iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IV **Month of publication:** April 2023

DOI: https://doi.org/10.22214/ijraset.2023.50592

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 IV Apr 2023- Available at www.ijraset.com

Research Paper on App-Based Solution to Identify & Solve Disease in Plants

Mr. Prasham Shah[1], Mr. Anshul Kherde[2], Mrs. Rasika Solav[3], Mrs. Megha Warghane[4], Mrs. Nafiya Khan[5], Dr. A. A. Khodaskar[6], S. W. Wasankar[7], Dr V. K. Shandilya[8]
[1,2,3,4,5]Student, B.E. C. S. E., Sipna C.O.E.T. College
[6,7]Asst. Prof., Department of C.S.E., Sipna C.O.E.T. College, Amravati
[8]H.O.D., Department of C.S.E., Sipna C.O.E.T. College, Amravati

Abstract:** Crop diseases are a major threat to food security, but their rapid identification remains difficult in many parts of the world due to the lack of the necessary infrastructure. The combination of increasing global smartphone penetration and recent advances in computer vision made possible by deep learning has paved the way for smartphone-assisted disease diagnosis. We collected an fixed dataset of images of plant leaves of healthy and infected plants. The user interface is developed as an Android mobile app, allowing farmers to capture a photo of the infected plant leaves. It then displays the disease category along with the confidence percentage. It is expected that this system would create a better opportunity for farmers to keep their crops healthy and eliminate the use of wrong fertilizers that could stress the plants.

I. INTRODUCTION

India, being an agricultural country, depends heavily on the production of crops to feed its people and maintain the economy. Around 70% population of India lives in rural zones.

More than 50% of India's workforce is directly employed by agriculture. A greater part of the rural population depends on agriculture for most of their earnings. The country needs a massive supply of crops every year. Plant diseases hamper the production of crops often. As a result, the price of food gets higher and poor people to have to stay half-fed or unfed. Hence, plant diseases have become a great threat to crops.

Moreover, due to farmers' illiteracy, most of the time they cannot understand what is wrong with the crops. This causes them great sorrow. With the increase in the human populace and the decrease in croplands, the production rate of production is in danger. Preventing plant diseases is one of many ways to keep the crop production rate above the necessary margin.

Recent advancements in technology have created remarkable opportunities in developing countries. Android mobile phones are now cheap and affordable for lower-earning people. An automated system can significantly help farmers to diagnose crop diseases easily and take action accordingly to avoid the waste of crops. Hence, we got motivated to create an android application that can detect the diseases of plants from captured images of leaves.

A. Objective

1) To identify the disease in the plant Using Image processing
2) To identify the type of disease and pesticide for that disease.
3) To notify the farmers so that early action can be taken.

B. Problem Statement

Agriculture plays a critical role in providing a food supply for the growing population of the planet. Annual global food supply loss because of plant diseases is 40% on average. In developing countries, like INDIA smallholder farmers generate quite 80% of the agricultural production. For them, the loss of crops has devastating consequences. Sometimes, farmers can lose almost 100% of their crops thanks to plant diseases.

This makes crop diseases a significant threat to food security around the world. Disease identification may well be challenging thanks to the shortage of the required lab infrastructure. The project presents plant characteristics analysis using image processing techniques for automated vision systems employed in the agricultural field. The system utilizes image content characterization and make android Application for every solution.

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 IV Apr 2023- Available at www.ijraset.com

II. LITERATURE REVIEW

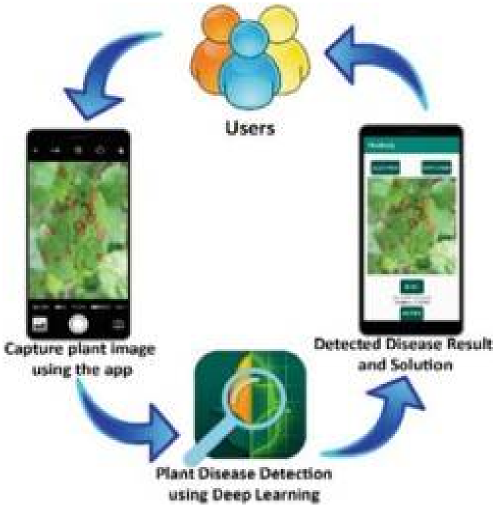
1) This study proposed an automatic approach for image-based phenotyping of plant disease using Directional Local Quinary Patterns (DLQP) as feature descriptor and Support Vector Machine (SVM) as a classifier. The proposed DLQP based system is specifically used for agricultural applications. Six tomato leaf diseases, three potato, and three apple leaf diseases are taken for experimentation. For each disease we performed a classification process and compared the individual performance of DLQP, LTP and LBP as feature descriptors. It is found that proposed DLQP texture feature descriptor improves the performance for plant disease phenotyping. The maximum detection efficiencies of 97.8% for apple, 95.6% for tomato, and 96.2% for potato are achieved using DLQP and Medium Gaussian kernel for SVM. Also, a comprehensive comparison shows that the proposed method performs significantly well as compared to existing methods. The proposed system provides promising results for plant disease phenotyping but there is a scope for improvement by using a combination of other shape and color-based feature descriptors with DLQP.
2) In this paper, the k-FLBPCM method combining LBP feature extraction with contour masks has been proposed for reducing noise and improving plant classification accuracy. Results have shown that various factors can reduce weed identification accuracy, including outdoor scene complexity and morphological variability of plants. On the basis of the experimental results, the kFLBPCM method had the best performance of 98.63% accuracy in identifiying morphologically similar plants. This method is particularly useful to discriminate between 2 classes with highly similar morphologies while tolerating morphological variability within each class. Furthermore, results have shown that the execution time of the proposed method is faster than that of the combined LBP method in the previous published article. As a result, the proposed method helps to improve classification of plants with similar morphological features. Furthermore, the fast processing time of this method enhances the ability to implement plant detection in real time.
3) In this paper, The author says that the agriculture is an important sector of GDP of India and ensure food security but due to various reasons like population, climate changes, global warming, several plant are harmed by disease impacted not only agriculture producton, but also its quality and quantity. Thusdiseases of plants can by identify and detect through various methods in this methods, Deep learning is one of them.
4) In this paper, convolutional neural network models Application but it can be used for detection and diagnosis of plant disease by comparison of leaves images of healthy and diseased through deep learning methods Experiment was performed with the use of 87,848 images, containing 25 different plant combination with disease and healthy plants. Many experiments were done with the best one was accuracy reaching 99.535 success for detection the disease of the plant if any. We can say that this experiment shown the significant success of this model which can be used and early ad possible for detecting disease in plants, It will definitely work as a pre harvesting warning tool in the field of agriculture so that the farmers crop produce high yield production.
5) Corn has been the native food of Indian people and the disease affecting them has been a matter of concern as it will have a tremendous effect on our Indian economy and a threat to food security. Smart use of technology can be a revolution in the proper eradication of such disease so that they can be treated in time and a food security can be achieved as well. This paper presents a real time manner which is primarily based on deep convolution neural network. With the proper adjustment of hyper-parameters and pulling combination on a system with GPU the performance of Deep neural network can be improved. The parameters used in this device is optimized to get a desired result within stipulated time. The pre-trained Deep CNN model was stationed into raspberry pi 3 using Intel Movidius Neural Compute stick consisting dedicated CNN hardware blocks. An accuracy of 88.46% has been achieved in demonstration of the corn leaf disease. It shows the compatibility of this system. This presented model can be used in smart devices like raspberry-pi or smartphones and drones as well for its convenience
6) In the paper the accurate and quick image identification and demonstration of image Deep Learning has been seen as a revolution in this field. Convolution neural network has proved to be efficient in the precise and correct evaluation of the plants disease-causing organism. The architectures evaluated include VGG 16, Inception V4, ResNet with 50, 101 and 152 layers and DenseNets with 121 layers. The data used for the experiment is 38 different classes including diseased and healthy images of leaf's of 14 plants from plant Village. Out of 38 different plants species both healthy and diseased taken for evaluation of the image 14 plants were from plant village. An accurate and efficient outcome is desired for the quick eradication of the disease for a healthier life of the plants. Thus we can reduce the burden of food loss from the entire nation and food security can be achieved. With the growing number of epochs, there has been noticed that DenseNets has been up to the mark in its proper evaluation. It moreover, requires less time, and a quick result is always obtained. It has been found that the result is 99.75 %

accurate which shows its efficiency. Keras with Theano backend was required for the evaluation of training of the architecture.

III. RESEARCH METHODOLOGY

A. Proposed System

The overview of the proposed system is shown in Fig. 1. The user of the application captures the image of a leaf of the subject plant using the phone camera. The captured image is then processed using Image processing. The application then gives results based on the accuracy of the image whether the plant is healthy or diseased. The result will show the specific disease name as well as the solutions to cure the disease .

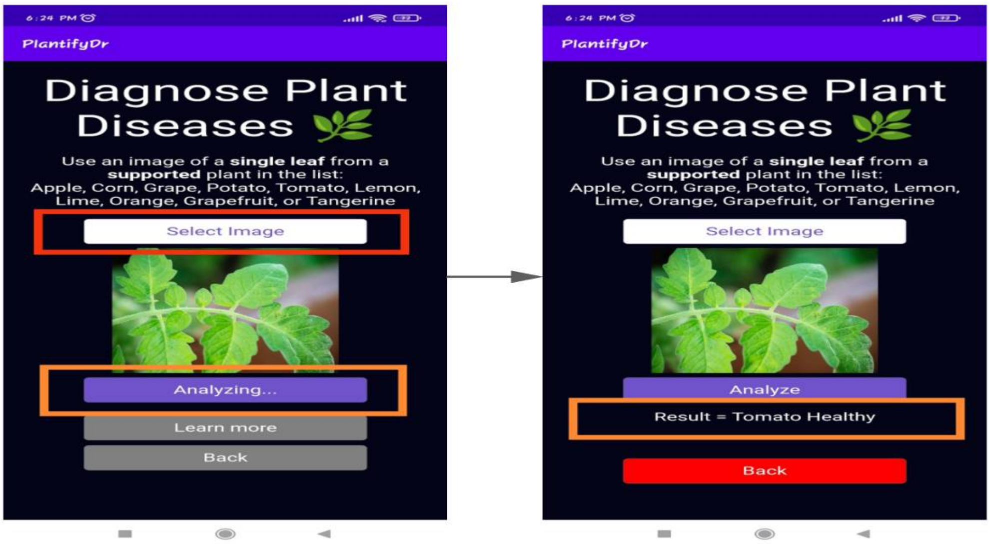


Inclusion and exclusion criteria were defined to select relevant apps. In the screening process, an app was included if it is related to plant disease detection and mentions this feature in the *description* or *about* section of the app in the respective app store (inclusion criteria). The exclusion criteria were: (i) apps that are not relevant to plant or plant disease detection; (ii) apps that are only information based or educational about plant diseases; (iii) apps under the category of games since they do not have any relevance with the scope of our review; (iv) apps that provide a marketplace for farming essentials such as fertilizers or pesticides, or provide expert farming consultancy or advice, and (v) apps that are not in English as other languages are not comprehensible to us.

The investigators collaborated on the inquiry, screening, and retrieval phases of the app searching and collection processes. Each kept a separate list of apps they discovered in app stores using the finalized procedure's inclusion and elimination parameters. The investigators used their personal devices to decide which apps are suitable for selection. Some problems were faced during the accumulation of the individual app lists, for instance, an app was excluded by one investigator but added by another investigator. Disagreements among the investigators were settled by discussion before consensus was achieved. The resulting app lists were combined to create the final list of apps for review (n = 606). Multiple screenings were performed to reach a consensus among researchers to rule out apps that were irrelevant to the review. After removing duplicate apps (n = 12), title and description-based screening was performed, which identified eligible apps (n = 45) for the review, considering the exclusion criteria. Those 45 apps were installed and screened, and in that process, 28 apps were excluded for various reasons. This screening process resulted in selecting 17 apps for our review.

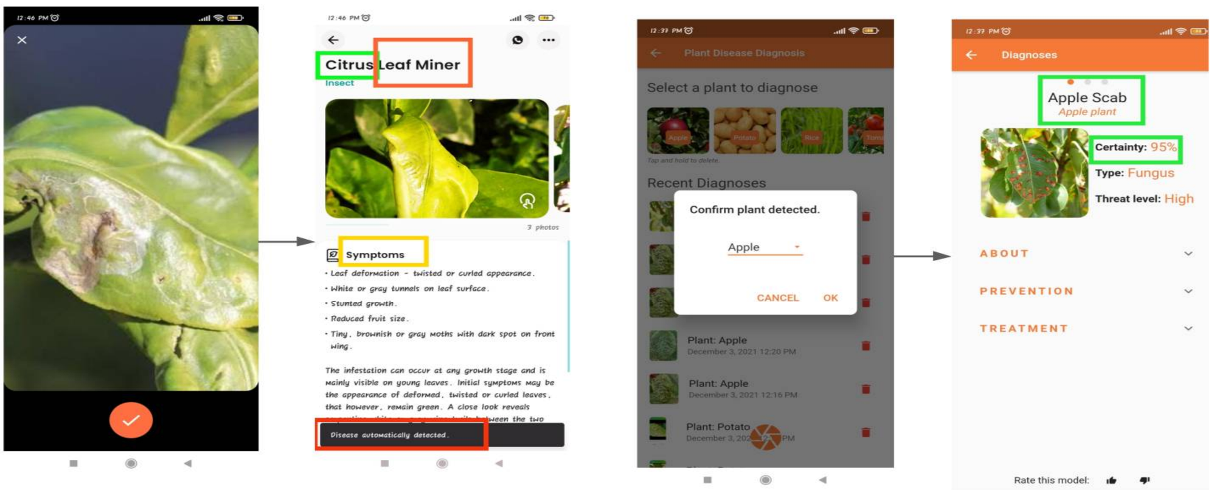
IV. RESULT

First, identifying the plants is a preliminary criterion for plant disease detection apps. Among the 17 reviewed apps, 47.06% (8/17) can automatically identify plants from the given image and 41.18% (7/17) kept the option of choosing the plants manually before diagnosing any disease. Only two apps, Leaf Doctor and Riceye, do not fulfill this criterion as Leaf Doctor focuses only on disease severity and visualizing the infected area of the leaf, where Riceye is dedicated for rice crops only. Different apps have adopted different technologies to identify plants. For example, the PlantifyDr app uses ML algorithms to identify a plant and detect whether a specific plant has a disease or not. Plant identification by PlantifyDr is shown in Figure 4. Another key criterion in our study was to identify the plant coverage, i.e., the number of plants covered by the disease detection apps. The only app that missed this criterion is Leaf Doctor. Most of the apps, nearly 53% (9/17), can identify diseases of more than 10 plants.



Uploaded leaf image   Plant identification

Our most significant functionality is disease detection, where it is expected that an app would automatically recognize the disease from the photos of affected plants or leaves. Fortunately, 82% (14/17) of the apps have fulfilled that expectation. Only one app, Cropalyser, identifies diseases based on answers given by the user from a series of questionnaires. On the other hand, the Leaf Doctor and Plant Doctor apps do not provide this functionality. Our reviewed apps use a vari ety of techniques to detect diseases. For instance, Plants Disease Identification app uses ML Apple technology to classify the plant diseases productively. The apps Cassava Plant Disease Identify and Garden Plant Diseases Detector use computer vision techniques to classify the disease and monitor severity. To get the maximum accuracy in disease detection, a large image database containing thousands of images has been used for developing a model using artificial neural networks (ANN). The app Cassava Plant Disease Identify allows users to report photos that are not properly captured. As more photographs are uploaded, the accuracy of the database improves. Users can notify the developer of the app by email if a photograph is not recognized. The app is improving its accuracy over time by using ML. The app Pestoz- Identify Plant diseases also applies advanced computer vision techniques to identify the diseases. shows screenshots of the disease detection UI of the Plantix and AgroAI apps.



Imported image of diseased leaf | Automatic plant identification and disease detection | Manually selected the plant/crop | Detected the disease automatically

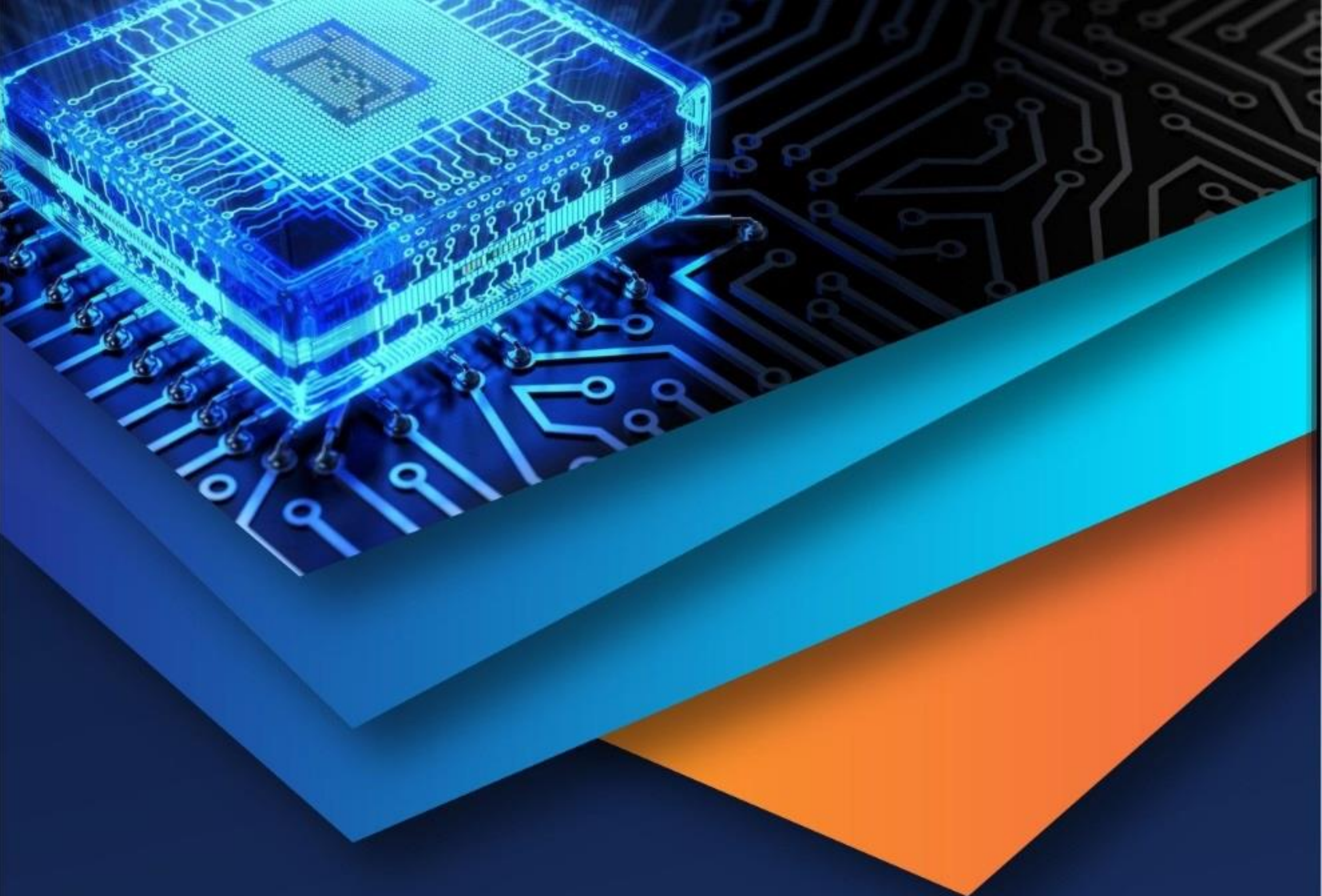
(a) Plantix-your crop doctor   (b) AgroAI-Plant Diseases Diagnosis (Early Access)

V. CONCLUSION

Faced with growing demands, shrinking natural resources, and more stringent regulations, the agriculture sector worldwide found refuge in AI through the use of smart and innovative IoT technologies to optimize production and minimize losses. Crop diseases are one of the critical factors behind crop production losses in the United States. Therefore, correct disease diagnosis is one of the most important aspects of modern agriculture. Without proper identification of the disease, disease control measures can waste money and lead to further plant losses. To increase the system's usability, we developed a mobile app that would create a better opportunity for limited-resources farmers to detect plant diseases in their early stages and eliminate the use of incorrect fertilizers that can hurt the health of both the plants and the soil.

REFERENCES

[1] Ahmad W, Shah S, Irtaza A (2020) Plants disease phenotyping using quinary patterns as texture descriptor. KSII Trans Internet Inf Syst 14(8):3312–3327.
[2] Le VNT et al (2020) A novel method for detecting morphologically similar crops and weeds based on the combination of contour masks and filtered Local Binary Pattern operators. GigaScience 9(3):giaa017.
[3] JundeChena ,Jinxiu Chena , DefuZhanga, , YuandongSunb , Y.A. Nanehkarana, Using deep transfer learning for image-based plant disease identification
[4] Konstantinos P. Ferentinos, Deep learning models for plant disease detection and diagnosis.
[5] SumitaMishraa, Rishabh Sachana , Diksha Rajpala, Deep Convolutional Neural Network based Detection System for Real-time Corn Plant Disease Recognition.
[6] Edna Chebet Tooa, Li Yujiana , Sam Njukia , Liu Yingchun,A comparative study of fine-tuning deep learning models for plant disease identification



10.22214/IJRASET

INDEX COPERNICUS
45.98

IMPACT FACTOR:
7.129

TOGETHER WE REACH THE GOAL

IMPACT FACTOR:
7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY