iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** XII **Month of publication:** December 2022

DOI: https://doi.org/10.22214/ijraset.2022.47767

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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 10 Issue XII Dec 2022- Available at www.ijraset.com

Banana Leaf Disease Detection Using Deep Learning Approach

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Abstract: ***India is an agriculture based country. A major part of population depend on agriculture for their income. In such a case, where agriculture is important for survival, plant diseases are a real problem and prove to be an obstacle in the way of farmers. In some cases, a majority of yield has to face damage because of late detection of diseases. This has a direct effect on the life of farmers and they have to bear a loss. To avoid these negative impacts we have developed a project for detection of diseases in banana plant. Using the technologies and techniques of machine learning and deep learning such as image processing, Convolutional Neural Networks, etc. we have implemented a machine learning model which helps in early detection of various diseases in banana plant and thus minimizes the loss of yield. The farmers will be able to detect diseases in their crop and hence carry out necessary precautionary measures to prevent further spread of diseases .***
Keywords: Deep Learning, Machine Learning, Plant Leaf Disease Detection, Classification, Image Pre-processing, Convolution al Neural Network

I. INTRODUCTION

Banana is an essential fruit crop worldwide with more than 95 million tones of production. In India, a vast amount of farmers rely on it for their income. With total annual production of more than 16.50 million tones from 480.50 thousand ha., and average of 32.5 T/ha. Maharashtra occupies first place in production with 61 T/ha. Banana contributes 36% to total fruit production in India. Banana holds 20% of the total plantation area in India. Maharashtra is nation's largest state after Rajasthan when area is considered and first in production. Jalgaon is the most important area for banana farming district in Maharashtra, occupying 50,000 hectares of banana farms. Every year, due to various types of bacterial, fungal and viral diseases in banana crop, farmers have to face tremendous losses. This paper focuses on various types of techniques that are used for early detection of diseases in plants and thus aid the farmers and minimize their losses

II. LITERATURE SURVEY

Various works have been done in the field of plant leaf disease detection before. Many people have worked on the identification and detection of various crops such as tomato, banana, sorghum, apple, wheat, etc. This paper focuses on banana crop but the methods, techniques, and workflows used and described in earlier papers have some similarities among them. Even though the diseases of different crops are different, the principles used for their detection have similarity and this system can be generalized and can be used for other crops also after proper training of the model.

[1] Husnul Ajra et al. proposed a system which uses two well-known convolutional neural networks AlexNet and ResNet-50 for detection and classification of diseases in potato plant and tomato plant. The datasets of both the leaves are analysed and the CNN models are used to identify the symptoms of unhealthy leaves. The feature extraction and classification is done by AlexNet and ResNet-50 models. The accuracy of the proposed approach was 97% and 96.1% for ResNet-50 and 96.5% and 95.3% for AlexNet for the classification of uninfected-infected leaf and leaf diseases, respectively.

[2] Ms. Deepa et al. proposed a system for detection of plant leaf disease which uses image pre processing, feature extraction, training, clustering and classification. K means clustering is used for clustering of leaves and then support vector machine technique(SVM) is used for classification. Multiclass classification is performed by using one to one or one to many mapping using multi SVM.

[3] Xulang Guan proposed a system for plant disease detection which uses four convolutional neural network models. Four CNN models are Inception, Resnet, Inception Resnet, and Densenet were deployed and the results of CNN models were processed by stacking method. The use of the stacking method achieved an 87% accuracy rate, which is a significant improvement compared to the result of using a single CNN model.

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[4] Surampalli Ashok et al. proposed a system for tomato plant disease detection which uses convolutional neural network classifier for its operation. The images from the dataset are first pre processed using Gaussian filter. This feature extraction is done by using the Discrete Wavelet Transform and GLCM. For feature extraction, DWT utilizes the coefficients with sub-bands and computed correlation of GLCM is used to classify the leaf image or the segment of a leaf image depending upon various luminous levels. After that, segmentation is performed and then CNN classifier is used for classification.

[5] Xinda Liu et al. proposed a system for detection of diseases in various plants. Reweighting approach is used here. Firstly, the weights of all divided patches are computed and then allocation of weight to each loss for each patch label pair is done. Finally, extraction of patch features from the network trained with loss reweighting is done and LSTM network is used for further operations.

[6] Sakshi Raina et al. proposed a system for detection of plant diseases which includes steps such as image acquisition, image pre processing, image segmentation, feature extraction and statistical analysis. Classification using classifier is performed later. Linear classification models such as support vector machines and logistic regression and non linear models such as K nearest neighbors, Naïve Bayes, Random forest are SVM kernel are used.

[7] Pushkara Sharma et al. proposed a system for detection of plant diseases which includes image pre-processing, segmentation and classification. K means clustering is used for segmentation process. For classification, classifiers like K nearest neighbours, support vector machines, logistic regression and convolutional neural network are used.

[8] Sandeep Kumar et al. proposed a system in which aim was to detect the diseases in plants by considering leaves. For that K-mean clustering algorithm is use for segmentation to divide image into segments where one part is unhealthy part. Segmented image is fed to GLCM for extraction of important information. SVM is used for classifying diseases which have high dimensional input space compared to that of remaining classifiers.

[9] Meeradevi et al. proposed a system in which three type of model are considered, VGG16 model, with an accuracy of 0.9572, next the classic transfer Learning Model using pre-trained weights of image-net, but in this overfitting was the problem and lastly, L2 regularization is used with the above mentioned model, for solving overfitting problem. The method of training neural networks with extracted features and transfer learning increases accuracy to great extent. CNN, transfer learning and attention layer is use to classify leaves into different class labels.

[10] Md. Marjanul Islam Tarik et al. proposed a model using CNN for classifying potato infections into 7 classes with accuracy about 99 %. In this, image processing is used to diagnose potato leaf disease. This model works in six stages, first large amount of data is fed so to get high accuracy then pre-processing is done to normalize the image then feature extraction is done Then model is created and finally data is fed to the model.

[11] R.S. Latha et al. proposed a system which focuses on tea crop diseases. Convolution Neural Network is applied to classify 7 different type of diseases, along with normal leaf identification. The ultimate goal of the proposed work is to classify and improve the accuracy of correctly predicting the diseases. In used CNN, Convolution layer contains number of filter used to extract features for images. Pooling layer is use for reducing size of data by merging. Flattening layer is used for converting 2d data to 1d data. For activation function, ReLU is used. Considered diseases are Gray blight, White spot, Brown blight, Bud blight, Leaf blight, and Red scab using convolution neural network.

[12] Sandesh Raut et al, has implemented detection of Leaf diseases, using concepts like SVM, .The separation and grouping of images has been done using segmentation, the images are further processed using the morphological processing, the images are further processed for features extraction, the features are then classified using neural networks, clustering and fuzzy logic.

[13] Mr. V Suresh et al built an application where classification of disease affected plants and healthy plants is done and this proposed work focuses on the accuracy values during realistic conditions, and this work is implemented by having different plant disease images. This work is built from scratch and generates a good accuracy.

[14] Yin Min Oo proposed work is to develop an image processing system that can identify and classify four types of plant disease namely Cercospora Leaf Spot, Bacterial Blight, Powdery Mildew and Rust. Using SVM classifier, the experimentation is performed for a large number of images. From the evaluated results, we have analysed that the percentage of diseased portion also affect the overall crops/agriculture land. Accuracy also varies for different images.

[15] Surendra Kumar et al has implemented the study and the implemented techniques are SVM, BPNN, SGDM and K means Clustering. With the help from any of these techniques the automation in plant leaf disease detection is achieved. In SVM it is very difficult to find optimal parameters for training purpose because they are non linearly separable. Neural network can tolerate noisy inputs.

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III. OBJECTIVES

1) To study the image pre-processing techniques such as segmentation and feature extraction for detecting leaf diseases.
2) To study Deep Learning architectures for classification.
3) To study classification of leaf diseases by using deep convolutional neural network.
4) To study techniques to increase efficiency of Deep Convolutional Neural Network

IV. CONCLUSION

The existing systems use various methods and techniques for detection of diseases in different plants. The different methods used in the existing techniques consists of convolutional neural networks, support vector machines, K-Means Clustering, AlexNet, ResNet-50, K-Nearest Neighbours, Naïve Bayes, Random Forest, Reweighting, etc. All the techniques have their own set of merits and demerits. None of them are completely ideal and perfect. Among all the earlier works which were studied, models using Convolutional Neural Networks were found to have good accuracy as compared to other models. Accuracy also depended on the image pre-processing techniques. After studying earlier works it was noticed that efficient image pre-processing techniques led to more accurate results.

REFERENCES

[1] Husnul Ajra, Mst. Khairun Nahar, Lipika Sarkar, Md. Shohidul Islam(2020). "Disease Detection of Plant Leaf using Image Processing and CNN with Preventive Measures" 2020 Emerging Technology in Computing, Communication and Electronics(ETCCE).
[2] Ms. Deepa, Ms. Rashmi N, Ms. Chinmai Shetty(2021). "A Machine Learning Technique for Identification of Plant Diseases in Leaves" Proceedings of the Sixth International Conference on Inventive Computation Technologies [ICICT 2021].
[3] Xulang Guan(2021). "A Novel Method of Plant Leaf Disease Detection Based on Deep Learning and Convolutional Neural Network" 2021 IEEE 6th International Conference on Intelligent Computing and Signal Processing (ICSP 2021).
[4] Surampalli Ashok, Gemini Kishore, Velpula Rajesh, S. Suchitra, S.G.Gino Sophia, B.Pavithra(2020) "Tomato Leaf Disease Detection Using Deep Learning Techniques" Proceedings of the Fifth International Conference on Communication and Electronics Systems (ICCES2020).
[5] Xinda Liu, Weiqing Min,Shuhuan Mei, Lili Wang, Shuqiang Jiang(2021). "Plant Disease Recognition: A Large-Scale Benchmark Dataset and a Visual Region and Loss Reweighting Approach" IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 30, 2021.
[6] Sakshi Raina, Dr. Abhishek Gupta(2021). "A Study on Various Techniques for Plant Leaf Disease Detection Using Leaf Image" Proceedings of the International Conference on Artificial Intelligence and Smart Systems (ICAIS-2021)
[7] Pushkara Sharma, Pankaj Hans, Subhash Chand Gupta(2020). "Classification of plant leaf diseases using machine learning and image Preprocessing techniques" 10th International Conference on Cloud Computing, Data Science & Engineering (Confluence).
[8] Sandeep Kumar, KMVV Prasad, A. Srilekha, T.Suman, B. Pranav Rao, J.Naga Vamshi Krishna(2020). "Leaf Disease Detection and Classification based on Machine Learning" International Conference on Smart Technologies in Computing, Electrical and Electronics (ICSTCEE 2020).
[9] Meeradevi, Ranjana V, Monica R Mundada, Soumya P Sawkar, Rithika S Bellad, Poornima S Keerthi(2020). "Design and Development of Efficient Techniques for Leaf Disease Detection using Deep Convolutional Neural Networks".
[10] Md. Marjanul Islam Tarik, Sadia Akter, Abdullah Al Mamun(2021). "Potato Disease Detection using Machine Learning" Proceedings of the Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV 2021).
[11] R.S Latha, G.R.Sreekanth, R.C.Suganthe, R.Rajadevi, S.Karthikeyan, S.Kanivel(2021). "Automatic Detection of Tea Leaf Diseases using Deep Convolution Neural Network" 2021 International Conference on Computer Communication and Informatics (ICCCI -2021), Jan. 27-29, 2021, Coimbatore, INDIA
[12] Sandesh Raut (2019).” Review On Leaf Disease Detection Using Image Processing Techniques”. (IRJET) Volume: 04 Issue: 04.
[13] Mr. V Suresh (2020).” Plant Disease Detection using Image Processing”. (IJERT) Vol. 9 Issue 03, March-2020.
[14] Yin Min Oo (2019). “Plant Leaf Disease Detection and Classification using Image Processing”. IJRE (Vol. 5 No. 9) September-October 2019.
[15] Surendra Kumar (2018).” Plant Disease Detection using Image Processing” International Journal of Computer Applications (0975 – 8887) Volume 124 – No.16, August 2015.

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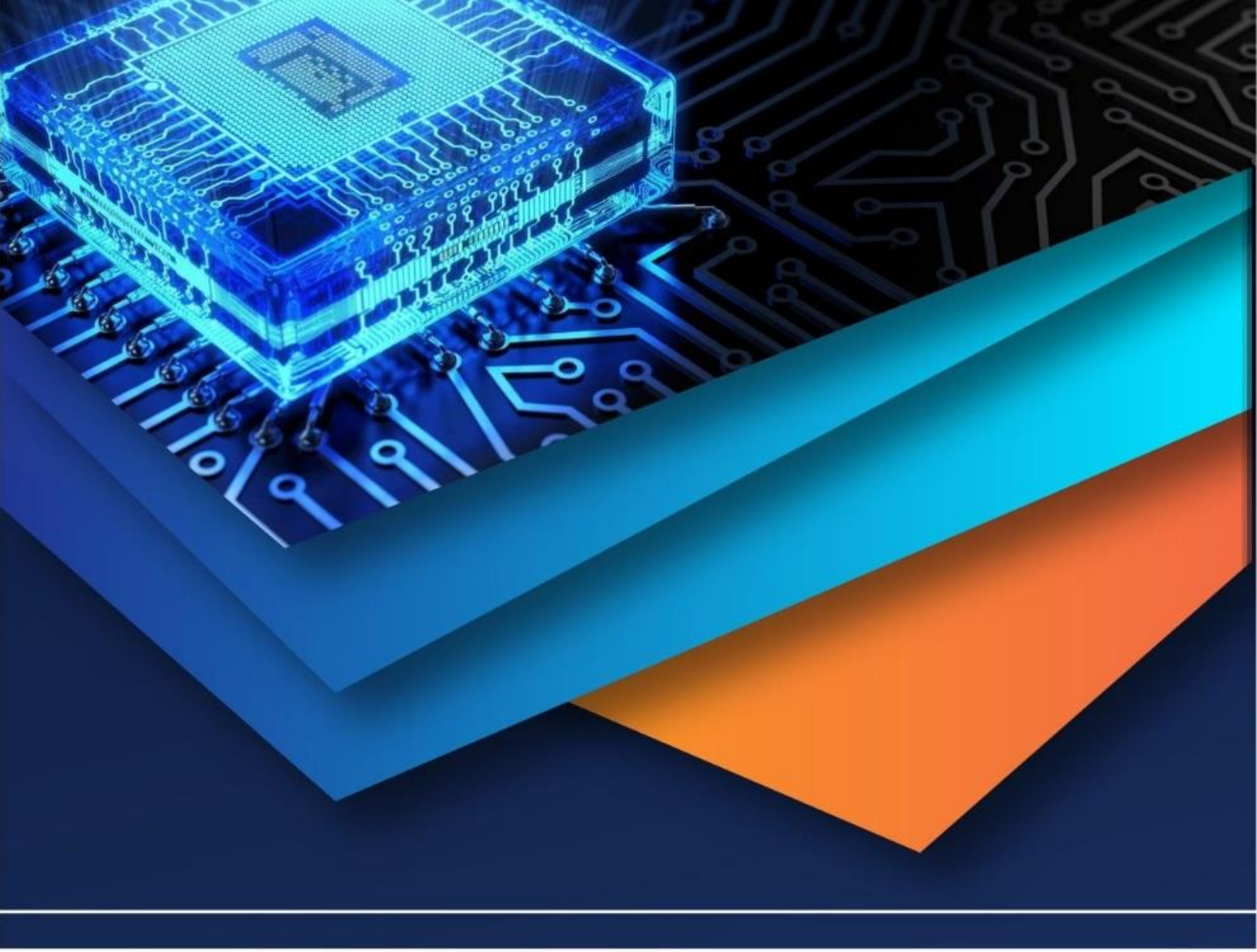

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