iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** III **Month of publication:** March 2021

DOI: https://doi.org/10.22214/ijraset.2021.33515

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue III Mar 2021- Available at www.ijraset.com

Plant Leaf Diseases Detection using Machine Learning Models

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Abstract: The first effort in learning about plants is observing plant features. This project developed a plant search system that allows users to do a search even when they do not know the plant name simply by observing plant characteristics. The system consists of a plant features, searches for the features according to the input features, and returns the leaves with selected clusters.
At present, leaf classification uses machine vision to extract and analyze color, size, shape, and surface texture. However, the proposed extraction margin method can only be carried out roughly and there is still a difference between the margin of the extracted shape, polygon, and the margin of the shape of the original image.
This project clusters the leaves using image area size, pixel color values similarity, based on brightness values of the image and leaf shapes.
In addition, the project aims in finding the rots in the leaves. Based on the count of pixels of rot colors, the total rot percent in the leaf is calculated and displayed. This assists in evaluating the leaf quality. If future researchers were to expand to other features, leaf apex, etc., even those that are hard to quantify, can also be quantified. The project is designed using R Studio 1.0. The coding language used is R 3.4.4
Keywords: Hue Saturation Value, K-Means, Gray Level Co- occurrence Matrix, Classification.

I. INTRODUCTION

Currently, most plant search systems use RFID or QRCode to obtain plant information. However, these two technologies have specific hardware requirements that must be setup in advance to carry out scanning and sensing through a mobile phone to find the name of the plant.

Since the variety of plants is very diverse and covers a wide range, these two methods have regional limitations. Some researchers have attempted to classify different tobacco leaves using the Fuzzy Function. Their auto-inspecting and grading system uses machine vision to extract and analyze color, size, shape, and surface texture. However, the proposed extraction margin method can only be carried out roughly and there is still a difference between the margin of the extracted shape, polygon, and the margin of the shape of the original image.

Therefore, to improve the method for capturing the plant outline, this study proposes a Centroid-Contour distance to capture the outline of the plant features and the distance from the center point to each margin point to more accurately quantify the plant features of the original image.

II. LITERATURE REVIEW

In this paper [1] the authors stated that most of classification, quality evaluation or grading of the flue-cured tobacco leaves are manually operated, which relies on the judgmental experience of experts, and inevitably limited by personal, physical and environmental factors. The classification and the quality evaluation are therefore subjective and experientially based. In this paper, an automatic classification method of tobacco leaves based on the digital image processing and the fuzzy sets theory is presented. A grading system based on image processing techniques was developed for automatically inspecting and grading flue-cured tobacco leaves. This system uses machine vision for the extraction and analysis of color, size, shape and surface texture. Fuzzy comprehensive evaluation provides a high level of confidence in decision making based on the fuzzy logic. The neural network is used to estimate and forecast the membership function of the features of tobacco leaves in the fuzzy sets. The experimental results of the two-level fuzzy comprehensive evaluation (FCE) show that the accuracy rate of classification is about 94% for the trained tobacco leaves, and the accuracy rate of the non-trained tobacco leaves isabout72%. They believed that the fuzzy comprehensive evaluation is a viable way for the automatic classification and quality evaluation of the tobacco leaves.

III. PROPOSED METHOD

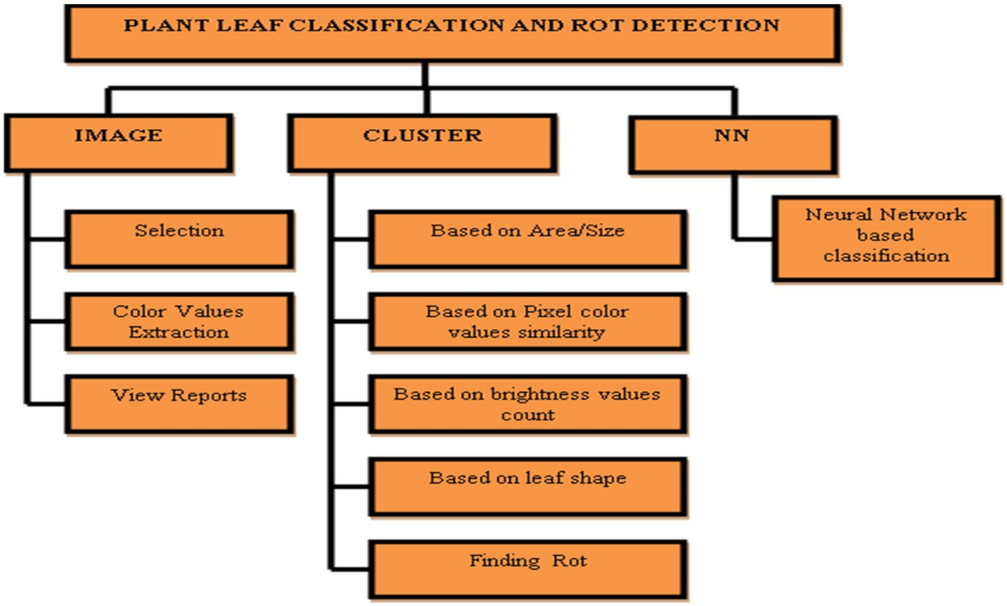

Figure 1 The proposed methodology contains three major steps

Automatic detection of plant diseases is an essential research topic as it may prove benefits in monitoring large fields of crops and thus automatically detect the symptoms of diseases as soon as they appear on fruits or plant leaves. The proposed system is a software solution for automatic detection and classification of fruits or plant leaf diseases. The developed processing scheme consists, color transformation structure for the input RGB image is created, then the rotted area is detected using specific threshold value followed by segmentation process, the texture statistics are computed for the useful segments, finally the extracted features are grouped as small, medium and big. Process is carried out to find the diseased region using color values and the plant diseases are graded by calculating the quotient of disease spot and leaf areas.

IV. MODULE DESCRIPTION

A. Image Selection

In this module, the betel leaves images are submitted to the system as input. The leaf brown spot diseased leaves are taken in this module. Images are taken in a controlled environment and are stored in the JPEG format. These are submitted to the clustering processes as well as rot identification.

B. Color Values Extraction

In this module, the betel leaves images pixels colors areretrieved with their red, green and blue components values. They are used in pixel color value similarity checking modules.

C. Cluster Based on Area Size

In this module, the betel leaves images dimensions are retrieved using dim() from ‘bmp’ library and are saved in a vector. The minimum and maximum area size are found out and the difference is divided by three to get range size. Then range1 is calculated as minimum value and ‘minimum value’ plus ‘range size’. Then range2 is calculated as ‘minimum value’ plus ‘range size’ and ‘minimum value’ plus 2 * ‘range size’. The range 3 is calculated as minimum value and ‘minimum value’ plus 3 * ‘range size’. Then the sizes within these ranges are clustered in their respective clusters.

D. Cluster Based on Pixel Color Values Similarity

In this module, the betel leaves images colors are retrieved and are saved in a vector. Then an image is compared with other image pixels’ red, green and blue component values. If matched, then the variable is incremented. Then the total similarity count is stored. This logic repeated for all the images. Then the similarity percent fell within 33% are grouped in one cluster, within 66% are grouped as the next cluster and the remaining as third cluster.

E. Cluster Based On Brightness Values Count

In this module, the betel leaves images brightness values are retrieved and are saved in a vector. Then an image is compared with other image pixels' brightness values. If matched, then the variable is incremented. Then the total similarity count is stored. This logic repeated for all the images. Then the similarity percent fell within 33% are grouped in one cluster, within 66% are grouped as the next cluster and the remaining as third cluster.

F. Cluster Based on Leaf Shape

In this module, the betel leaves images distance total from midpoint to all the edge pixels are calculated and are saved in a vector. Then an image is compared with other image distance total values. The unique distance values are used for clustering the images with shape as feature.

V. ROT AREA CALCULATION

In this module, the betel leaves images grayscale values are calculated and are saved in a vector. Then an image is compared with whiter area pixels and black area pixels. Then the percent of white area is found with total black area pixels to find the rot percent of the leaf image.

A. Rot Area Calculation Formula

Here, the betel leaves images grayscale values are calculated and are saved in a vector. Then an image is compared with whiter area pixels and black area pixels. Then the percent of white area is found with total black area pixels to find the rot percent of the leaf image.

The minimum and maximum area size are found out and the difference is divided by three to get range size.

Range1 = minimum value + range size

Range 2 = minimum value + range size + (minimum value+2) * range size

Range 3 = minimum value +3 * range size

VI. NEURAL NETWORK ALGORITHM

In Proposed system we are using neural network algorithm. Artificial Neural networks (ANN) or neural networks are computational algorithms. It intended to simulate the behavior of biological systems composed of "neurons". ANNs are computational models inspired by an animal's central nervous systems. It is capable of machine learning as well as pattern recognition.

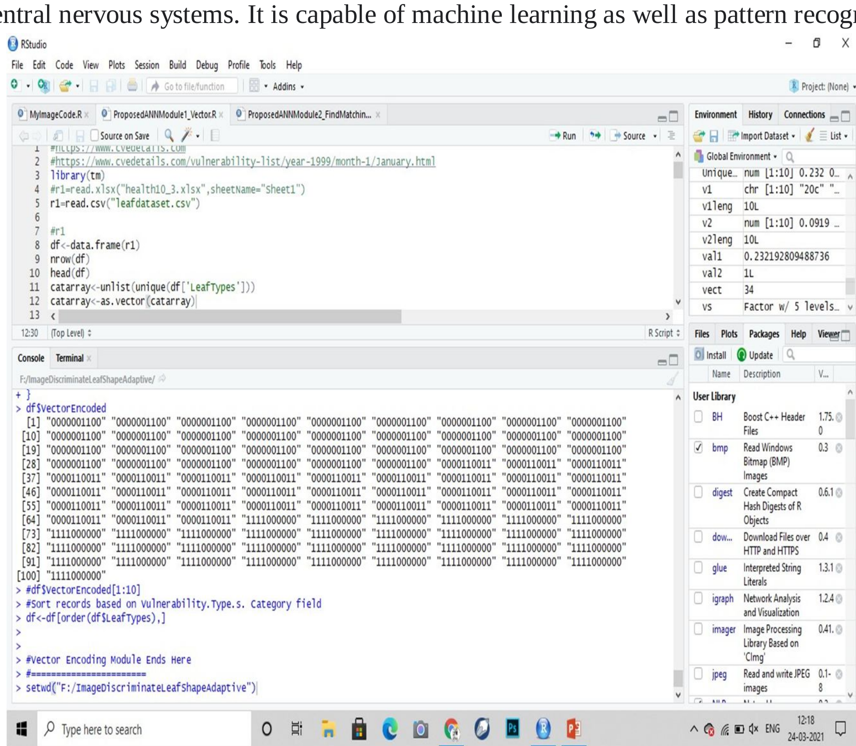

Figure 2Encoding the Image

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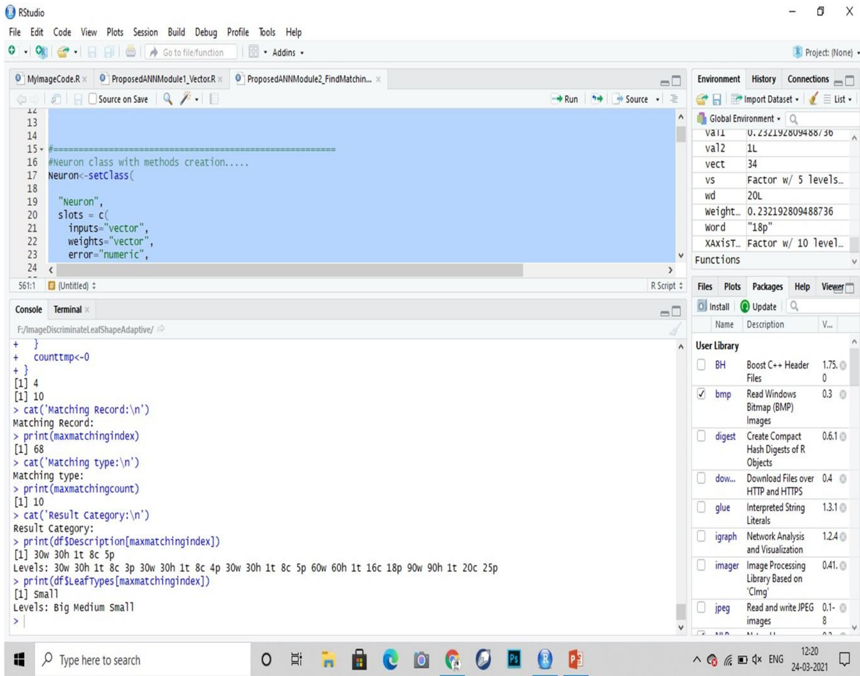

Figure 3 Finding the rot percentage in leaf

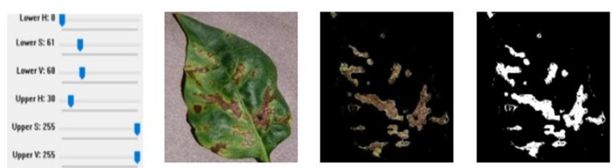

Figure 4 Leaf image clustering

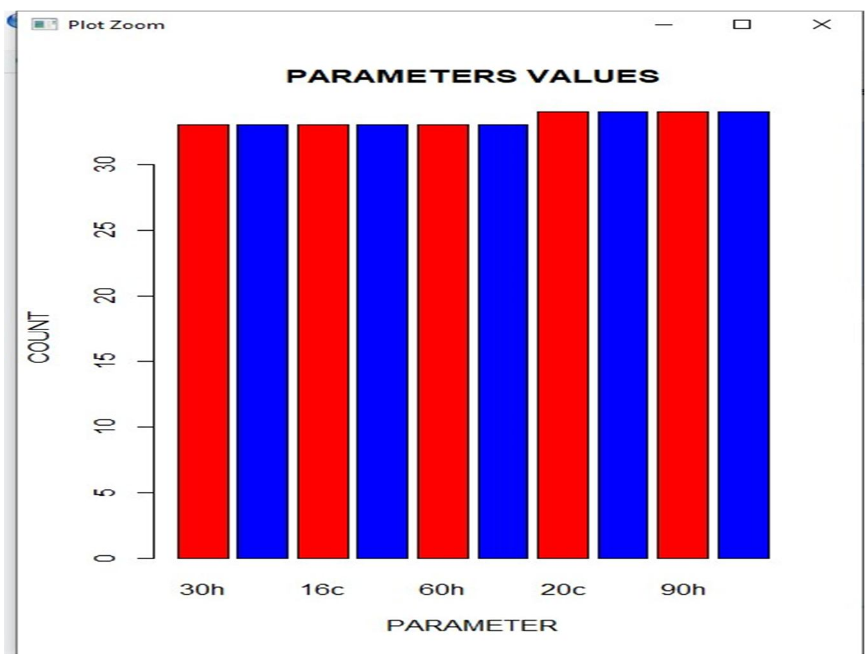

Figure 5 Final output barchart

VII. CONCLUSION

This project developed a plant search system that applied some features and clustered them using an adaptive approach. The first method used was the Centroid-Contour distance to quantify some features and combine the Fuzzy Function theory; the second method used was similarity based on area, brightness values, and pixel color similarities. The method with high efficiency can be applied for other search query systems besides plants and can be easily applied to other systems with the concept of quantifying feature similarities for applications. It is believed that almost all the system objectives that have been planned at the commencements of the software development have been net-with and the implementation process of the project is completed. A trial run of the system has been made and is giving good results. The procedures for processing is simple and regular order. The process of preparing plans has been missed out which might be considered for further modification of the application. In future, this project may find the similarity using rots present in the leaves.

REFERENCES

[1] Poojanpanchal, VigneshCharan Raman and ShamlaMantri, "Plant Diseases detection and classification using machine learning models" 978-1-7281-2619-7, 2019.
[2] F. Zhang and X. Zhang, ''Classification and quality evaluation of tobacco leaves based on image processing and fuzzy comprehensive evaluation,'' Sensors, vol. 11, no. 3, pp. 2369–2384, Feb. 2011.
[3] M. S. M. Asaari, S. A. Suandi, and B. A. Rosdi, ''Fusion of band limited phaseonlycorrelationandwidthcentroidcontourdistanceforfingerbased biometrics,'' Expert Syst. Appl., vol. 41, no. 7, pp. 3367–3382, Jun. 2014.
[4] Y. Guo, M. Wang, and X. Li, ''Application of an improved Apriori algorithm in a mobile e-commerce recommendation system,'' Ind. Manage. Data Syst., vol. 117, no. 2, pp. 287–303, 2017.
[5] G. J. Simon, P. J. Caraballo, T. M. Therneau, S. S. Cha, M. R. Castro, and P. W. Li, ''Extending association rule summarization techniques to assess risk of diabetes mellitus,'' IEEE Trans. Knowl. Data Eng., vol. 27, no. 1, pp. 130–141, Jan. 2015.
[6] Y. S. Kim and B.-J. Yum, ''Recommender system based on click stream data using association rule mining,'' Expert Syst. Appl., vol. 38, no. 10, pp. 13320–13327, Sep. 2011.
[7] V.S. Suresh kumar "Frequent Pattern Complex query management using FIUT Approach", South Asian Journal of Engineering and Technology, pp: 300-304, issue 204, volume 202, 2018
[8] Gokulraj P and Kiruthikadevi K, "Revocation and security based ownership deduplication of convergent key creating in cloud", International Journal of Innovative Research in Science, Engineering and technology. Vol. 3, Issue 10, ISSN: 2319-8753, October 2014.
[9] Sureshkumar V S, Chandrasekar A," Fuzzy-GA Optimized Multi-Cloud Multi-Task Scheduler For Cloud Storage And Service Applications" International Journal of Scientific & Engineering Research, Vol.04, Issue.3,pp-1-7, 2013
[10] E.Prabhakar, V.S.Sureshkumar, Dr.S.Nandagopal, C.R.Dhivyaa, Mining Better Advertisement Tool for Government Schemes Using Machine learning " , International Journal of Psychosocial Rehabilitation, Vol.23,Issue.4, pp. 1122-1135, 2019
[11] Prabhakar E, " Enhanced AdaBoost algorithm with modified weighting scheme for imbalanced problems, The SIJ transaction on Computer science & its application,Vol.6,Issue.4, pp.22-26, 2018.
[12] Suresh kumar V S ,Thiruvankatasamy S, Sudhakar R, "Optimized Multicloud Multitask Scheduler For Cloud Storage And Service By Genetic Algorithm And Rank Selection Method", Vol.3,Issue.2, pp.1-6, 2014
[13] Prabhakar E, Santhosh M, Hari Krishnan A, Kumar T, Sudhakar R," Sentiment Analysis of US Airline Twitter Data using New Adaboost Approach" , International Journal of Engineering Research & Technology (IJERT),Vol.7,Issue.1, pp.1-6, 2019
[14] V.S. Suresh kumar "E-Farming by means of E-Mandi Process", International Journal of Research and Advanced Development (IJRAD), ISSN: 2581-4451, pp: 55-57, Issue 6, volume 2, 2019
[15] P Gokulraj, K Kiruthika-Devi," Revocation and security based ownership deduplication of convergent key creating in cloud", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, no.10, pp16527-16533, October 2014.
[16] E Prabhakar, R Parkavi, N Sandhiya, M Ambika," Public Opinion Mining for Government Scheme Advertisement", International Journal of Information Research and Review, Vol. 3, no.4, pp2112-2114, February 2016.
[17] E Prabhakar, G Pavithra, R Sangeetha, G Revathy," Mining Better Advertisement Tool For Government Schemes", International Journal For Technological Research In Engineering, Vol. 3, no.5, pp1023-1026, January 2016.
[18] Karthik.S. Nandagopal.S, Arunachalam.V.P.," Mining of Datasets with Enhanced Apriori Algorithm", Journal of Computer Science, Vol. 8, no.4, pp599-605, 2012.
[19] V Dharani S Thiruvenkatasamy, P Akhila, V Arjitha, K Bhavadharani," A MD5 Algorithm Approach to Monitor Village Using Mobile Application", South Asian Journal of Engineering and Technology, Vol. 8, no.s1, 2019.