IJCSE International Journal of Computer Sciences and Engineering Open Access
Survey Paper Vol.-7, Special Issue-11, May 2019 E-ISSN: 2347-2693

Rice Crop Disease Identification and Classifier

Vishakha Lahu Bansod

[1]Dept. of Computer Science and Engineering, Kalinga University, Raipur, India
[1]Dept. of Computer Science and Engineering,Rajiv Gandhi College of Engineering, Research and Technology, Chandrapur, India

Corresponding Author: vishakha_bansod@rediffmail.com

Available online at: www.ijcseonline.org

***Abstract*—**many papers have been referred, covering the work on rice plant diseases and other different plants and fruits, and present a survey of few papers based on important criteria. These criteria include size of image dataset, no. of classes (diseases), preprocessing, segmentation techniques, types of classifiers, accuracy of classifiers etc. Utilize this survey and study to propose a work on detection and classification of rice crop diseases.

***Keywords*—**plant Dieses, Rice Crop, SVM, preprocessing, Feature extraction, wireless sensor, k-mean

I. INTRODUCTION

In India, there is a many change in Agriculture Technology. Not most of the farmers are using latest technology gadgets in their farms. There is a huge gap between technology and farmers in India. Many start-ups have emerged to bridge this gap between the technology and the farmers. Food demand is exponentially increasing due to rise in population. People talking about tractors and heavy machinery in farms era is now replaced by smart technology such as Internet of Things, Artificial Intelligence and Machine Learning. Smart sensors are replaced by heavy machinery in American farms. Farmers are using technology such as temperature and moisture sensors, drones, smart irrigation, terrain contour mapping, self-driving and GPS enabled tractors/rovers - to produce food more sustainably.

Several digital apps are designed to help farmers to identify diseases attacked in the farm. Even **NPK (Nitrogen, Phosphorus and Potassium)** values of the plant are calculated to monitor the plant's health.

Many MNCs are investing hugely in using technology in agriculture. **Artificial Intelligence, Machine learning, Deep learning and IoT** technologies are adopted by start-ups and tech companies to boost the crop yield.

Applying wireless sensor network for monitoring rice crop and pest identification is needed nowadays. Joining the sensor data alongside with Mobile application, benefit farmers to abuse their insight in a proficient path with a specific end goal to extricate the best outcomes from their rice crop development. Here I present a technology which aggregates the Machine learning algorithms for disease identification in the rice crops. The framework can scale in view of every farmers requests and the subsequent gathering of data may speak to an important asset for future.

The Major objectives of the research are:

- To construct a database to store rice disease information.
- To find out the affected disease based on disease infected crop images using deep CNN & SVM classifier.
- To build a database for rice disease syndromes and treatment possibilities.

The paper is organized as follows

1. First section introduces the previous methodologies for disease identification in rice crops.
2. Second section briefs the system model of the proposed smart disease prediction & identification in rice crops.
3. Third section outlines how the database is developed for storing the available rice crop disease management information.
4. Fourth section describes the implementation of the proposed system and the accuracy of the proposed methodology.

II. LITERATURE SURVEY

Jitesh P. Shah, Harshad Kumar B. Rajapati, Vipul K. Dabhi, [2] have Identification of diseases from the images of a plant is one of the interesting research areas in the agriculture field, for which machine learning concepts of computer field can be applied. This article presents a prototype system for detection and classification of rice diseases based on the images of infected rice plants. This prototype system is developed after detailed experimental analysis of various techniques used in image processing operations. Here consider three rice plant diseases namely Bacterial leaf blight, Brown spot, and Leaf smut. Capture images of infected rice plants using a digital camera from a rice field. Here empirically evaluate four

techniques of background removal and three techniques of segmentation. To enable accurate extraction of features, They propose centroid feeding based K-means clustering for segmentation of disease portion from a leaf image. We enhance the output of K-means clustering by removing green pixels in the disease portion. We extract various features under three categories: color, shape, and texture. We use Support Vector Machine (SVM) for multi-class classification. We achieve 93.33% accuracy on training dataset and 73.33% accuracy on the test dataset. We also perform 5 and 10-fold cross-validations, for which we achieve 83.80% and 88.57% accuracy, respectively.

In [6], three rice diseases: bacterial leaf blight, sheath blight, and rice blast were considered. Their work used 3*3 rectangular filter windows to remove or weakened noises. After noise removal, the images were converted into two forms:

$$y1 = 2g - r - b$$
$$y2 = 2r - g - b$$

To segment disease spots from the rice leaf, their work used Otsu method. The shape and texture features were considered in their work [6] because the outside light highly influences color features. Their work used shape features such as area and perimeter. The texture features were obtained using gray level co-occurrence matrix. They used 4 shape features and 60 texture features.

In [7], disease segmentation was considered as a two class problem in which an image is treated as a matrix of M rows and N columns that can contain disease spot and natural part. Their work extracted color texture features using chromatography concepts of CIE XYZ color space and color features using CIE l*a*b* color space. The following shape features were considered in [7]: area, roundness, shape complexity, extending length and concavity, and equivalent rate of longer axis and shorter axis of the ellipse.

III. PROPSED SYSTEM MODEL

The proposed Smart Rice Disease Detection Management model is based sensor network incorporated to a mobile application.

The developmental approach of the proposed system includes two modules:

- Disease Identification: Identification of disease affected
- Disease Management: Remedial measure for disease

Disease Identification is all about detecting what type of infection is occurred in the rice crop. Disease Management is about determining the result of disease identification which is intimated to the farmer through mobile app.

3.1 Disease Identification

The disease identification process depicted in figure 1 is implemented with the help of mobile application. It is a four step process namely: 1) Image capture & selection 2) Image zoom and crop, 3) Upload image and 4) Receive notification. Image capture & selection: Diseased affected paddy image is captured through a clear camera. Multiple snapshots are to be taken for choosing the appropriate affected area. A clear image is chosen such that the disease affected areas are clearly visible. In case of same crop problem, choose images from the database which was created earlier; Image Zoom and crop: Choose the best portion of the disease affected image and crop it; Upload Image: Cropped image is to be uploaded in the remote server using the mobile app; Receive notification: Once image has been uploaded in the remote server, pattern matching is performed with the available datasets using pattern matching algorithm, and the precaution is send to the farmer via mobile app by the expert.

3.2 Disease Identification and classifier

Algorithm For detecting various rice crop diseases of Bacterial leaf blight, Brown spot, and Leaf smut the image processing techniques namely image acquisition, image preprocessing, image segmentation, feature extraction and classification of image are introduced

The following are the steps for plant leaf disease detection and classification using image processing:

Figure 1: Flow diagram of basic steps for rice disease detection and identification

A. Image acquisition

Diseased affected rice image is captured through a clear camera. To find the exact disease affected, the RGB color of the cropped image is must be clearly visible as shown in figure 2. This is achieved with the help of a high end mobile camera. These images are stored in either of process able image extension in the database.

Figure 2: Disease affected Rice crop RGB color image

B. Image preprocessing

In image preprocessing, image data recorded by sensors on a satellite restrain errors related to geometry and brightness values of the pixels. These errors are corrected using appropriate mathematical models which are either definite or

statistical models. Image enhancement is the modification of image by changing the pixel brightness values to improve its visual impact. Image enhancement involves a collection of techniques that are used to improve the visual appearance of an image, or to convert the image to a form which is better suited for human or machine interpretation.

Sometimes images obtained from satellites and conventional and digital cameras lack in contrast and brightness because of the limitations of imaging sub systems and illumination conditions while capturing image. Images may have different types of noise. In image enhancement, the goal is to accentuate certain image features for subsequent analysis or for image display [3]. Examples include contrast and edge enhancement, pseudo-coloring, noise filtering, sharpening, and magnifying. Image enhancement is useful in feature extraction, image analysis and an image display. The enhancement process itself does not increase the inherent information content in the data. It simply emphasizes certain specified image characteristics. Enhancement algorithms are generally interactive and application dependent. Some of the enhancement techniques are

- Contrast Stretching
- Noise Filtering
- Histogram modification

Figure 3: Contrast Enhanced Rice Crop Image

C. Image Segmentation

The K-means clustering is used for classification of object based on a set of features into K number of classes. The classification of object is done by minimizing the sum of the squares of the distance between the object and the corresponding cluster.

Figure 4: Image Segmentation of Rice Crop Image

D. Feactures Extraction

Feature extraction plays an important role for identification of an object. In many application of image processing feature extraction is used. Color, texture, morphology, edges etc. are the features which can be used in plant disease detection. Texture means how the color is distributed in the image, the roughness, hardness of the image. It can also be used for the detection of infected plant areas.

The rice leaf disease consists of different shape and color because of several types of disease such as Bacterial leaf blight, Brown spot, and Leaf smut. Features such as shape, color play a major role in disease identification. Shape can be identified by measuring the breadth and height of the rice diseased image to measure the object pixel count. The pixels are then used to distinguish RGB values for calculating the Grey-Level Co-occurrence Matrix (GLCM).

E. Detection and Classification

i) Using ANN:

After feature extraction is done, the learning database images are classified by using neural network. These feature vectors are considered as neurons in ANN. The output of the neuron is the function of weighted sum of the inputs. The back propagation algorithm modified SOM; Multiclass Support vector machines can be used.

ii) Back propagation:

BPNN algorithm is used in a recurrent network. Once trained, the neural network weights are fixed and can be used to compute output values for new query images which are not present in the learning database.

Once trained, the neural network weights are fixed and can be used to compute output values for new query images which are not present in the learning database. After getting the weight of learning database, then testing of query image is done.

IV. RICE DISEASE DATABASE MODEL

Database creation is the most basic and tedious undertaking in rice crop disease administration. On the premise of a vigilant examination of the contemporary resources, including distributed and unpublished writing, of crop diseases and populace flow of specialists' conclusions, applicable data for the rice crop infections was gathered from various sources. These samples datasets are stored in remote server for pattern matching.

Starting from the basic image reading process, I give dataset of nearly **100** each set of healthy plant images, diseases infected images. Therefore, each set of categories will have 100 images. The large set is acquired for the accuracy purpose.

VI. CONCLUSION & FUTURE WORK

The accurately detection and classification of the plant disease is very important for the successful cultivation of crop and this can be done using image processing. 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.

REFERENCES

[1] R.Rajmohan, M.Pajany,R.Rajesh,D.Raghu Raman, U. Prabu, " SMART PADDY CROP DISEASE IDENTIFICATION AND MANAGEMENT USING DEEP CONVOLUTION NEURAL NETWORK AND SVM CLASSIFIER" International Journal of Pure and Applied Mathematics Volume 118 No. 15 2018, 255-264

[2] JITESH P. SHAH, HARSHADKUMAR B. PRAJAPATI, VIPUL K. DABHI,"A SURVEY ON DETECTION AND CLASSIFICATIOPN OF RICE PLANT DISEASES" 2016 IEEE International Conference on Current Trends in Advanced Computing (ICCTAC) 15 September 2016

[3] Malti K. Singh, Subrat Chetia,"Detection and Classification of Plant Leaf Diseases in Image Processing using MATLAB", International Journal of Life Sciences Research ISSN 2348-3148 (online) Vol. 5, Issue 4, pp: (120-124), Month: October - December 2017

[4] Sachin Khirad, A. B. Patil," Plant Disease Detection Using Image Processing", IEEE ICCUBEA.2015.153

[5] DETECTION & PREDICTION OF PESTS/DISEASES USING DEEP LEARNING, from website: https://innovate.mygov.in/wp-content/uploads/2018/09/mygov1536109003113172.pdf

[6] Q. Yao, Z. Guan, Y. Zhou, J. Tang, Y. Hu, and B. Yang, \Application of support vector machine for detecting rice diseases using shape and color texture features," in Engineering Computation, 2009. ICEC'09. International Conference on IEEE, 2009, pp. 79{83.

[7] G. Anthonys and N. Wickramarachchi, \An image recognition system for crop disease identification of paddy fields in sri lanka," in 2009 International Conference on Industrial and Information Systems (ICIIS). IEEE, 2009, pp. 403{407.

[8] AI and IoT methods for plant disease detection in Myanmar from website: https://www.researchgate.net/publication/326988635_IoT_and_AI_methods_for_plant_disease_detection_in_Myanmar.

