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Identification of Soyabean Leaf Diseases

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ABSTRACT: Agriculture is one of the most important sectors in the Indian economy. It is the backbone of the country's development. One of the major problems faced by the agriculture sector is finding the diseases in the plants at a right time. In the olden days, disease identification is done by experienced people. But it is not possible in remote areas, as it is very difficult for farmers to contact the experts. Also it can be a wrong disease identification that can lead to the loss of yield. Climate change is also one of the major reasons for plant diseases. In large farms, if the disease is not recognized at the right time there is a huge loss in agriculture production. In India there are Agriculture Department People, they cannot see the problem exactly faced by the farmer hence sometimes they may give wrong suggestions to the farmers regarding the plant disease. This may also lead to the destruction of the crop.

So in order to address the challenges related to the classification and recognition of soybean disease and healthy leaf identification, it is important to have access to high-quality images. For this purpose we have made a dataset which comprises lot of photos of different Soyabean plant which will help us to recognize healthy as well as diseased leaf to identify what type of disease on the Soyabean plant. These images have been captured from various angles and directly sourced from soybean agriculture fields.

KEYWORDS: Agriculture, soyabean, diseases, crop, leaf

I. INTRODUCTION

The "Identification of Soybean Leaf Diseases" project represents a significant advancement in the agriculture field by using the smart technology to help farmers. Soyabean is a crucial global crop, affected by various diseases that can harm their growth and yield. This project we have employed computer program known as a Convolutional Neural Network (CNN), which used to distinguish between the healthy leaf and diseased leaf to know about the plant health. The CNN algorithm examines the images that we have taken from the soyabean plot, it identify any signs of diseases with remarkable accuracy. This innovative approach provides a rapid and reliable way to detect potential issues in the crops. By recognizing diseases, farmers can take timely actions to protect their crop, ensuring a healthier harvesting. Essentially, this project helps farmers to identify the diseases timely and they can aid the treatment for this. Also it reduces their cost of soyabean farming by avoiding the further damaging of crop due to diseases. So, the agriculture and advanced technology, this initiative aims to enhance farming practices, promote sustainable agriculture, and contribute to increase in farmer's security by safeguarding the well-being of soybean crops.

This project is about of image processing and machine learning, to develop a robust system for the automated identification of soybean leaf diseases. Traditional methods of disease identification rely on manual inspection, which is time-consuming and it cannot be accurate every time. So to avoid this human error we have used the combination of artificial intelligence, this project aims to streamline the identification process, enabling farmers and agricultural experts to diagnose soybean leaf diseases.

The implementation of this technology-driven solution enhance the agricultural productivity, and ultimately contributing to global food security.

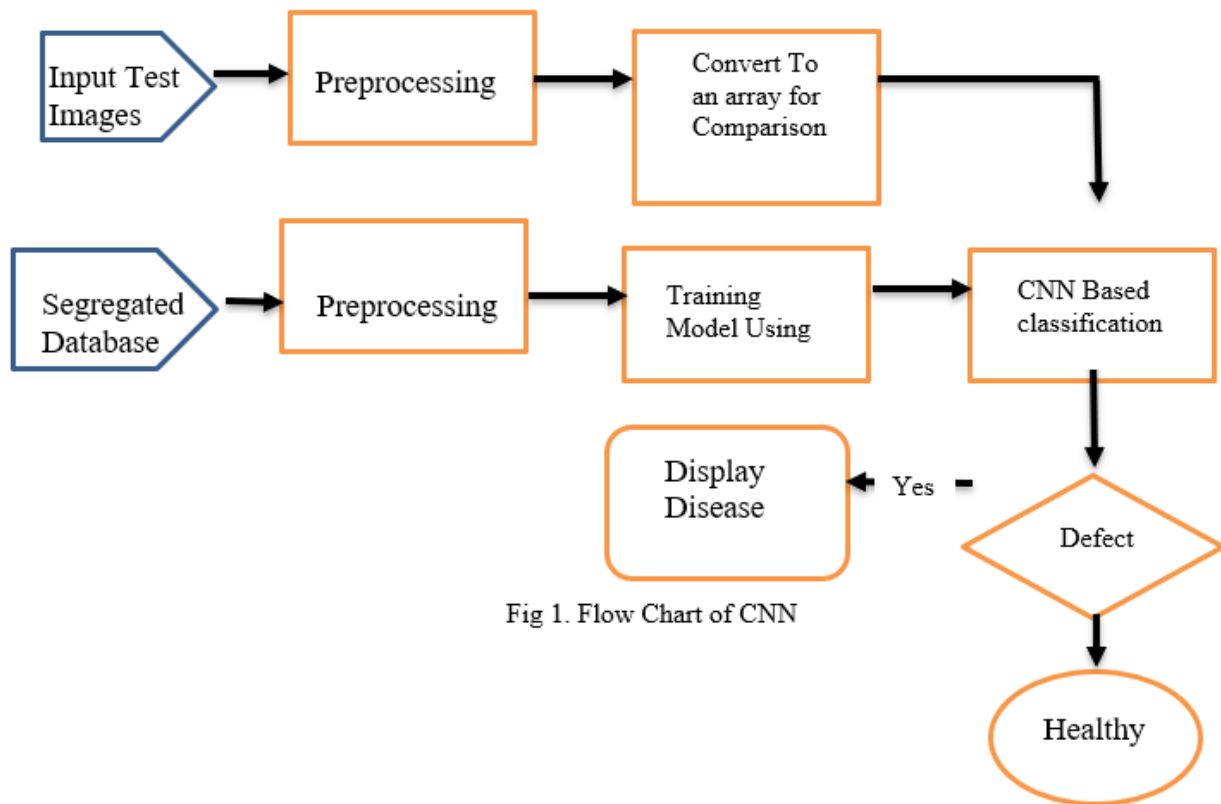


Fig 1. Flow Chart of CNN

II. RELATED WORK

In this system plant disease detection is made through image processing technique. Here python programming language is used, Detection of the plant disease involves steps image acquisition, image processing, image segmentation, feature extraction and classification.

In this section the proposed methodology which recognizes the diseases of a plant. By considering the image of a leaf and applying different image processing techniques, the images are classifying them as whether that leaf/plant is having any disease or not. The framework consists of several stages to get the accuracy of identifying the disease which is shown in Fig.1. Our system works in four steps which are defined below.

Step 1: The dataset named “Soyabean” is uploaded into the database for the analysis purpose.

Step 2: After uploading, the database will be Pre-processed such as image reshaping, rescaling, and conversion to an array format.

Step 3: The dataset is partitioned into training and testing sets.


Step 4: Constructed a CNN model. The training dataset is used as inputs to CNN and the weights are being adjusted to accurately recognize the disease.

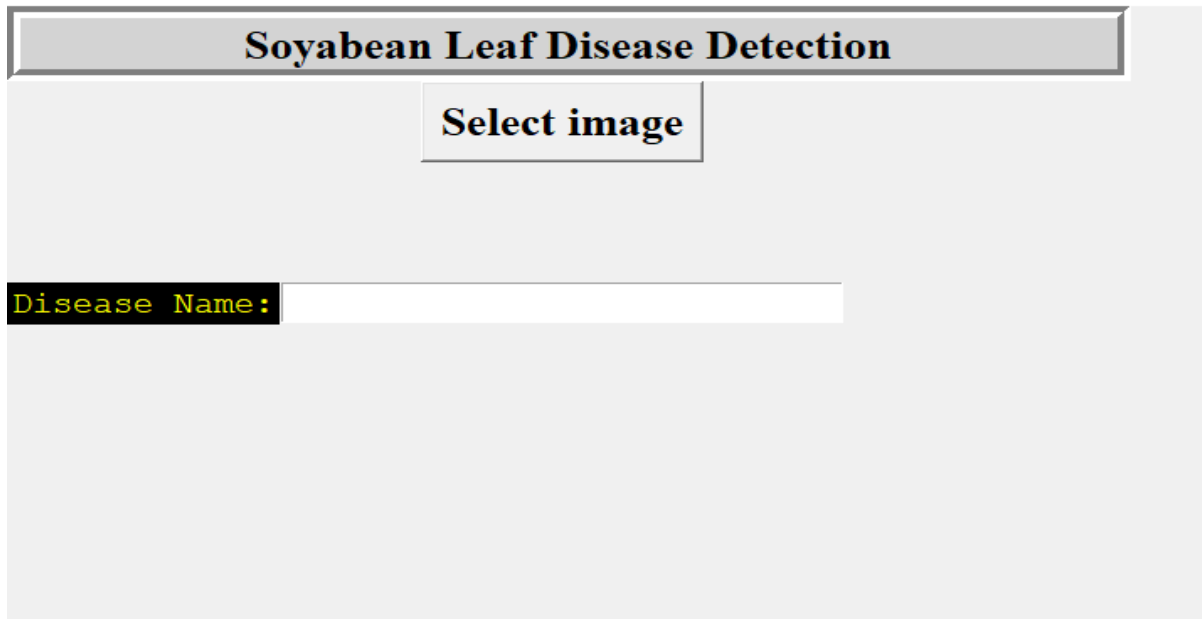
III. METHODOLOGY

The methodology for the project "Identification of Soybean Leaf Diseases Using CNN" encompasses several systematic steps. Initially, we assemble a substantial collection of images portraying both healthy soybean leaves and leaves afflicted by various diseases. These images serve as the foundation for our analysis. Next, we employ Convolutional Neural Networks (CNNs), a sophisticated form of artificial intelligence, to scrutinize these images. CNNs are adept at discerning intricate patterns and distinctive features within visual data, making them ideal for tasks such as image classification. Through a process called training, we expose the CNN model to our dataset, presenting it with numerous examples of both healthy and diseased leaves. This exposure enables the CNN to learn the distinguishing characteristics of each condition. Following the training phase, we subject the CNN to a series of tests using previously unseen images. These tests evaluate the model's efficacy in accurately identifying soybean leaf

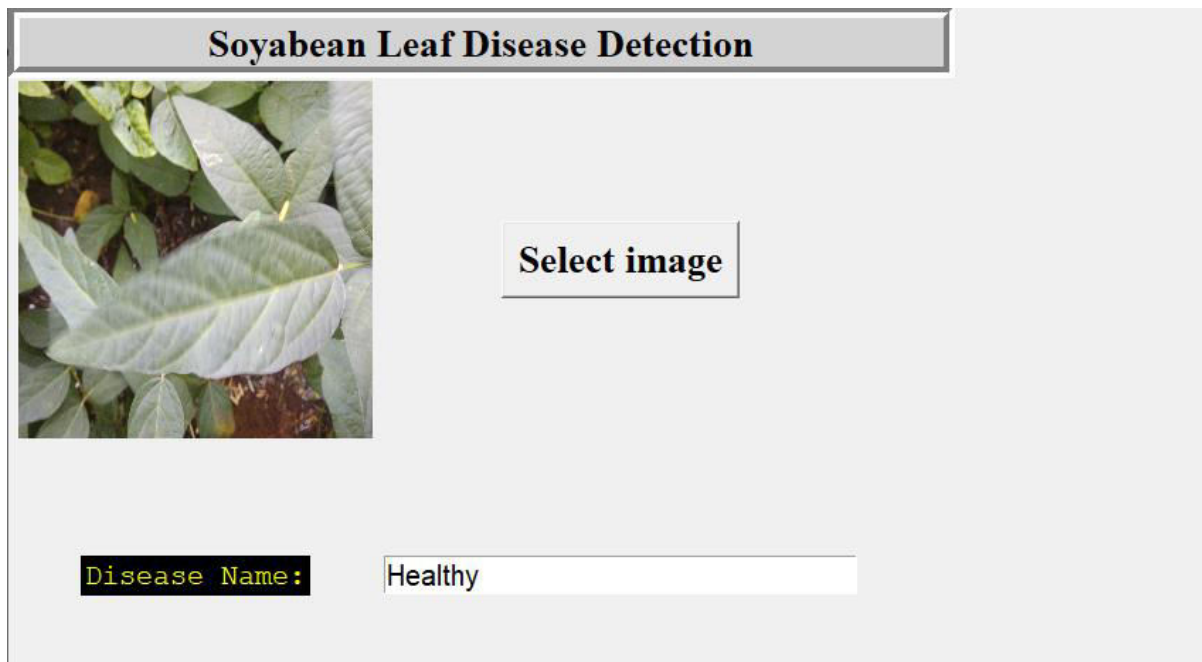
diseases. By systematically following this methodology, we aim to develop a robust system capable of autonomously detecting and categorizing diseases in soybean plants based on visual cues present in their leaves. Such a system holds significant potential for assisting farmers in effectively managing the health of their crops.

IV. EXPERIMENTAL RESULTS

 Soya Leaf Disease Detection



(GUI)



(Healthy Image)

 Soya Leaf Disease Detection

Soyabean Leaf Disease Detection



Select image

Disease Name:

Target Leaf Spot

(Target Leaf Spot)

Soyabean Leaf Disease Detection



Select image

Disease Name:

Rust

(Rust)

Soyabean Leaf Disease Detection



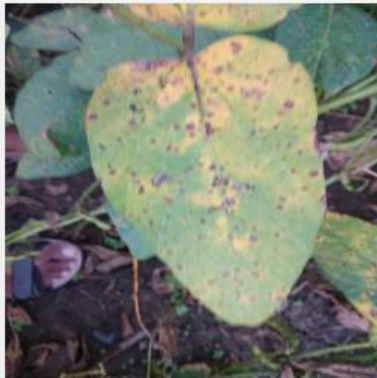
Select image

Disease Name:

Sudden Death Syndrome

(Sudden Death Syndrome)

Soyabean Leaf Disease Detection



Select image

Disease Name:

Frogeye Leaf Spot

(Frogeye Leaf Spot)

V.CONCLUSION

In conclusion, the project "Identification of Soybean Leaf Diseases Using CNN Algorithm" demonstrates a significant advancement in agricultural technology by leveraging the power of Convolutional Neural Networks to accurately and efficiently detect soybean leaf diseases. This automated system offers several benefits, including high accuracy, early diagnosis, labor efficiency, scalability, and consistent results, making it a valuable tool for modern farming practices. However, it also presents challenges such as the need for extensive datasets, computational resources, and the dependency on image quality.

Despite these challenges, the system has the potential to revolutionize how soybean diseases are monitored and managed, leading to healthier crops and increased yields. By providing timely and precise disease identification, farmers can take appropriate measures to mitigate the spread and impact of diseases, ultimately contributing to food security and sustainable agriculture. Future enhancements, such as expanding the dataset, improving model generalization, and integrating with other agricultural technologies, can further refine the system and expand its applicability. Overall, this project highlights the transformative potential of machine learning and image processing in addressing critical issues in agriculture.

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