International Journal of Innovative Research in Computerand Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.488 |

||Volume 8, Issue 7, July 2020||

Identification of Crops Fertilizer by Predicting Its Disease Using Image Processing

Janani R[1], Shalinipriya R[1], Priyanka S [2]

Final Year, Dept. of CSE, Bannari Amman Institute of Technology, Sathyamangalam, India

Assistant Professor, Dept. of CSE, Bannari Amman Institute of Technology, Sathyamangalam, India

ABSTRACT: Agriculture is the main reason for the development of our country. Technology has proven its fullest in this area too. Even though many farmers are still unaware of what disease does his crop is affected of. Identifying the crop disease requires large amount of time and needed much knowledge in it. This paper focuses on providing the name of the crop disease and what fertilizers can be used and at which quantity. The image of infected crop is Preprocessed. Features like GLCM (Gray level Co-occurrence matrix), are extracted from the image. Then the fertilizer decision making is done using Layered Recurrent Neural Network (LRNN). This whole process is simulated using MATLAB 2016b. The performance is noted that the detection rate is higher than existing SVM classifier. Data protection is better in proposed system than the existing system.

KEYWORDS: Image processing, Neural network, Feature extraction, Contrast enhancement, median filtering.

I.INTRODUCTION

Now a days, Technology plays an important role in everyone's life. Agriculture is a area which needs much improvement. An infected crop can destroy its own self and damage the other crops too. Still now most of the farmers don't know what pesticide / insecticide should be given to the infected crop [3]. They are also not sure about the quantity also. If they provide a wrong fertilizer with surplus or excess amount, it may damage the whole farming field. This paper gives a solution to their problem. Now a days, Technology plays an important role in everyone's life. Agriculture is a area which needs much improvement. An infected crop can destroy its own self and damage the other crops too. Still now most of the farmers don't know what pesticide / insecticide should be given to the infected crop [3]. They are also not sure about the quantity also. If they provide a wrong fertilizer with surplus or excess amount, it may damage the whole farming field. This paper gives a solution to their problem.

In older days, people who are experienced technologically, identified the problem and acquired a solution to it [1]. But, due to many environmental changes the prediction has become tough. So, we can use image processing technique to detect the disease manually and intimate the farmer about it. The main objective of this paper is to get the input image from the user. Pre-process and segment it using the algorithms. Classify using the trained machine and display the required output to the user [2].

The flow of the above mentioned process is mentioned below:

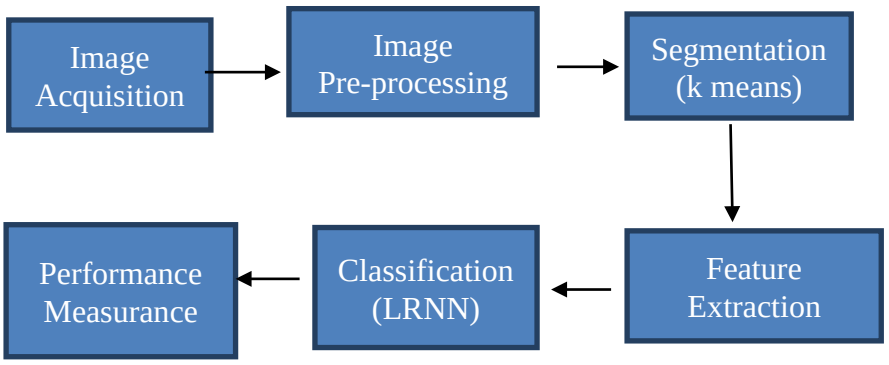

Fig 1: Block diagram for Fertilization Management

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.488 |

||Volume 8, Issue 7, July 2020||

II. RELATED WORK

In 2017, Bharat Mishra et al. [1], took a survey on detecting the leaf disease using many image processing techniques. They classified each and every image with the help of analysis tools and applications. In this paper, most emerging technologies that are used for predicting a disease is discussed. The key issues and challenges that are present in identifying a leaf disease is highlighted. Among many ways to detect the leaf disease they conclude by saying that image processing techniques are best and easy way to retrieve the required outputs. In Aug 2016, S. Singla et al. [2], classified the diseases that can be attacked to plant like fungi, bacteria and viruses. These not only restrict the growth of plants but also destroy the crop. If we have to find the disease manually, it would be time consuming and includes many laboratory works. Hence, in this paper, they surveyed the different types of existing methods in identifying the crop disease.

In 2013, A. Akhtar et al. [3], have suggested a method for automatic identification and classification of plant disease. In this paper, they compared the performance of several machine learning techniques for detecting the crop disease pattern from leaf images. A three phrase framework is implemented ie., the image is segmented, then the features are extracted and finally the image is classified using support vector machines.

In 2012, Y. Swang, Y. Wang et al. [4], implemented the feature extraction method for detecting a crop disease using image processing techniques. They considered the three aspect features such as color, texture and shape of the leaf. Their results analysed the feature extraction of the image and prospected the applications of extraction techniques in future detection of crop disease.

In Dec 2011, B. Banu et al. [5], predicted the weakness of current practical applications and their inability in the segmentation process as real world changes occur in the image. The used genetic algorithm method to implement image segmentation. Their goal in using this algorithm is to provide continuous adaptation methods and to interact with dynamic environment. Their experimental results demonstrate the ability to adapt the segmentation performance in outdoor color imagery.

In 2011, M. Hemalatha et al. [7], explored the challenges in using data mining techniques in the field of agriculture. They found that using machine learning algorithms like SVM Classification and neural networks are new approach for forecasting or predicting the crop management and soil fertilization. Their work concludes the applications of machine learning techniques in the field of farming and similar sciences.

III. PROPOSED WORK

In the proposed method, five steps are required to complete the process. They are, **Selecting an input image, Pre-processing, Segmentation, Feature Extraction and Classification.**

On the first step, the farmer should select the picture of the diseased crop. While running the application, the first option displayed is **input image**. Clicking that button will take the farmer to the selection dialog box. There the user should select the destined folder where the image of the crop is located. The image will get stored and resized based on the parameter that is given. With the fixed dimension, the selected image will be displayed on the screen.

Now the selected image is preprocessed. Generally, all images will be of RGB model and in this step, it is changed to another color phase known as **L*a*b***. L* is termed as Luminosity or Bright layer and a*b* is known as Chromaticity layer. Colors that fall on redgreen axis is denoted as a* and colors that fall on blue-yellow axis is denoted as b*. Median filtering of the image is done to find the sample region of each color. All the informations necessary are found in those chromaticity layer. Finally, it calculates the sample region's average color in that a*b* color phase.

Segmentation is a process which extracts the needed area from the background. The algorithm used for this process is **k means clustering** which is best suited one for clustering. It is an unsupervised algorithm. To form a cluster, we should calculate the minimum distance which is known as Euclidean Distance Metric. Among different clusters, the closest cluster is found. Total number of clusters formed is also identified for further enhancement.

In general, every image has certain features. Here **GLCM (Gray Level Co-occurrence Matrix)** is used to extract the feature of segmented image. The RGB image is now converted into grayscale image for better extraction. This gray level co-matrix helps us to bring out the texture of the image. Generally, all image will have pixels confined within 0-250. It calculates how pairs of pixels that has some specific value occur in an image. A graph is generated on the basis of histogram values for the segmented image. 22 features are extracted in this project and few of them are as follows: Entropy, uniformity, dissimilarity, contrast, correlation, cluster shade etc.,

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.488 |

||Volume 8, Issue 7, July 2020||

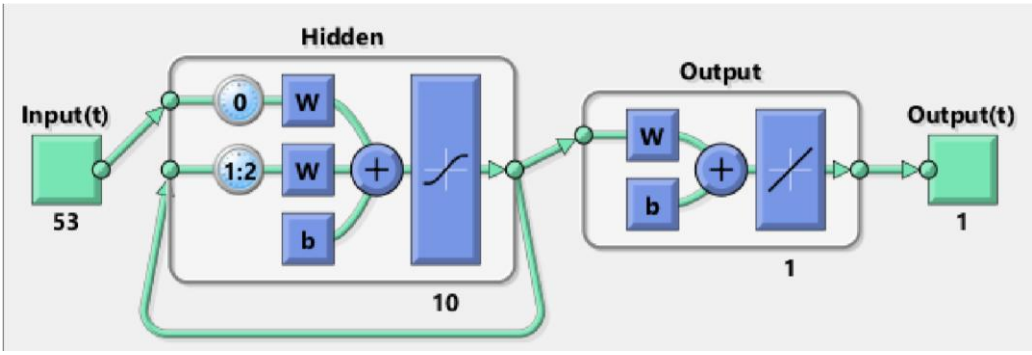

Fig 2: Architecture of Layered Neural Network

The Proposed classifier used in this paper is **LRNN (Layered Recurrent Neural Network)**. The main benefit of using this algorithm is it is a layered architechture and feed forward system. In the existing system, SVM is used as the classifier. It uses certain techniques called Kernels to estimate boundary for the expected output. Kernels are used to learn complex functions. But in our proposed system, instead of learning complex functions, multi-layered structure can be implemented. To classify the images, LRNN should be trained first. Rice leaves along with their disease are stored in a dataset called as training images. Three plant diseases are stored in it and it can also be extended to as many by using Multi SVM. This algorithm works best for image recognition, classification and data protection.

IV. RESULTS

At the end of classification process, the image will undergo into Layered Neural Network and after processing, the required output will be displayed in the GUI.

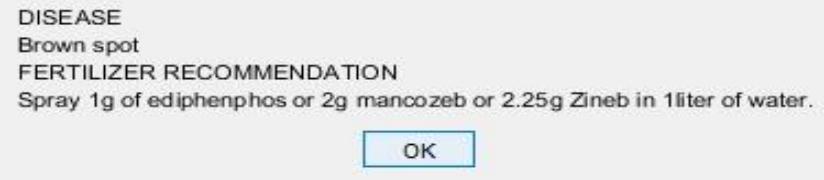

Fig 3: Message displaying the name of the disease and fertilizer recommendation.

A graph is plotted for describing the comparison between the existing and proposed method. Various factors are taken into consideration. They are: Accuracy, Sensitivity, Specificity, Precision, Recall, f-measure, g-mean.

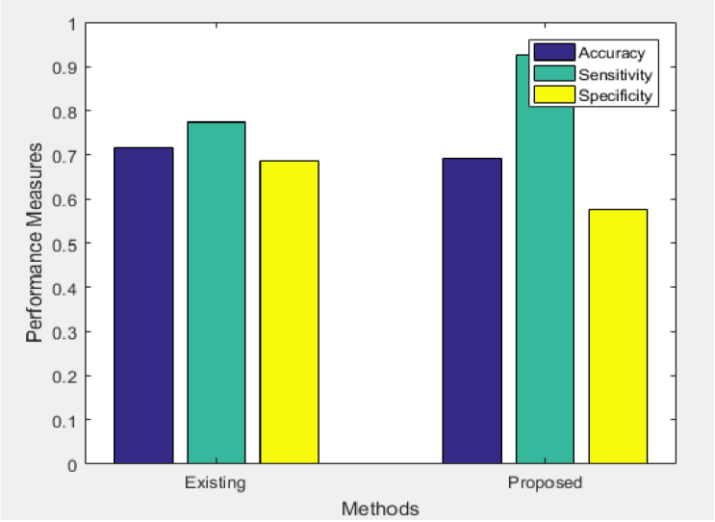

Fig 4: Comparison between Existing (SVM) And Proposed (LRNN) Method

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.488 |

||Volume 8, Issue 7, July 2020||

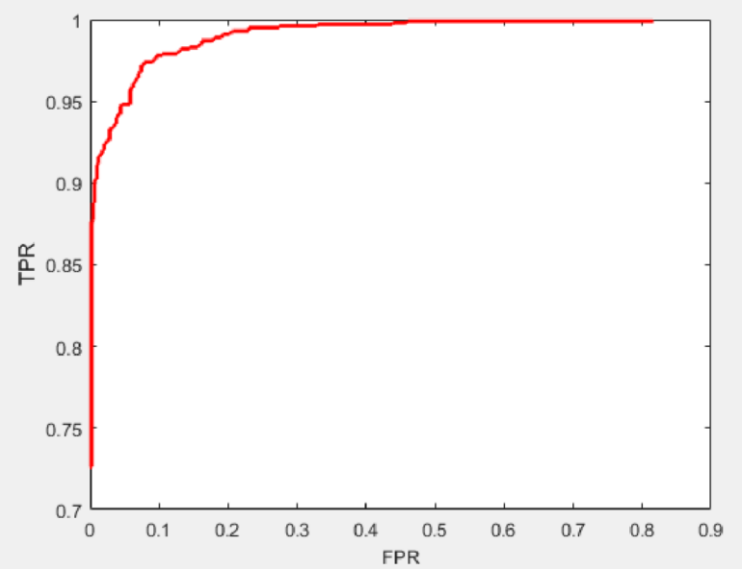

Fig 5: ROC Curve

Finally **ROC (Receiver Operating Characteristics)** curve ie., a probability curve is obtained which describes the True Positive Rate(TPR) and False Positive Rate(FPR) of the above mentioned performance metrics.

V. CONCLUSION

Thus, the whole study summarizes, identifying the disease of a rice crop and giving a possible solution to that problem using image processing is implemented. The six steps can accurately detect a leaf disease. The experimental results have proven that the disease can be detected using less computational effort. Using this method, the disease can be identified at the initial stage itself and the life of crops can be saved. The graph displaying the performance of factors in existing method and proposed method shows that it has considerable amount of variations.
Factors like Accuracy differs from 60% - 70%, Sensitivity from 79% - 90%, Specificity from 60% - 70% and so on. Like this, many pest control tools can be used without violating any people and environment, we can take the agriculture to our next level of success. One can also extend this approach in future by increasing the number of training samples with optimal features. Different algorithms can be used for segmentation and classification to improve the efficiency even better. The whole process can be automated in order to detect the disease in very short time.

VI. FUTURE WORK

This approach can be extended in future by increasing the number of training samples with optimal features. Different algorithms can be used for segmentation and classification to improve the efficiency even better. The whole process can be automated in order to detect the disease in very short time.

REFERENCES

1. Bharat Mishra, SumitLeema, Mamta Lambert, SwapnilNema. Recent Technologies of leaf disease detection using image processing approach. IEEE proceedings. Vol-6. pp 539-546, 2017.
2. P. Kaur, S. Singla, A review on plant leaf disease detection techniques, *IEEE proceedings*. Vol-3. pp 9540-9547. Aug 2016.
3. Akhtar, A. Khanum, S. A. Khan, A. Shaukat, "Automated Plant Disease Analysis (APDA): Performance Comparison of Machine Learning Techniques", *11th Inter. IEEE Conference on Frontiers of Infor. Tech.*, 2013.
4. Y. Song, Z. Diao, Y. Wang, H. Wang, "Image Feature Extraction of Crop Disease", *IEEE Symposium on Electrical & Electronics Engineering (EEESYM)*, 2012.
5. B. Bhanu, S. Lee, J. Ming, "Adaptive image segmentation using a genetic algorithm", *IEEE Trans Syst Man Cybern*. Vol-12. pp 9406-9458. Dec 2011.
6. Al-Hiary, H., S. Bani-Ahmad, M. Reyalat, M. Braik, and Z. AlRahamneh. 2011. Fast and accurate detection and classification of plant diseases. International Journal of Computer Applications, 17(1): 31-38.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.488 |

||Volume 8, Issue 7, July 2020||

7. P. Revathi, R. Revathi, M. Hemalatha, "Comparative Study of Knowledge in Crop Diseases Using Machine Learning Techniques", *Inter. J. of Compu. Sci. and Inform. Techn.*, vol. 2, pp. 2180-2182, 2011.
8. Argenti, F., L. Alparone, and G. Benelli. Fast algorithms for texture analysis using cooccurrence matrices. IEEE proceedings, 137, (6): 443-448.
9. ReenaTijare, PawanKhade, Rashmi Jain, The Survey of Disease Identification of Cotton Leaf, International Journal of Innovative Research in Computer and Communication Engineering, 2015.
10. Zhang S. W, Shang Y.J, and Wang L, Plant Disease Recognition Based on Plant Leaf Image, Journal of Animal and Plant Sciences, 25 (1), 2015, 42-45.