



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 8, August 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.524

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Plant Leaf Plague Detection

Mr. Shankar Prabhath U, Mr. Darshan, Dr. T. Subbaraj

Department of Master of Computer Applications, Rajarajeshwari College of Engineering, Bengaluru, Karnataka, India

ABSTRACT: The agricultural sector is a vital part of India's economy, and plant plague can considerably effect the crops and the livelihoods of millions. Recently, India has experienced many variations in weather patterns and a rise in plant diseases, leading to notable reductions in agricultural output. Early discovery of plant leaf plagues is essential to prevent disease feast and diminish crop losses. However, visually identifying diseases with the naked eye can be challenging, and misidentification can result in ineffective treatments and further losses. Thus, developing correct and resource full methods for detection of plant plague is crucial. Image processing algorithms, particularly in Convolutional-Neural-Networks (CNNs), have developed as effective tools for detecting and diagnosing plant diseases. These algorithms analyze leaf imageries and custom machine learning techniques to precisely classify and classify diseases. This project aims at developing the optimal and very precise mode for detecting plant leaf plague using CNNs by analyzing leaf images. The ultimate goal is to recommend appropriate insecticides to farmers for effective disease management. By leveraging machine learning, and this scheme can aid in growth of crop yields, reduce economic losses, and contribute to the sustainable development of India's agricultural sector.

KEYWORDS: Plant Leaf Plague Detection , Dataset and Preprocessing , Model Architecture and Training, Evaluation Metrics, Deployment and Application.

I. INTRODUCTION

India's economy heavily relies on its agricultural sector, with over 60% in populace engaged in farming. However, various challenges have negatively impacted this sector, including change in climate pattern and the rise in plant diseases, leading to reduced crop yields. This has triggered noteworthy economic hardships for farmers. Premature detection of plant plague is crucial but challenging, as they often become noticeable only after widespread damage. To address this, using modern knowledge can offer keys for early disease detection. Plant diseases, caused by bacteria, fungi, or viruses, can be different categories from trifling leaf or fruit damage to complete crop destruction. Common plant diseases include black spot, powdery mildew, Fusarium wilt, gray mold, leaf blight, white mold, scab, and fire blight.

In this project, we collected leaf images from Kaggle and performed image preprocessing to remove noise and convert RGB images to grayscale. We then used Convolutional-Neural- Networks (CNNs) to classify these images, as neural networks are extremely operational for image classification tasks. By leveraging technology to detect and diagnose plant diseases, we can help farmers implement appropriate control measures to mitigate disease spread and prevent significant crop losses. This can improve farmers' livelihoods and boost the country's economy.

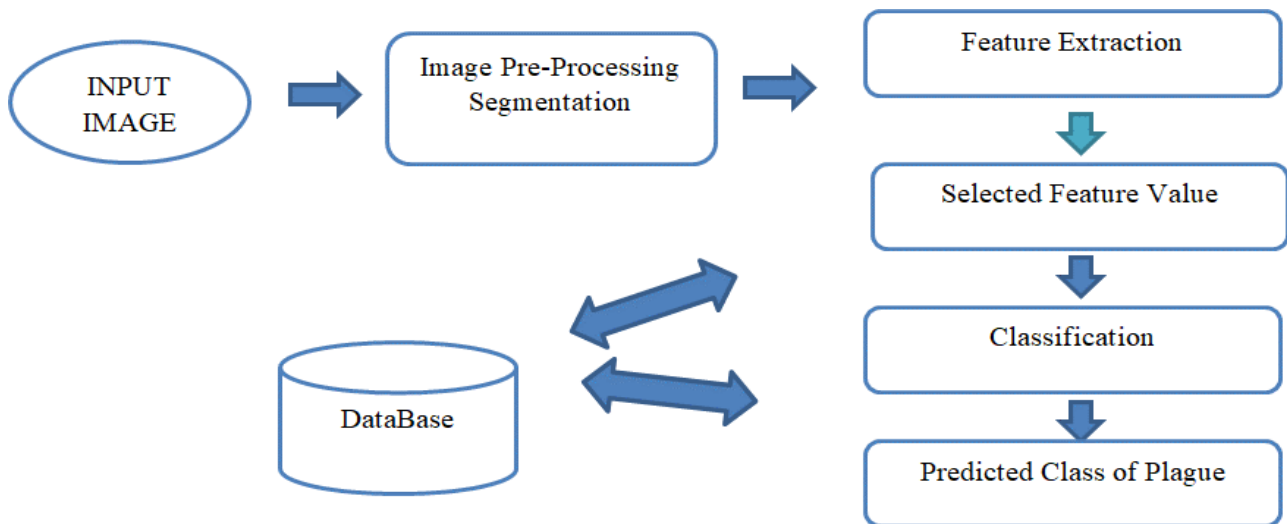
II. RELATED WORK

Numerous studys say that has been conducting on usage of imagerie processing and machine-learning procedures on plant plague detection and classification. In one paper by Pushkara Sharma, Pankaj Hans, and Subhash Chand Gupta, the imageris of almost an 2000 used to divided into 19 different classes[1]. Gaussian Blur used as noise removal, and images are transformed after RGB to HSV for image preprocessing. K-means clustering are refered for segmentation. Four classifiers were tested, including logistic regression, KNN, SVM, and CNN. Another paper by Ms. Deepa, Ms Rasmi N, and Ms. Chinmai Shetty used machine-learning schemes for identify leaf plague. Gray cooccurrence medium (GLCM) been used for quantity abstraction, K - means clustering is used for the clustering. The classifier which was used represents SVM, and four classes were defined, including anthracnose, alternaria alternata[2], bacterial blight, and healthy leaves. In a paper by Vaishnavi Monigari, G. Khyathi, and T. Prathima, information of over 20,000 imageries of unhealthy and in good physical shape plant leaf was used and classified into 15 classes to devlop the CNN. The framework (OpenCV) was used for pictures processing, and image augmentation are helpful in collecting the images. The developed model achieved 90% accuracy and could

distinguish healthy leaves from eight diseases. Finally, The paper publication by Jamal Mustafa AL- Tuwajari and Marwan Adanan Jasim targetted on plant leaves plague finding and learning on how to image process and classification techniques for tomato, potato leaves and pepper[3]. The dataset uses particularly of over 20,000 images, and nurel networks was for organization, including 12 classes for diseased leaves and 3 classes for healthy leaves. The ideal accomplished an exactitude of 98.29% for training and 98.029% for the testing dataset.

III. METHODOLOGY

This projected scheme for " Plant Leaf Plague Detection " is a comprehensive and intelligent solution that leverages advanced technologies to address the challenges associated with plant disease identification in agriculture. This system incorporates a (convolutional neural network) CNN for automated and accurate prediction of powdery mildew and rust in plant leaves. This planned model is designed to be user- friendly, accessible, and effective in supporting farmers and agricultural professionals in making informed decisions for disease management[4].



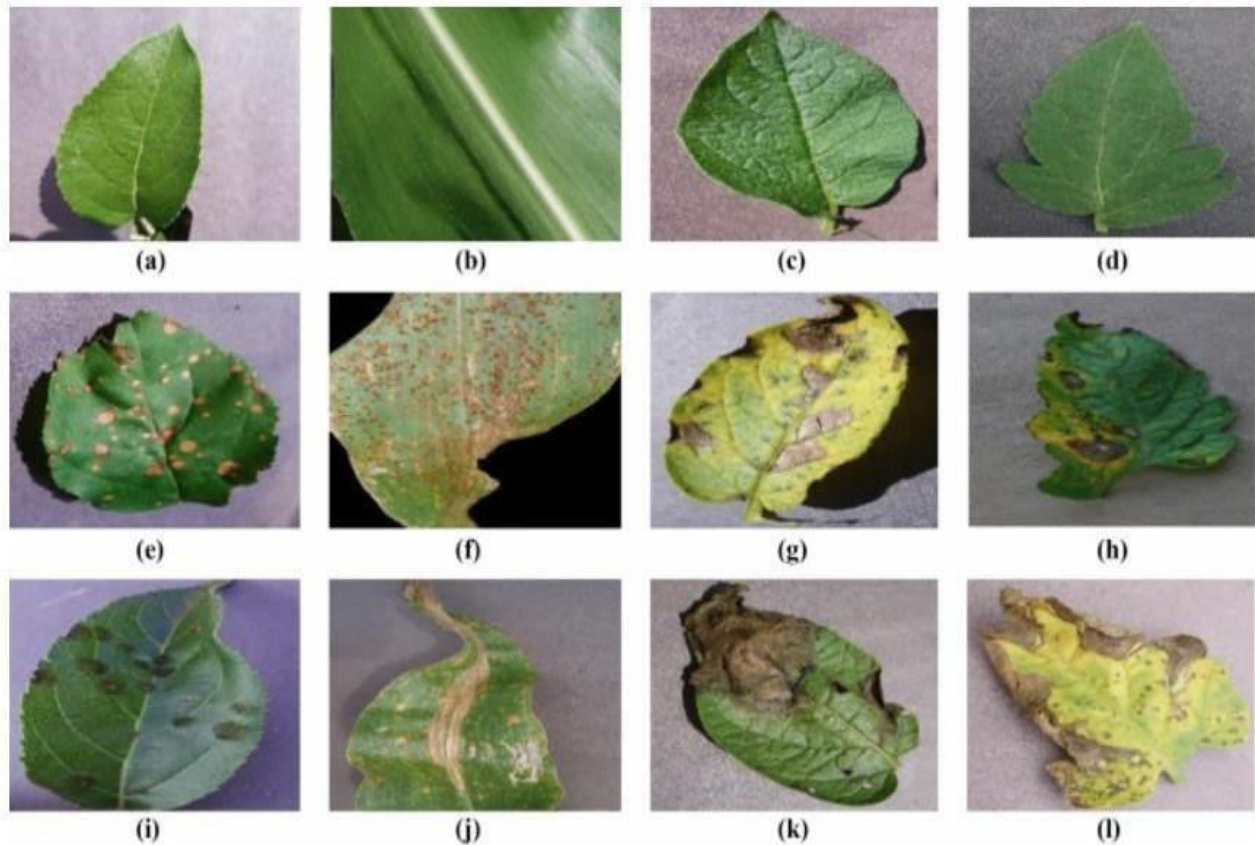
In a way for detecting a plant leaf disease, the first thing to do is to gather some images, including both healthy leaves and diseased ones, that accurately represent the real world. The images will then be pre- processed to eliminate noise and other irrelevant information using techniques like normalization, data augmentation, etc. Usually, a neural network such as (CNN) will be used for this purpose. The dataset will then be derived into three parts first training set second validation set, lastly testing set. In this training set is where the system is trained while validating set is where the performance of the system is monitored. After the training set, the scheme might be tested in test set where verity of methods such as precision, exactness and remembrance, and the scheme will be evaluated on the test set based on its performance. If the system's presentation is low, optimization techniques like transfer learning or extra data augmentation might be used to recover it. Once the scheme is optimized, it can then be deployed in real world applications. The process is cyclical: Data collection Preprocessing Model selection Training Testing Testing Deployment[5]

- └ Data Collection: Gathering information on plant-leaf with and without illnesses is the initial phase in the process. The dataset need to be typical of the real-world situations in where the model will be used.
- └ Data Preprocessing: To eliminate noise and unnecessary information, the dataset must be preprocessed after which it is gathered. Techniques like data cleaning, normalization, and augmentation for this. For example, the gathered photos are first pre-processed to transform RGB photos into grayscale photos, and then into an array format.
- └ Model Selection: Choosing a suitable deep learning system is the next stage.The (convolutional neural networks)CNNs are frequently employed in image classification applications, like the identifying of plant-leaf plague. The selected CNN has multiple layers: Convolution2D, Dropout, Activation, Flatten, Dense, and MaxPooling 2D.
- └ Model Training: The preprocessed dataset must be for training the chosen model. To do this, divide the information (data) into parts for testing, validation, and training. After that, the system is skilled by the training set, and its performance is observed on the validation set.

Model Evaluation: The way to determine the model's accurateness, strictness, recollection, and F1- score, it must be tested on a testing set.

IV. EXPERIMENTAL RESULTS

The initial stage in the detecting of leaf diseases involves the conversion of plant leaves images into grayscale and binary formats. This initial step simplifies the images and reduces their difficulty, where it makes more suitable for processing by deep learning systems. Grayscale conversion reduces the color channels to a single channel, enhancing contrast and emphasizing the edges on leaf for easier pattern and feature identification. Converting grayscale images to binary format entails thresholding the pixel values to black or white, further simplifying the images and highlighting the leaf edges more prominently. By isolating the regions of interest, like the plant greeneries and their features, and eliminating irrelevant details like the background or soil, binary conversion simplifies the image and enhances its clarity. The outcome is a clear, noise-free image that accentuates the crucial portions of the leaves, facilitating accurate disease identification and classification by the deep learning model, ultimately enhancing the system's overall performance.



V. CONCLUSION

To summarize, the project showcased the efficacy in deep_learning techniques on identifying plant leaf plague. By utilizing a (convolutional neural network) CNN architecture, the project achieved impressive accuracy rates in classifying various categories of plant leaf plague. The successful combination of Open CV for image handling and feature extraction, with the CNN model, played a important part in this project's accomplishments. Moreover, the project's capability to predict appropriate medications for the identified diseases is a valuable asset to the agriculture industry, empowering farmers.

REFERENCES

1. IEEE Access vol. 7, 2019 contains an article on Deep-Learning for Image-Based Plant-Disease Detection written by M.A., Iqbal, M.J., F.K.O., and Hameed.1.
2. In 2018, the Computing- Communication Workshop and Conference (CCWC) featured a paper by Sarkar, Bhattacharya, Ghosal, and others titled "Deep- Learning Based Plant-Disease- Detection Using-Leaf Image Classification.
3. "Plant-Leaf Disease-Detection Using Convolutional-Neural- Network," Singh, H., Gupta, R. P., and Srivastava, M. K. 2018 Conference on Pattern- Recognition and Recent Trends in Image Processing.
4. BMC Plant Biology, vol. 16, no. 1,2016, Mohanty, S., Hughes, D. P., Salathé, M. "Deep-Learning for Plant-Diseases: Detection and Saliency Map Visualisation.
5. "Plant Physiology and Biochemistry, vol. 151, 2020;Mohanta, P. K., Subudhi, J. K., Nayak, S. R., et al., "Deep-Learning Approaches for Plant- Disease-Detection and Diagnosis.
6. "Using CNN with PCA and SVM for Plant-Disease-Detection," Singh, S. K., Arora, M., Bhanu, S. K., et al. 2020: Conference on Science - Technology Emerging Trends for Engineering Systems.
7. Nasre, N. M., Shelke, R. B., & Awale, R. N. "Using CNN and Transfer Learning for Plant- Disease -Detection." 2020 International Conference on Control and Inventive Systems.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details