iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.51405

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Leaf Disease Detection

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Abstract: ***Early disease identification is crucial for productive crop production in agriculture. illnesses such as bacterial spot, late blight, Septoria leaf spot, and yellow curved leaf the quality of the tomato harvest. Automatic classification techniques of plant diseases also assist in taking action once they are discovered diseased leaf symptoms Presented below is a Convolutional Learning Vector Quantization and Neural Network (CNN) model Method for detecting tomato leaf disease based on the (LVQ) algorithm and categorization. There are 500 tomato photos in the dataset. leaves that display four disease symptoms. We created a model of CNN for feature extraction and categorization automatically. Color Research on plant leaf diseases actively uses information. In our model, three channels based on RGB are subjected to filters.***
Keywords: CNN algorithm, Python Language, Machine learning.

I. INTRODUCTION

Plant diseases have an effect on plant growth and agricultural productivity and impact agriculture in social, ecological, and economic ways. Recent analysis on leaf dis- eases demonstrates damage to the vegetation Plant leaf ailments conjointly end in substantial losses to farmers' finances and early unwellness identification bbenefitsexplicit thought. Plant ailments are investigated within the literature primarily empha- sizes biological problems. they create predictions supported by the plants' apparent surface and go. the first detection of diseases is important for an important step within the correct medical care of unwellness. The finding is often performed by human professionals. Ex- parts on humans visualize diseases, though they encounter many challenges which may undermine their work. during this state of affairs, recognizing distinctive categories- ing diseases

II. LITERATURE SURVEY

In this paper, Rohit Nalawade, and Apoorv Nagap. real-time monitoring. Users can automatically control the flow of water if not physically present via an app, also the real-time values can be tracked.[1]

One of the major problems faced by this sector today is plant disease which is a major threat to global food security and leads to the excess use of chemicals and pesticides harming the eco-system.[2]

It has been widely used in image and video, voice, and natural language processing. At the same time, it has also become a research hotspot in the field of agricultural plant protection, such as plant disease recognition and pest range assessment,[3]

This paper presents a method for the early detection of leaf diseases in plants based on some important features extracted from its leaf images. This proposed system consists of a device called Beagle bone Black; it is interfaced with a digital camera or web camera which is used to detect diseases in leaves. In the proposed system, images of leaves are captured and compared with image healthy leaves images which are in a database that is pre-stored in the device.[4]

Due to drastic climatic changes and scarcity of water, the need for proper and sustainable irrigation methods is in high demand. The water demand for plants varies from place to place with the changes in soil content, texture, climatic factors, and so on. The plants need to be irrigated according to their water requirements at that climatic conditions. As like as the water requirements, plant diseases are alsoa factor that keeps the plants not growing properly[5]

This study describes the creation of an expert system for identifying plant illnesses in the Barracuda mango (Nam-Dok Mai), one of Thailand's key agricultural export products[6]

This study has combined four CNN models to create a novel plant disease detection method. An open-source library of 36258 photos divided into 61 classes ofhealthy and diseased plant leaves and 10 plant species was used in the experiment.[7]

A plant significantly impacts both human life and the environment. Diseases do affect plants, just like they do for people and other animals. Numerous plant diseases exist and have an impact on a plant's ability to grow normally. The entire plant, including the leaf, stem, fruit, root, and flower, is affected by these diseases.

The disease that plants' leaves are affected by and the precautions that should be taken to avoid harm are not now available to the public.

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III. INTRUSION DETECTION MODEL

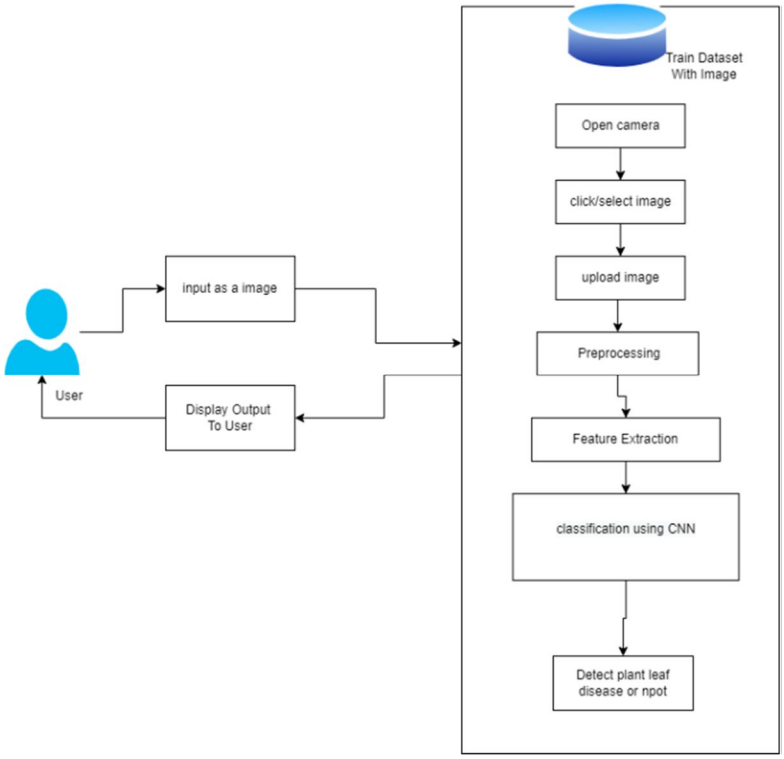

Figure 1: System Architecture

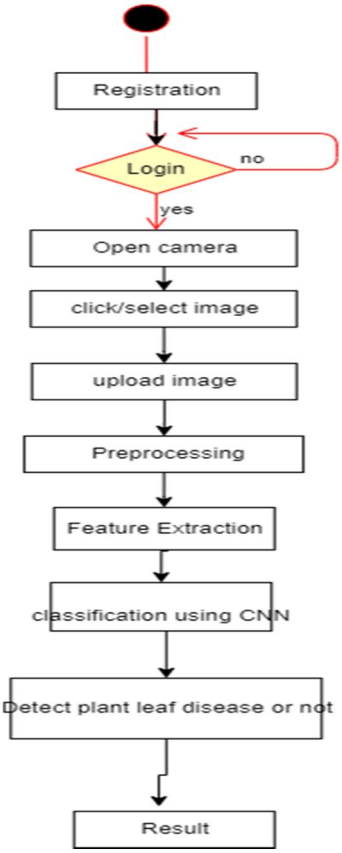

Figure 2: Activity Diagram

A. Using the Python pickle function Dataset of plant Leaves

1) To test and train the model, the Kaggle platform was used to obtain photos of ill plants.
2) The dataset contains around 9000+ photos of 7 different plant leaves across 9 categories.
3) Using the Cv2 module, the first 200 photos of each category are utilized to train the model, and then each image is transformed into an array with a pre-defined default size (256x256).
4) Labels are made for each illness connected to the plant to detect and recognize the sickness.

B. Developing a CNN Model and Defining It

1) Build a sequential model using a predefined input shape.
2) The model includes a switch for backends that support "channel first" as well as a default "channel last" architecture. Creation of the first CONVRELUPOOL occurs in section iii)With an a3x3 kernel and RELU activation, the CONV layer has 32 filters.
3) 25% (0.25%) dropout, maximum pooling, and batch normalization are used.
4) Dropout is a regularisation method for preventing complicated coadaptations on training data, which helps reduce overfitting in neural networks.
5) Next, two sets of (CONVRELU) * 2POOL blocks are made. One FC (Fully Connected Layer) and one RELUlayer set will thereafter be used.
6) In this case, the model was built using the Keras Adam Optimizer and binary cross-entropy with accuracy measures.
7) The network is trained by a calling model. fit generator, which also supplies the training and testing data and an epochs value of 30 for this project.
8) The model file is then saved in. pkl format.

IV. SCOPE

This study aims to develop an associate automaton application to find and determine plant dis- eases through a deep convolutional neural network. The disease may be a vital issue in agricultural countries like Asian countries. each year production of crops sustains serious loss thanks to diseases. it's quite troublesome to find plant diseases with human eyes. therefore it's essential to make an automatic system to find diseases. The planned sickness detection model takes a picture of a plant leaf as input, processes it, and uses a deep convolutional neural network to find and determine the sickness

V. CNN ALGORITHM

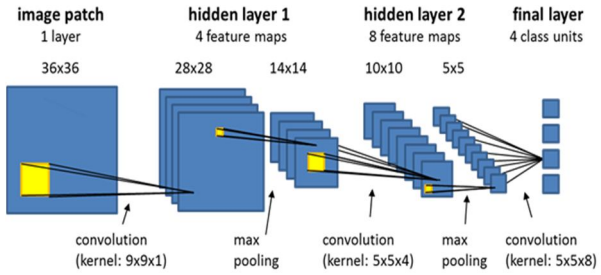

Figure 3: CNN Algorithm

The goal of artificial intelligence (AI) is to create computers and programs with intelligence that is capable of problem-solving ingeniously. Machine learning (ML) techniques, which provide the capacity to automatically improve outcomes and learn from experience - without being explicitly programmed - are a subset of artificial intelligence.

Artificial neural networks are used in deep learning (DL), also known as deep neural learning, a branch of machine learning, to analyze data. The strategy and architectural designs resemble human vision and were motivated by knowledge of how the neurological system works. Artificial neural networks have been widely used in machine learning for a while, but their popularity recently saw a surge after it was discovered that deep networks, which contain several layers, are capable of solving a wide range of real-world problems with accuracy levels that rival those of other machine learning techniques. Deep learning has been a significant area of study and development during the past 10 years.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
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Convolutional neural networks (CNN) have achieved especially good results in image analysis. The phrase refers to a subset of neural networks with a particular network design, where each "hidden layer" often contains two separate layers: the first stage is the result of a local convolution of the preceding layer (the kernel has trainable weights), and the second stage is a second layer that is not normally visible to the user. max-pooling stage, where only the maximum response of a few units from the first stage is retained, drastically reduces the number of units. The last layer is often a completely linked layer after multiple concealed levels. Each unit takes input from all of the units of the layer below and has a unit for each class that the network predicts.

VI. ADVANTAGES LIMITATIONS

To help farmers by characteristic the sickness gift in their plants. leaves and to supply the most effective attainable resolution for that sickness. To enhance the productivity of farming and to develop the interest towards farming. To reduce the hassle of farming in terms of your time and cash.

VII. CONCLUSION

Grayscale pictures square measure easier to analyze and execute for a spread of applications since they're additional clear and well-suited for analysis than RGB pictures, in line with the report The usage of bar graph feat improves the distinction of the pictures and provides the human eye a crisp image. bar graph mistreatment feat, improved im- age quality may be obtained in mistreatment grayscale for various medical uses, biological uses like plant leaves and digital X-rays malady, etc. In lightweight of this, these styles of mental imagery can examine and identification of plant disease. determines the plant leaves' quantity of malady.

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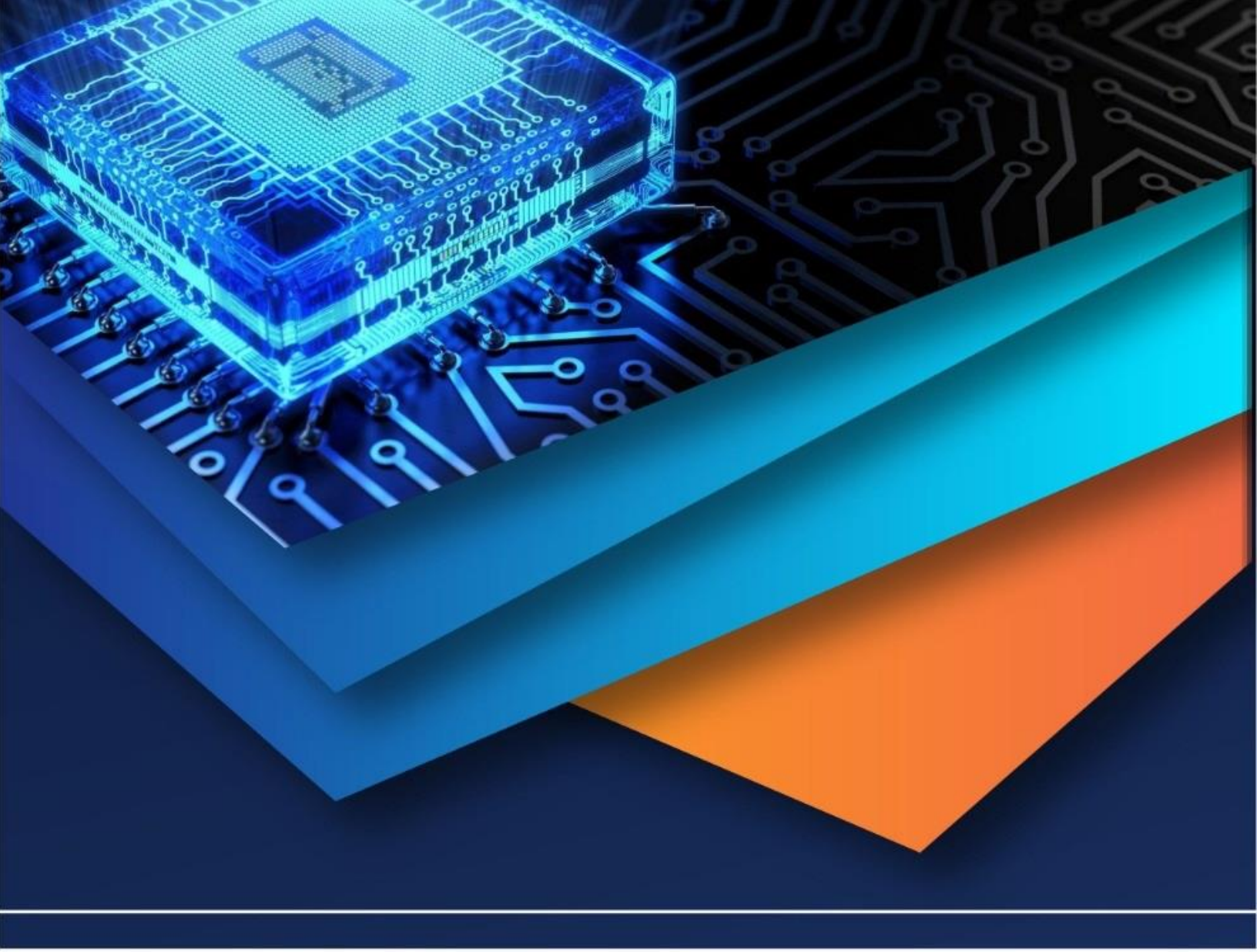

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