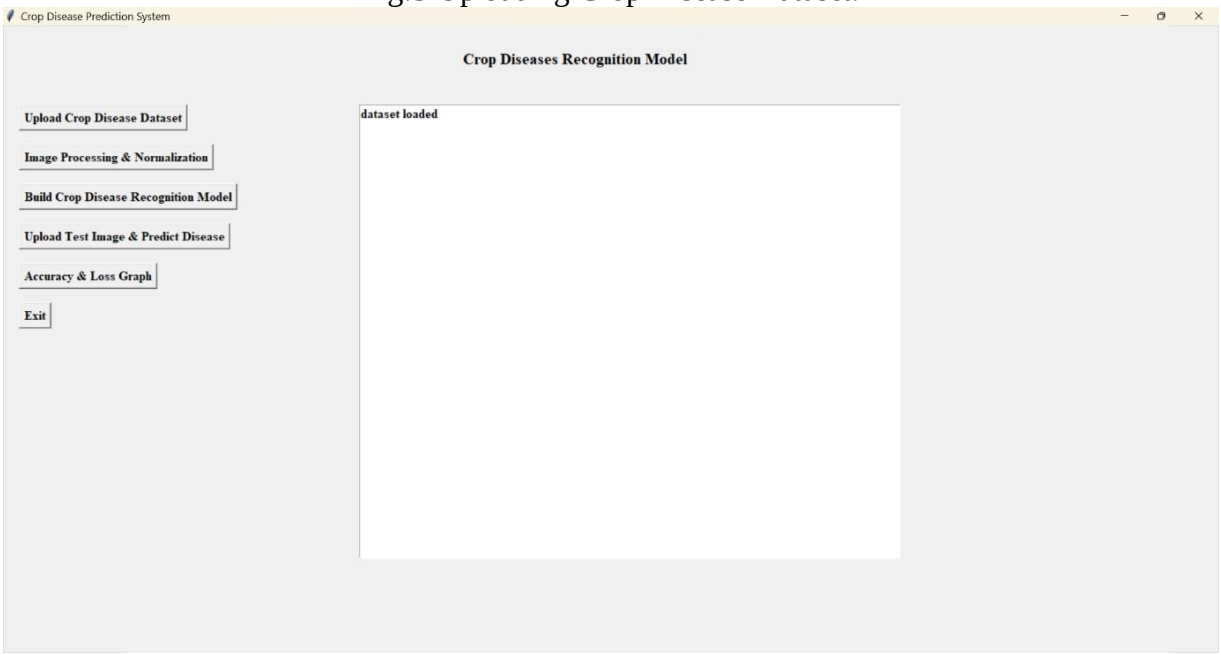

Fig:4 After Uploading the dataset is Loaded.

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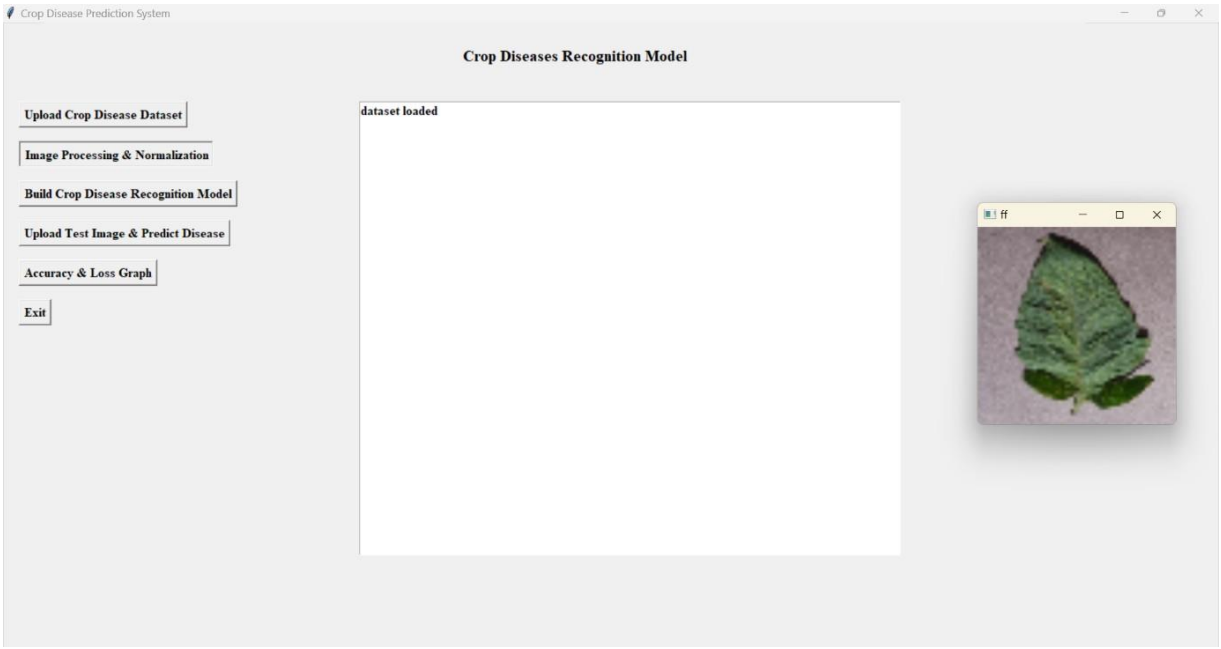

Fig:5 Image Processing &Normalization has performed and then a random leaf image is generated.

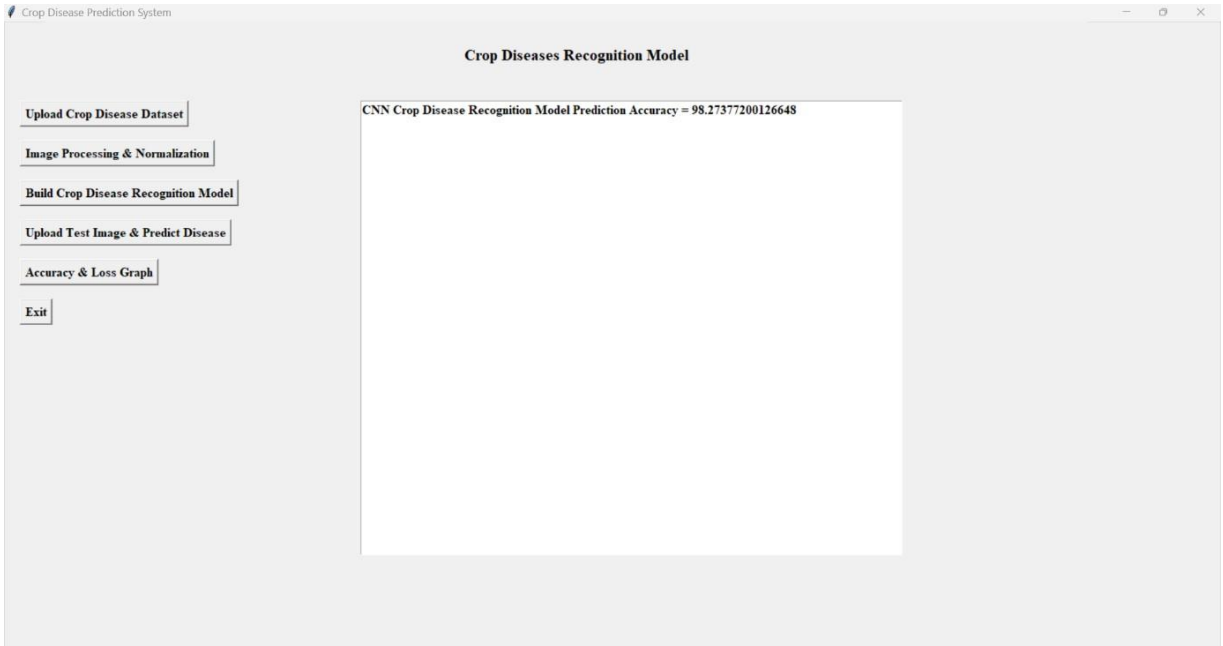

Fig:6 Crop Disease Recognition Model Prediction Accuracy.

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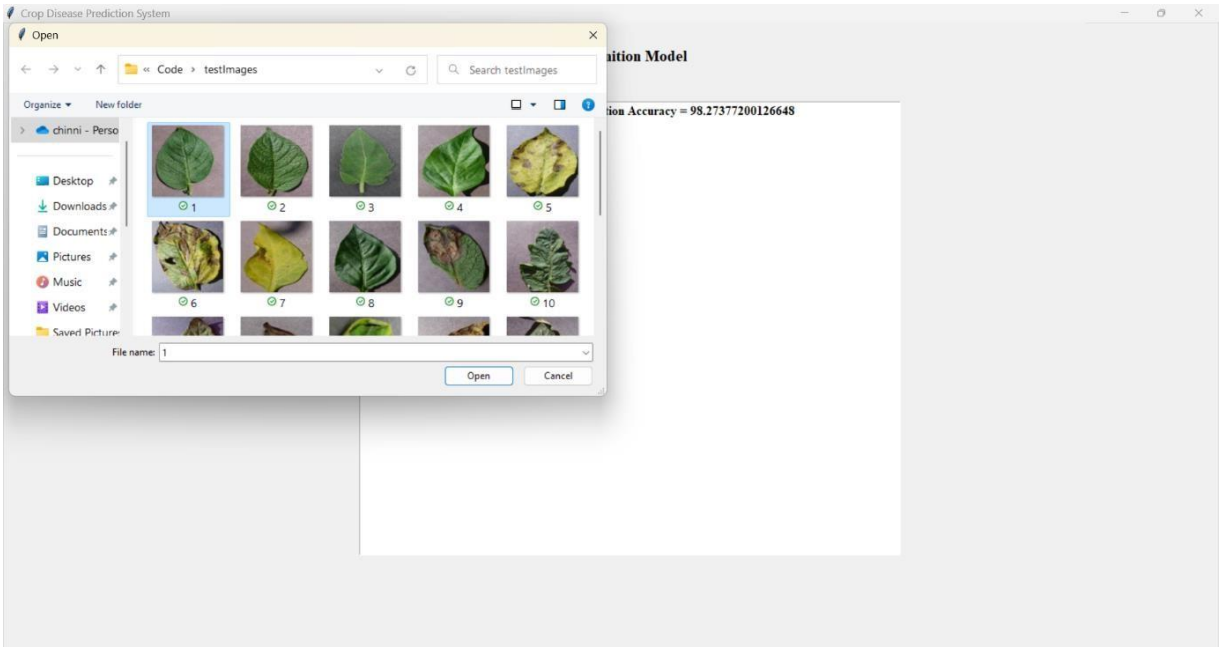

Fig:7 Uploading a test image to predict whether it is Healthy or diseased.

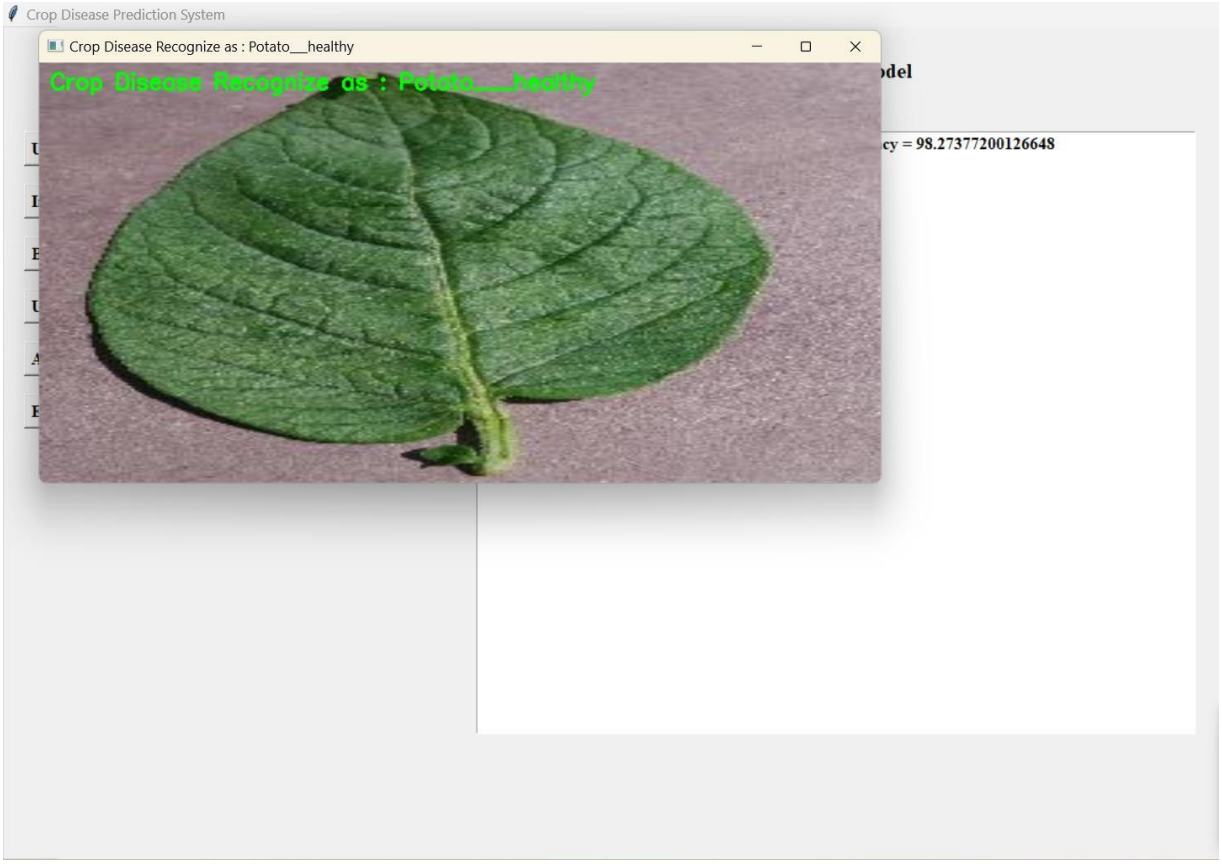

Fig:8 Predicts that the given test image crop disease is recognized as Potato_____healthy which

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means it is healthy.

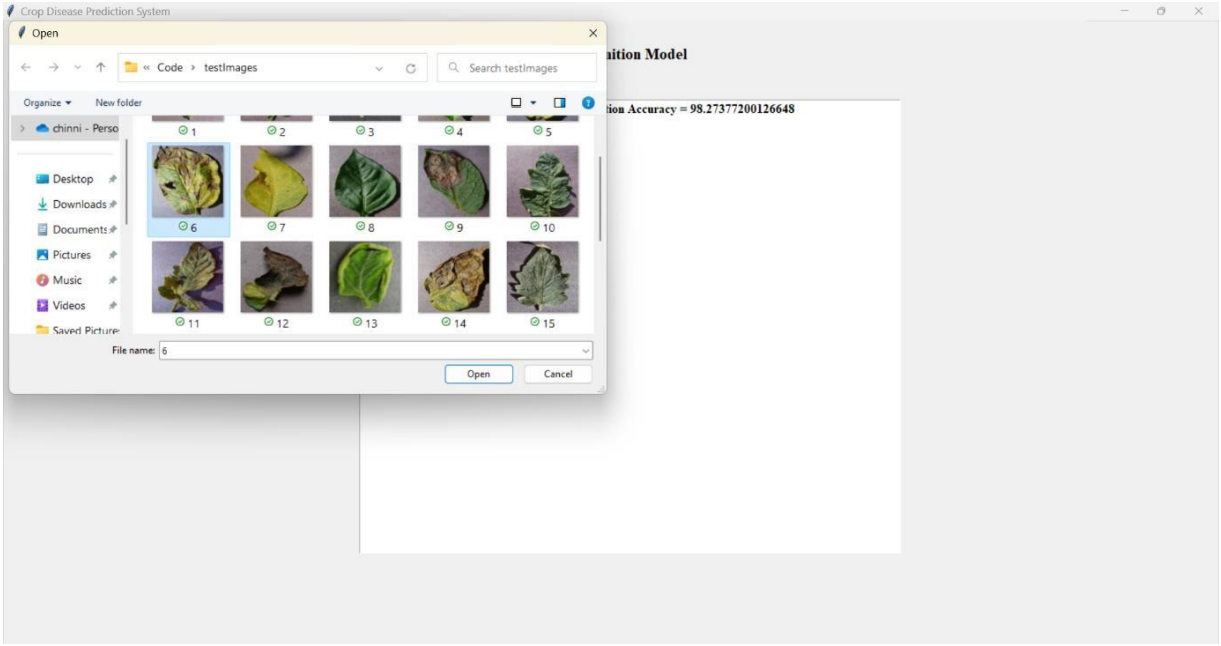

Fig:9 Again Uploading another test image to predict whether it is Healthy or diseased.

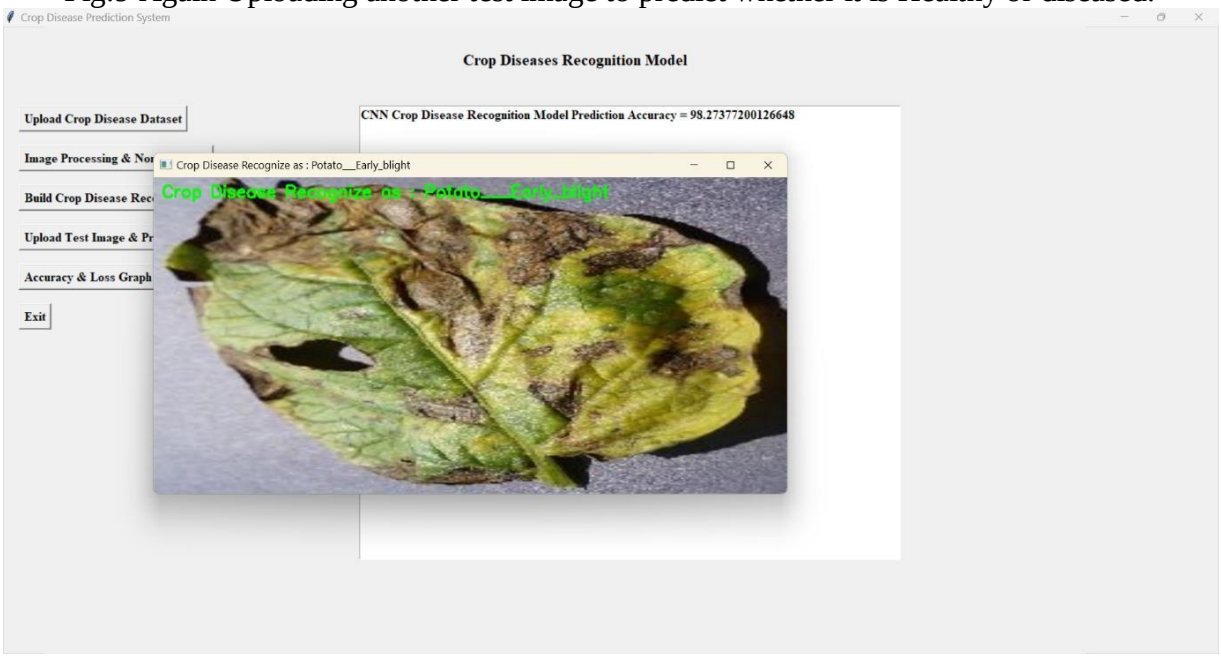

Fig:10 Predicts that the given test image crop disease is recognized as Potato_____Early_blight which means it is diseased.

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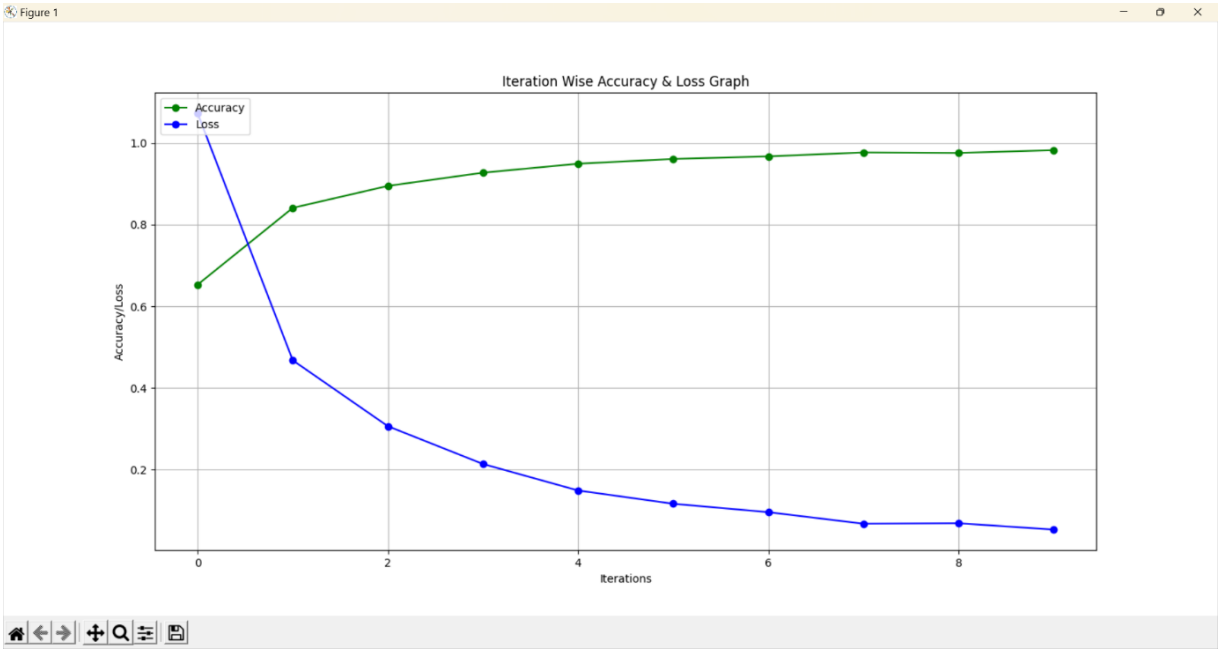

Fig:11 Accuracy &Loss Graph

6. CONCLUSION

This project presents an approach for detecting crop diseases using an improved convolutional neural network (CNN). The proposed deep-learning-based method can automatically extract the distinguishing features of diseased images and achieve high accuracy in identifying common types of crop diseases in real time. To ensure the model's generalization performance and obtain a sufficient dataset, a total of 2,000 images with uniform and complex backgrounds were collected in a laboratory setting.

This system can serve as a powerful tool to aid farmers and agricultural experts in identifying and managing crop diseases promptly. With the assistance of machine learning algorithms, accurate diagnosis of crop diseases can be made, providing early warning to farmers. The system can also be used to monitor crop health and suggest preventive measures to prevent disease outbreaks. Ultimately, this system can reduce crop losses and improve yields, benefiting the agricultural industry as a whole.

`10.2 Scope For Future Enhancement

There is scope for the future development of crop disease prediction. CNN models have proven to be highly effective in detecting and classifying diseases in crops, and they have the potential to significantly improve the accuracy and efficiency of crop disease diagnosis. With the increasing availability of image datasets and advancements in machine learning techniques, CNN models can be further optimized and trained on larger datasets to achieve higher accuracy in crop disease prediction. Additionally, with the integration of remote sensing and Internet of Things (IoT) technologies, CNN models can be deployed in real-time to detect crop diseases and facilitate timely and effective responses, leading to better crop management and increased crop yields. This can potentially reduce the need for manual inspection, which can be time- consuming and error-prone.

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