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IMPLEMENTATION APPROACHES OF DETECTION OF DISEASES ON GREEN GRAM PLANTS

Ms.Monika Jaiswal[1], Prof.Bharti Bhattad[2]

[1]Computer Science and Engineering & Sager Institute of Technology & Research, Indore
[2] Computer Science and Engineering & Sager Institute of Technology & Research, Indore

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Abstract -Now a day's agriculture industry is playing most important role in Indian GDP. Machine learning tools in conjunction with image analysis software can analyze the soil erosion levels and health conditions of individual crops. The obtained data is used to identify the infected regions on green gram plants and others, allowing farmers to use pesticides exactly where it's needed[1].Our platform is provides the facility to detects of various diseases on different- different plants through ML techniques which helps to increased production rate, and able to known the symptoms of diseases and take a treatment on timely.ML tools provides the image processing techniques to collect data and analyze the symptoms of diseases and allowing to spray of pesticides ad fertilizers according to infection of diseases. Our system is needful for Middleclass, High-class and Lower-class farmers who want to get more profit in minimum to minimum agriculture land.

***Key Words*:** ML, Diseases Detection, Image Processing, Green Gram, Production rate, Infected region.

1.INTRODUCTION *(Size 11, Times New roman)*

The major challenges of sustainable development is to reduce the usage of pesticides, cost to save the environment and to increase the quality. Precise, accurate and early diagnosis may reduce the usage of pesticides.

Data mining is termed as extracting the relevant information from large pool of resources. The advents of data mining technologies have been adopted in the prediction of plant diseases. Rice is one of the major crops cultivated in India. Nowadays, technology is widely used for plant disease prediction. The management of perennial leaf requires close monitoring system especially for the diseases that affects production and post-harvest life. The concept of image processing with data mining technologies assists us in following purposes[10]:

i) Recognizing infected leaf and stem
ii) Measure the affected area
iii) Finding the shape of the infected region
iv) Determine the color of infected region
v) And also influence the size and shape of the leaf.

The user is to select a particular diseased region in a leaf and the cropped image is sent for processing .This paper intends to study about the prediction of the plant diseases, at an untimely phase using k-mean clustering algorithm.

Our research paper introduce the various diseases and symptoms on Green Gram (Moong) plants are as follows[2].

Diseases:- 1. Powdery mildew

Symptoms:-1. White powdery patches appear on leaves and other green parts which later become dull coloured.

2. These patches gradually increase in size and become circular covering the lower surface also.

Treatment:-1. Use Resistant varieties.

2. The seeds must be shown early in the month of June to avoid early incidence of the disease on the crop.

Diseases:- 2. Anthracnose

Symptoms:-1. The disease appears to all aerial part and at any stage of plant growth.

2. Circular, black, sunken spots with dark centre and bright red orange margins on leaves and pods.

Treatment:-1. Hot water treatment at 54° for 10 min.

2. Follow crop rotation

3. Remove and destroy infected plant debris in soil.

Diseases:- 3. Leaf Spot

Symptoms:-1. Causing heavy losses in yield.

2. spots produced are small, numerous in numbers with pale brown centre and reddish brown margin.

Treatment:-1. Spray Mancozeb 2kgha or Carbendazim 50g/ha

2. Follow crop rotation

3. Remove and destroy infected plant debris in soil.

We can see the below infected and non-infected pictures of green gram plants[3].

Non-infected Pictures f green gram plants

Infected pictures of green gram plants

2. MACHINE LEARNING

Machine learning teaches computers to do what comes naturally to humans and animals: learn from experience. Machine learning algorithms use computational methods to "learn" information directly from data without relying on a predetermined equation as a model. The algorithms adaptively improve their performance as the number of samples available for learning increases[7].

REAL-WORLD APPLICATIONS

With the rise in big data, machine learning has become particularly important for solving problems in areas like these[7]:

• Computational finance, for credit scoring and algorithmic trading

• Image processing and computer vision, for face recognition, motion detection, and object or diseases detection

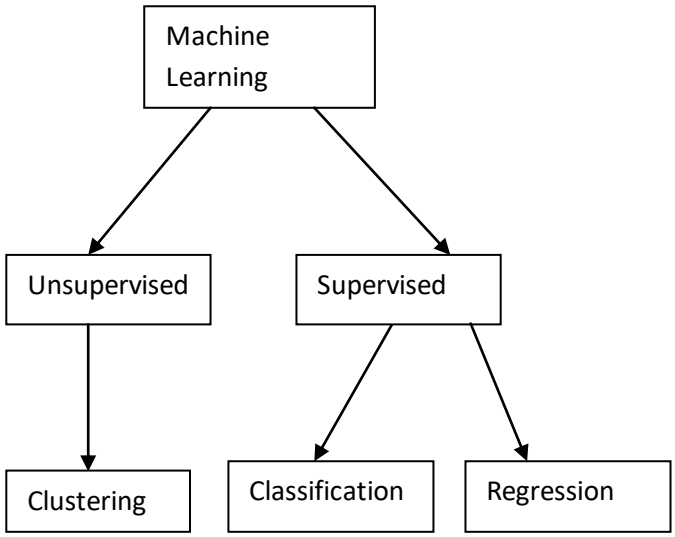
• Computational biology, for tumor detection, drug discovery, and DNA sequencing

• Energy production, for price and load forecasting • Automotive, aerospace, and manufacturing, for predictive maintenance

• Natural language processing

HOW MACHINE LEARNING WORKS

Machine learning uses two types of techniques: supervised learning, which trains a model on known input and output data so that it can predict future outputs, and unsupervised learning, which finds hidden patterns or intrinsic structures in input data.



MATLAB Tools:- MATLAB is a proprietary multi-paradigm programming language and numeric computing environment developed by Math Works. MATLAB allows matrix manipulations plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages[9].

MATLAB for a range of application, in industry and academia, including deep learning and machine learning, signal processing and communications, image and video processing, control systems, test and measurement, computational finance, and computational biology.

3. RESEARCH AND METHODOLOGY

In this section, we explain about the leaf disease prediction using k-mean clustering algorithm. This paper includes several steps Image Acquisition, Image Preprocessing, Feature Extraction, and neural network based classification[10] .

It works as follows:

i) Image Acquisition
ii) Image Preprocessing
iii) Image segmentation
iv) Feature extraction

3.1 Image Acquisition :-

The initial process is to collect the data from the public repository. It takes the image as input for further processing. We have taken most popular image domains so that we can take any formats like .bmp, .jpg, .gif as input to our process.

3.2 Image Preprocessing:-

As the images are acquired from the real field it may contain dust, spores and water spots as noise. The purpose of data pre-processing is to eliminate the noise in the image, so as to adjust the pixel values. It enhances the quality of the image.

3.3 Image segmentation:-

Image segmentation is the third step in our proposed method. The segmented images are clustered into

different sectors using Otsu classifier and k-mean clustering algorithm. Before clustering the images, the

RGB color model is transformed into Lab color model. The advent of Lab color model is to easily cluster the segmented images.

3.4 K-means Clustering Algorithm:-

a) Load the input images.

b) Commute the RGB image into L*a*b color space.

c) RGB images are combination of primary colors (Red, Green, Blue) .

d) RGB image feature Pixel Counting technique is extensively applied to agricultural science.

e) The L*a*b* space consists of a radiance layer 'L*', chromaticity-layer 'a*' indicating where color falls along the red-green axis and chromaticity layer 'b*' indicating where the color falls along the blue-yellow

axis. All of the color information is in the 'a*' and 'b*' layers.

f) Clustering the variant colors using k-mean method

3.5 Otsu's classifier:-

In image processing technique, Otsu's strategy is utilized to perform clustering based image Threshold. The diminishment of a gray level image to a binary image is done by Nobuyuki Otsu .This algorithm assumes , image contains two classes of pixels .It incorporates bi-modal histogram (foreground pixels and background pixels).We can calculate the optimum threshold by isolating the two classes and their combined spread (intra-class variance) is negligible or equivalently.

4. LITERATURE REVIEW

An Overview of the Research on Plant Leaves Disease detection using Image Processing Techniques by Kiran R. Gavhale, and U. Gawande, Gavhale and Gawande (2014) presented reviews and summarizes image processing techniques for several plant species that have been used for recognizing plant diseases. The major techniques for detection of plant diseases are: back propagation neural network (BPNN), Support Vector Machine (SVM), K-nearest neighbor (KNN), and Spatial Gray-level Dependence Matrices (SGDM). These techniques are used to analyses the healthy and diseased plants leaves.

Intelligent Diagnose System of Wheat Diseases Based on Android Phone by Y. Q. Xia, Y. Li, and C. Li , In 2015, Xia and Li have proposed the android design of intelligent wheat diseases diagnose system. In this process, users collect images of wheat diseases using Android phones and send the images across the network to the server for disease diagnosis. After receiving disease images, the server performs image segmentation by converting the images from RGB color space to HSI color space. The color and texture features of the diseases are to be determined by using colour moment matrix and the gray level co-occurrence matrix. The preferred features are input to the support vector machine for recognition and the identification results are fed back to the client.

Implementation of RGB and Gray scale images in plant leaves disease detection –comparative study by Padmavathi and Thangadurai (2016) have given the comparative results of RGB and Gray scale images in leaf disease finding process. In detecting the infected leaves, color becomes an important feature to find the disease intensity. They have considered Grayscale and RGB images and used median filter for image enhancement and segmentation for extraction of the diseased portion which are used to identify the disease level. The plant disease recognition model, based on leaf image classification, by the use of deep convolution networks have developed. 13 kinds of diseases are identified from the healthy leaves with the capability to differentiate leaves from their surroundings.

4.1 Traditional Threshold Segmentation Methods

Threshold can never be ignored in image processing. Iterative Method, Otsu Method, and 2-Mode Method are the most common threshold segmentation methods. It is section introduces these traditional methods.

4.1.1 Iterative Method:- Te Iterative Method can calculate the threshold in a certain extent automatically. For the iterative process, the Iterative Method includes a prior knowledge concerning the image and noise statistics. And the optimal segmentation threshold can be found by continuously reducing the gray scale mean.

4.1.2 2-Mode Method:-The image is often composed of normal foliage and diseased area, so the histogram of gray scale can be regarded as two normal distribution functions.

V. PROPOSED ARCHITECTURE OF SYSTEM TO BE BUILT

This architecture is presented to implementation approach of our system –The solution of the above problem is to make a software or website. We can understand by the following system architecture of the given problem.

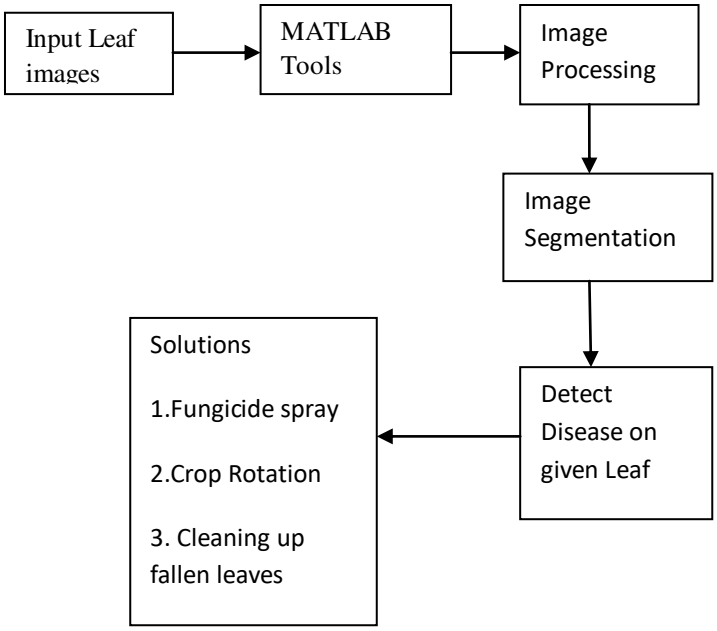


Fig-1: System Architecture

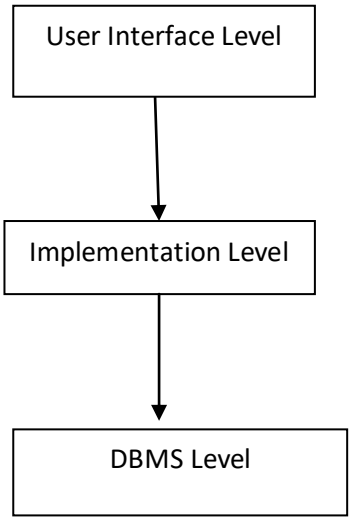


Fig-2: Implementation Process

6. IMPLEMENTATION APPROACH-

Our System is provides the android Mobiles based application for farmers which is used to identify of various diseases on plants and take treatments on time.

In this research paper introduces the various steps to implement our system are as follows :

Step 1: In this step take a images of leaf and plants as a input and upload a picture or take a live photo.

Step 2 : In this step we will used MATLAB tools for Image Processing techniques. It is really helpful to implement to our system.

Step 3: The purpose of data pre-processing is to eliminate the noise in the image, so as to adjust the pixel values. It enhances the quality of the image.

Step 4: Before clustering the images, the RGB color model is transformed into Lab color model. The advent of Lab color model is to easily cluster the segmented images.

Step 5: It is final step in this step is useful to crops management and treatment. In this step is provides the solutions i.e. Fungicide and fertilizer spray, Crop rotation, cleaning up fallen leaves and used resistance verities of seeds according to symptoms of diseases.

Our system based on three levels are as follows:-

7. DISCUSSION-

Acquiring and importing data:- Import images and video generated by a wide range of devices, including webcams, digital cameras, satellite and airborne sensors, medical imaging devices, microscopes, telescopes, and other scientific instruments[9].

Image Enhancement:- Increase the signal –to-noise ratio and accentuate image features by modifying the colours or intensities of an image. Perform convolution and correlation , remove noise , adjust contrast, and remap the dynamic range[9].

Code for image processing:-

```
lambda  = 4;%8
theta   = 0;
psi     = [0 pi/2];
gamma   = 0.5;
bw      = 1;
N       = 12;
bp_filter_input_image = sharpened_original_image;
bp_filtered_image = zeros(size(bp_filter_input_image, 1),
                    size(bp_filter_input_image, 2), N);
```

```
img_out_disp = zeros(size(bp_filter_input_image, 1),
            size(bp_filter_input_image, 2), N);
% display 12 images in one window
figure;
for n=1:N
    mean_filter = BP_fn(bw,gamma,psi(1),lambda,theta) +
            1i * BP_fn(bw,gamma,psi(2),lambda,theta);
    % filter output to the n-th channel
    bp_filtered_image(:, :, n) =
imfilter(bp_filter_input_image,
                    mean_filter, 'symmetric');
    % next orientation
    theta = theta + pi/N;
    % default superposition method, L2-norm
    image_vector = [];
    image_vector = sum(abs(bp_filtered_image(:,:,n)).^2,
3).^0.5;
    % normalize
    img_out_disp(:,:,n) =
image_vector./max(image_vector(:));
    %result show
    str=sprintf('BP theta=pi/%d',n);
    subplot(3,4,n),imshow(img_out_disp(:,:,n));xlabel(str);
end
```

Data mining technologies has been incorporated in the agriculture industry. This project implements an innovative idea to identify the affected crops and provide remedy measures to the agricultural industry. By the use of k-mean clustering algorithm, the infected region of the leaf is segmented and analyzed. The images are fed to our application for the identification of diseases. It provides a good choice for agriculture community particularly in remote villages. It acts as an efficient system in terms of reducing clustering time and the area of infected region. Feature extraction technique helps to extract the infected leaf and also to classify the plant diseases. The embedded voice navigation system helps to guide us throughout the process. As future enhancement of the project is to develop the open multimedia (Audio/Video) about the diseases and their solution automatically once the disease is detected[10].

8. CONCLUSION-

We have concluded that according to our this information improves segmentation and disease Recognition system. An improved histogram segmentation method is proposed; this method can find appropriate threshold automatically rather than manually, which is more scientific, reliable, and efficient. Meanwhile, the linear regression model can be modified easily by changing the independent and dependent variables; it has accuracy, applicability, and greater potential. Our system to be built for those farmers whose depends only agriculture sector. Our aim is increased the production rate of crops.

REFERENCES-

[1] WWW.hpe.com

[2] eagri.org

[3]Shutterstock.com

[4] https://www.analyticsvidhya.com/, https://www.python.org/

[5]https://www.w3schools.com/html/html css.asp

[6]https://www.springer.com/

[7]WWW.Machinelearning .com

[8]https://google.co.in

[9] https://in.mathworks.com/campaigns/offers/machine-learning-with-matlab.html.

[10]G.Saradhabal, R.Dhivya, S.Latha,R.Rajesh, College of Engineering and Technology, Villupuram, India.

[11] V. Pooja, R. Das, and V. Kanchana, “Identifcation of plant leaf diseases using image processing techniques,” in Proceedings of the 2017 IEEE Technological Innovations in ICT for Agriculture and Rural Development (TIAR), pp. 130–133, Chennai, April 2017.

[12] P. L. Cheong and S. D. Morgera, “Iterative methods for restoring noisy images,” Institute of Electrical and Electronics Engineers Transactions on Acoustics, Speech and Signal Processing, vol. 37, no. 4, pp. 580–585, 1989.

[13] Y. S. Tang, D. H. Xia, G. Y. Zhang, L. N. Ge, and X. Y. Yan, “Te detection method of lane line based on the improved

Otsu threshold segmentation," Applied Mechanics and Materials, vol. 741, pp. 354–358, 2015.

[14] Y. Geng, Study on Crop Disease Diagnosis Based on Image Recognition, University of Science and Technology of China, Anhui, China, 2009.

[15] Q. Wang, Image Histogram Features and Its Application, University of Science and Technology of China, 2014.

[16] R. Pydipati, T. F. Burks, and W. S. Lee, "Identifcation of citrus disease using color texture features and discriminant analysis," Computers and Electronics in Agriculture, vol. 52, no. 1-2, pp. 49– 59, 2006.

[17]S. Huang, "A novel method of stone surface texture image recognition," in Proceedings of 2016 IEEE International Conference on Signal and Image Processing (ICSIP '16), IEEE, Beijing, China, 2016.

[18] F. Peng, D.-L. Zhou, M. Long, and X.-M. Sun, "Discrimination of natural images and computer generated graphics based on multi-fractal and regression analysis," AEUE - International Journal of Electronics and Communications, vol. 71, pp. 72–81, 2017.