

Chapter 1

INTRODUCTION

1.1 Overview

Plant diseases are one of major reasons behind the production and economic losses in agriculture and identifying disease correctly is a challenging task and requires expertise.

Frequently the illnesses or its signs like colored spots or streaks can be observed on the plant leaves. The plants diseases are usually caused by microbes including fungi, bacteria, and viruses. There is a wide spectrum of signs and symptoms which differ because of the cause or etiology of the plant disease. Plants have become an important source of energy and are a fundamental piece in the puzzle to solve the problem of global warming.

There are several diseases that affect plants with the potential to cause economic, social and ecological losses. The detection and classification of leaf diseases accurately is the key to prevent the agriculture loss. Different plant leaf bears different diseases. There are a list of methods and classifiers to detect plant leaf diseases. There are many issues to farmer regarding the plant diseases and many times they do not get proper guidance to detect and cure the disease of plants.

In this context, diagnosing disease in an accurate and timely way is at utmost importance.

Chapter 2

LITERATURE SURVEY

[1] Sachin D. Khirade and A. B. Patil. “Plant Disease Detection Using Image Processing.” International Conference on Computing Communication Control and Automation (ICCUBE), 2015 International Conference on, pp. 768-771. IEEE, 2015.

This paper discussed various techniques to segment the disease part of the plant. This paper also discussed some Feature extraction and classification techniques to extract the features of infected leaf and the classification of plant diseases. The use of ANN methods for classification of disease in plants such as self-organizing feature map, back propagation algorithm, SVMs etc. can be efficiently used. From these methods, we can accurately identify and classify various plant diseases using image processing techniques.

[2] Akshita Arora, Nazim Khan, Shefali Gupta, Samikchha Singh Maansi Gupta. “Leaf Disease Detection Using CNN and Raspberry PI.” In computing, communications and Networking Technologies (ICCCNT), 2019 Fourth International conference on, pp. 1-5 IEEE, 2019

There are essentially three fundamental kinds of Leaf ailment, Bacterial, Fungal and Viral. The precision of plant ailment recognition is essential in plant ailment location, however the procedure ought to be rapid in the meantime. The aim of this paper is to help the farmers to protect his farm from any kind of pests and disease attacks and eliminate them without disturbing the decorum of the soil and untouched parts of other plants. Mostly in India, farmers use manual monitoring and some apps which have huge database limitations and are only bound to detection part. Since, Prevention is better than cure, this paper aims at detection of attack of pests/diseases in future thereby making farmer to prevent such attacks.

[3] Santhosh Kumar S, and B. K. Raghavendra. Diseases Detection of Various Plant Leaf Using Image Processing Techniques: A Review. 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS)

Literature survey has detailed explanation of the importance of disease detection both to plants and to mankind. To have a meaningful impact of plant diseases & techniques in the area of agriculture, deliberation of proper input is necessary. Research issues addressed here are to develop a systematic approach to detect and recognize the plant diseases would assist farmers

and pathologist in prospect exploration. The paper depicts the importance of image processing in agriculture field and considering the type of disease for further research work.

[4] Huu Quan Cap, Katsumasa Suwa, Erika Fujita, Satoshi Kagiwada, Hiroyuki Uga, and Hitoshi Iyatomi. A deep learning approach for on-site plant leaf detection. 2018 IEEE 14th International Colloquium on Signal Processing & Its Applications (CSPA).

This paper presents a simple and accurate leaf regions detection system with high affinity with other existing disease diagnosis systems. We confirmed that the performance of 78.0% in F1-score is sufficiently acceptable for this task from visual assessment.

[5] Abirami Devaraj, Karunya Rathan, Sarvepalli Jaahnavi, and K Indira. Identification of Plant Disease using Image Processing Technique. 2019 International Conference on Communication and Signal Processing (ICCS).

The present study deals with Alternaria Alternate, Anthracnose, Bacterial Blight and Cercosporin Leaf Spot this automatic illness detection using image processing techniques in MATLAB. It involves loading an image, image pre-processing, image segmentation, feature extraction and classification. Development of automatic detection system using advanced technology like image process facilitate to support the farmers within the identification of diseases at an early or initial stage and supply helpful data for its management. we might prefer to extend our work additional on a lot of disease detection.

[6] Sharath N Payyadi, Varun S D, Satya Gururaj Kalluru, Archana R Kulkarni “Disease Detection in Paddy Crop using CNN Algorithm” nternational Journal of Recent Technology and Engineering (IJRTE)ISSN: 2277-3878,Volume-8 Issue-6, April 2020

This research presents a system which detects the diseases like blast and blight in paddy crop as early as possible using CNN algorithm. The Raspberry-Pi is used as the portable computer. The keras model is trained with four hundred images dataset of diseases leaf image and loaded into Raspberry-Pi. The leaf image on the field is captured using Pi-camera and later processed by python script. The keras model is used to predict the disease in captured image.

Chapter 3

PROBLEM STATEMENT

3.1 Existing System:

Many researchers had done research on various plants and their diseases also they had given some techniques to identify that disease. Automation of identifying disease entails the input data collected from different sources. In this review, considering all different research papers we are identifying and discussing key issues, challenges are Quality image of plant leaves, Data set need to be considered in large amount. Acquired images are affected by background data and noises. Segmenting the exact spot in a leaf into meaningful disease. Preparation of training and testing samples from input image. Classification plays a role in recognizing segmented spot into meaningful disease. Color of plant leaf, size and texture are varying when climate changed, Regular observation is needed for particular plants and Identifying diseases for different plant leaves is challenging

3.2 Disadvantages of the existing system:

- Learning is slow and it's hard to know how many neurons as well as layers are required
- Accuracy was low when plant image was given as input.
- It is expensive to buy as it uses hardware kit and any damage caused in hardware can become a hectic work
- Number of diseases to classify was low
- It is only detecting paddy crop diseases.

3.3 Proposed System:

Disease detection plays an important role in agricultural fields as having disease in plants is quite natural. If proper care is not taken in this area, then it can cause serious effects on plants due to which respective product quality/quantity or productivity is affected.

In context to this we are proposing a system which will detect the disease and also provide an appropriate cure accordingly.

Chapter 4

OBJECTIVE

The objectives of the project are:

Leaves of a plant can be used to determine the health status of that plant. The objective of this work is to develop a system that capable to detect and identify the type of disease using Machine Learning. Plant diseases are one of source of obstruction in the quality and productivity of plants which can lead to the shortage of food supply. Therefore, plant disease detection is essential to the agriculture industry. The objective of this research is to classify, detect and give cures for the plant diseases by assessing the images of the leaves with the application of Machine Learning, a Machine Learning classification algorithm with a single layer feed-forward neural network. A plant disease prevents a plant from reaching its maximum potential of production. This definition includes non-infectious and infectious diseases [1] that pose threat to the agriculture industry by causing a decline in production and economic as well as reduction in the quality and the quantity of the plant products.

Chapter 5

METHODOLOGY

5.1 Software Architecture of the Model

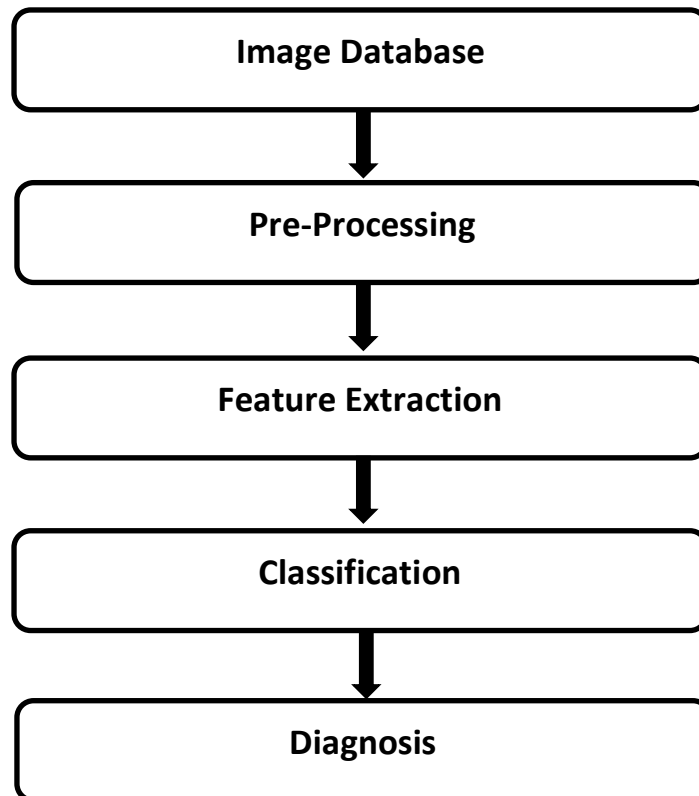


Fig. 1 Block Diagram of the proposed model

Image Database

First stage of any vision system is the image acquisition stage. The digitization and storage of an image is referred as the image acquisition. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today. However, if the image has not been acquired satisfactorily then the intended tasks may not be achievable, even with the aid of some form of image enhancement.

Pre-Processing

Commonly involves removing low frequency background noise, normalizing the intensity of the individual particles images, removing reflections, and masking portions of images. Image pre- processing is the technique of enhancing data images prior to computational processing.

Feature Extraction

As describing our own features may not result in higher efficiency, we started with SIFT(Scale Inverse Feature Transform)features as it computes the key points in the image which is more apt than describing features manually. So, after the skin segmented images were obtained using the YUV-YIQ model, we used the following approaches for extracting feature vectors.

Classification

This process refers to classification of diseases of plant leaf using machine learning algorithms based on features extracted.

Diagnosis

This process refers to diagnosis the disease detected and provide proper cure to it.

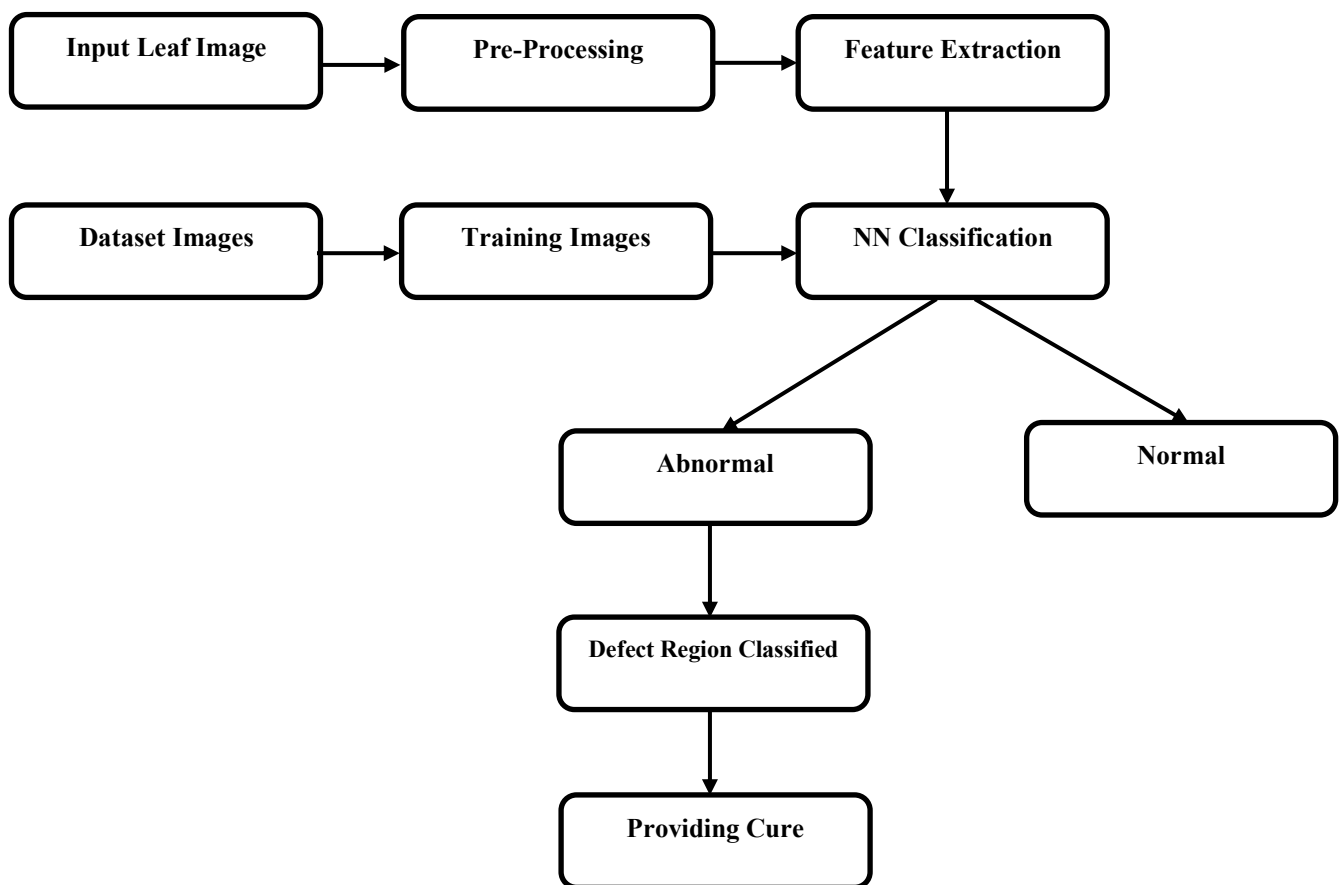


Fig. 2 Flow chart of the proposed model

5.2 Software Requirements

Mentioned below are the tentative software tools and libraries that we plan to use to build our project.

1. Python 3.7 or more

Python is an interpreted high-level general-purpose programming language. Its design philosophy emphasizes code readability with its use of significant indentation. Its language constructs as well as its object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects

2. Dependencies required

- NumPy
- Pickle
- Cv2 (OpenCV)
- Sklearn
- Keras
- Matplotlib
- Jupyter Notebook
- Python 3
- VScode
- PostgreSQL

Chapter 6

SUMMARY

In our country around approx. 60% of farmer are illiterate and poor, they do not know which pesticides can be used to save the plant from diseases and the plant infection. Our naked eyes can't detect the disease and also people may not know which fertilizer to be used to prevent the plant from diseases, so we use computer-based programming data to detect the disease and provide remedies. Health monitoring and disease detection on plant is very critical for sustainable agriculture. It is very difficult to monitor the plant diseases manually. It requires tremendous amount of work, expertise in the plant diseases, and also require the excessive processing time. To have a meaningful impact of plant diseases & techniques in the area of agriculture, deliberation of proper input is necessary. Research issues addressed here are to develop a systematic approach to detect and recognize the plant diseases would assist farmers and pathologist in prospect exploration. The paper depicts the importance of image processing in agriculture field and considering the type of disease for further research work. Our aim of the project is to detect the plant diseases and provide the solutions to recover from the plant diseases. We planned to design a software where it will detect the type of plant, disease and also provide its cure of disease.

REFERENCE

- [1] Sachin D. Khirade and A. B. Patil. "Plant Disease Detection Using Image Processing." International Conference on Computing Communication Control and Automation (ICCUBEA), 2015 International Conference on, pp. 768-771. IEEE, 2015.
- [2] Akshita Arora, Nazim Khan, Shefali Gupta, Samikchha Singh Maansi Gupta. "Leaf Disease Detection Using CNN and Raspberry PI." In computing, communications and Networking Technologies (ICCCNT), 2019 Fourth International conference on, pp. 1-5 IEEE, 2019.
- [3] Santhosh Kumar S, and B. K. Raghavendra. Diseases Detection of Various Plant Leaf Using Image Processing Techniques: A Review. 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS).
- [4] Huu Quan Cap, Katsumasa Suwa, Erika Fujita, Satoshi Kagiwada, Hiroyuki Uga, and Hitoshi Iyatomi. A deep learning approach for on-site plant leaf detection. 2018 IEEE 14th International Colloquium on Signal Processing & Its Applications (CSPA).
- [5] Abirami Devaraj, Karunya Rathan, Sarvepalli Jaahnavi, and K Indira. Identification of Plant Disease using Image Processing Technique. 2019 International Conference on Communication and Signal Processing (ICCSP).
- [6] Sharath N Payyadi, Varun S D, Satya Gururaj Kalluru, Archana R Kulkarni "Disease Detection in Paddy Crop using CNN Algorithm" nternational Journal of Recent Technology and Engineering (IJRTE)ISSN: 2277-3878,Volume-8 Issue-6, April 2020.