International Journal of Scientific Research & Engineering Trends
Volume 7, Issue 2, March-April-2021, ISSN (Online): 2395-566X

Improving Vegetable Disease Detection using Modified K-Means Clustering Algorithm

Asst. Prof. C. Santhosh Kumar, J. Jenifer, G.Vidhya, Asst.Prof. R. Vijayabhasker

Dept. of CSE
Er.Perumal Manimekalai College of Engg.
Hosur

Dept. of ECE
Anna University Regional Centre
Coimbatore

cjsksag@gmail.com, kaviji04@gmail.com

***Abstract*- India is the cultivating country and rich in producing agricultural products. So, we have to classify and exchange our agricultural products. Manual arranging is tedious so we use automatic grading system. It requires less time for grading of the agricultural products. Image processing technique is helpful in examination and evaluating the products. In this paper we proposed a vegetable disease detection system for recognizing diseased vegetables. Here we utilize the Image processing system for reviewing the vegetables. Vegetables are recognized dependent on their features. The features are color, shape, size,texture. We extract these features utilizing algorithms to distinguish the vegetables. We develop a recognition system for 2D input images. The main aim of this work is detecting infected vegetable based on their features with K-means clustering algorithm. Algorithm is classified into three steps namely enhancement, segmentation and classification. In this Vegetable samples are collected as images from high resolution camera and the data acquisition is carried out for database preparation. The image segmentation process is based on pixel of the image and it is applied to get the segmented and infected vegetables using K-Means Clustering algorithm.**

***Keywords*- K-Means Clustering,, Image acquisition, Image enhancement, Image segmentation, Image classification and Image recognition.**

I. INTRODUCTION

Agriculture is backbone of our country. Agriculture is a primary activity. It includes growing, crops, fruites, vegetables and rearing of livestock. In the world, 50% of persons are engaged in agriculiture activity. Two-third's of Indian's population is still developed on agriculture. The Science and Art of cultivation on the soil, rairing, crops and rearinglive stock. Agriculture also called are farming. Vegetable production faces. Many important losses in our country due to bacterial infection. Vegetable quality are based on their size, shape, colour.

II. RELATED WORK

This segment audits the prevailing methodologies wont to endeavouring the difficulty of disease classification of various leafs, plants, and fruits what's more, vegetables. The work speaks to a various levelled reviewing strategy which is applied to the vegetables. From the proposed range, they will distinguish the great and bad vegetables.

Mandeep Kaur, Reecha Sharma [1], during this paper they detect the standard of the image by extracting features. The features are colour, shape and size. They use artificial neuralnetwork with the mixture of the features to detect the vegetables. during this process they capture the image of the vegetables under constant light . They extract the features from the captured image. Finally, they detect the standard of the image with good accuracy. [2] exhibited the arranging and reviewing of fruits utilizing image processing procedures. The framework begins the procedure by catching the fruit's picture.

Hadi Izadietal [3], determined the relationships between fruitsand vegetables based on size and projected area of single and multiple dimensions. [4] exhibited that the character of fruit relies on kind of imperfections, skin shading and sizeof fruit. In their research, they build up an image acknowledgment framework to acknowledge the dimension of development of Jatrophacurcas fruit of the soil it into different classifications.

Polder et al [5], proposed a strategy to live the smoothness of vegetables. during this the quality RGB picture are utilized to classify the stages utilizing Linear Discriminant Analysis (LDA) strategy. Chiefly a machine vision framework was made for deciding the dimensions and area of individual within the cluster. The longans were handled to eliminate clutter and then changed over the photographsto grey scale.

A canny edge detector was utilized to acknowledge edges within the pictures of longan products. Since the form is round, for this a round Hough change was moreover connected to the photographs in checking out longans. [6]

introduced the fruit, an image processing technique is ready for proficient component extraction [7] exhibited an efficient combination of colour and texture features for fruit acknowledgment. the popularity is finished by the bottom separation classifier hooked in to the measurable and co-event features got from the wavelet changed sub-groups. [8]

Proposed classification techniques in big data in cloud [9] have proposed a machine vision based arrangement framework to sort cherries agreeing their ripeness arrange is introduced. Eight classes were characterized and that they incorporate the entire cherry ripeness process, from the underlying stage (early green) to over ready and dry stages.

1. Vegetable Disease Identification:
This Existing system acquires six steps for capturing the accurate disease for the infected image. In first phase image acquisition process is occurred to capture the high-quality image. In second phase image preprocessing will occur to remove the noise in the picture to enhance the image using histogram equalization.

In third phase image segmentation will occur using k-means clustering algorithm to segment the image. In fourth phase feature extraction will be done by using morphological features like color, shape, size etc.. In fifth phase classification will occur with SVM. In Sixth phase it will recognize which disease is infected for that image.in the given below Figure [1] first part is training part and second part is testing part.

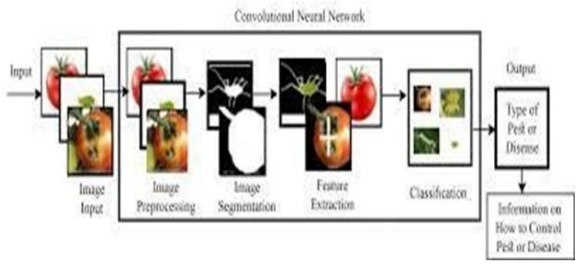

Fig 1. Existing Framework.

2. Existing Algorithm:
Step 1: Capture the image.
Step 2: Removing the noise in the picture for enhanced image.
Step 3: By using the k-means clustering transfer the image from RGB to l*a*b color space.
Step 4: Segment the image by using the input of color, texture, edges.
Step 5: Classify the image using Support Vector Machine which performs supervised learning.
Step 6: Determines and tells name of the infected vegetable.

This Existing system acquires six steps for capturing the accurate disease for the infected image. In first phase image acquisition process is occurred to capture the high-quality image. In second phase image preprocessing will occur to remove the noise in the picture to enhance the image using histogram equalization.

In third phase image segmentation will occur using k-means clustering algorithm to segment the image. In fourth phase feature extraction will be done by using morphological features like color, shape, size etc.. In fifth phase improved classification will occur with SVM. In Sixth phase it will recognize which disease is infected for that image.in the given below Figure[2] first part is training part and second part is testing part.

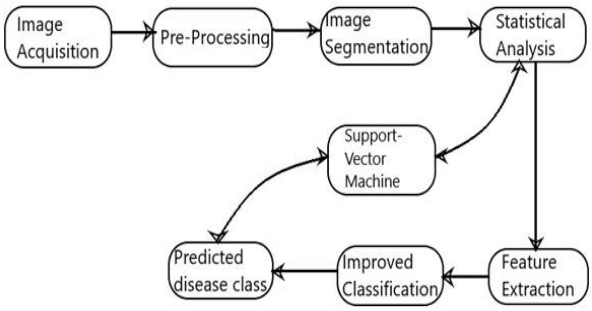

Fig 2. Proposed Framework.

3. Proposed Algorithm:
Step 1: Capture the image.
Step 2: Removing the noise in the picture for enhanced image.
Step 3: By using the k-means clustering transfer the image from RGB to l*a*b color space.
Step 4: Segment the image by using the input of color, texture, edges.
Step 5: Improve classify the image using Support Vector Machine which performs supervised learning.
Step 6: Determines and tells name of the infected vegetable.

4. Experimental Results:
This experiment will be done by using matlab. By using following steps it can be diagnosed whether the vegetable is infected or not.

III. MAGE ACQUISITION

Image acquisition is collecting data set of the disease infected images. The data set collection is collected from the internet. The input image of the vegetable is taken from the digital camera having high resolution and keeping specific distance between digital camera and required vegetables.

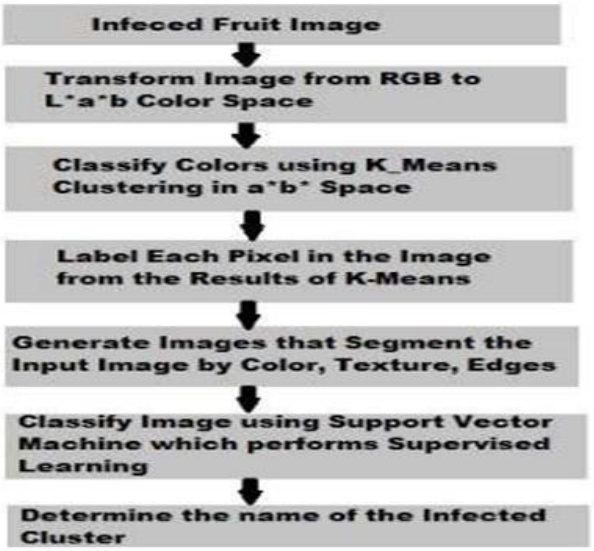

Fig 3. Vegetable Disease Identification.

The data set collection is collected from the internet. The input image of the vegetable is taken from the digital camera having high resolution and keeping specific distance between digital camera and required vegetables.

Fig 4. Image Acquisition.

1. Image Preprocessing:

The image preprocessing is used to remove the unwanted noise from the image of vegetables. It also performs histogram equalization on image to distribute the intensities to increase the quality of the image. Some techniques are used to pre- processing such as filter image, crop image, resize image.

Fig 5. Image preprocessing.

2. Image Segmentation:

It is the method of dividing an ima5 into many meaningful parts. Segmentation of images is done to change the representation or simplify the image in easier form. Image segmentation can be done by some techniques such as k-means clustering algorithm, otsu threshold method and watershed and etc..

K – Means Clustering:

k–means clustering used to segment the disease fruit image. In this project we are need to segment the image so\ we convert the RGB image into L*a*b color image. After converting the image in to L*a*b color space image we apply the k – means clustering with 3 clusters. And we can choose suitable segmented image for feature extraction.

$$\text{Accuracy} = \frac{\text{No. of correct output}}{\text{Total no. of image tried}} \times 100$$

K–Means Clustering Algorithm:

- Define number of clusters (k -> value).
- Choose centroid. In function it will choose the centroid itself.
- Cluster the image points based on the distance of their intensity values from the centroid intensity values.

Fig 6. Cluster 1.

Fig 7. Cluster 2.

Fig 8. Cluster 3.

3. Feature Extraction:

The feature extraction gives very good result for identification of disease from image. The feature

extraction is used in many applications of image processing.

Table 1. Existing trained and tested value of Tomato yellow leaf curl virus infected vegetable.

Feature	Tomato yellow leaf curlvirus Trained value	Tomato yellow leaf curlvirus Tested value
Stats	0.0002	0.0002
Contrast	0.0009	0.0009
Correlation	0.0003	0.0003
Energy	0.0009	0.0009
Homogeneity	0.0395	0.0395
Mean	0.0516	0.0516
Standard deviation	0.0046	0.0046
Entropy	0.0109	0.0109
RMS	2.2742	2.2742
Variance	0.0010	0.0010
Smoothness	0.0040	0.0040
Krutosis	0.0013	0.0013
Skewness	0.2550	0.2550

The feature extraction is used to reduce the large input data to small data so that it will take less time to process data but in extracted the feature must have important data to be process. The feature extraction can be done by using morphology, color, edges, texture.

Table 2. Existing trained and tested value of late-blight infected vegetable.

Feature	Late-blight trained value	Late-blight tested value
Stats	0.0009	0.0009
Contrast	0.0009	0.0009
Correlation	0.0004	0.0004
Energy	0.0009	0.0009
Homogeneity	0.0395	0.0395
Mean	0.0606	0.0606
Standard deviation	0.0036	0.0036
Entropy	0.0092	0.0092
RMS	3.3285	3.3285
Variance	0.0010	0.0010
Smoothness	0.0031	0.0031
Krutosis	0.0012	0.0012
Skewness	0.2550	0.2550

Table 3. Ttrained and tested value of infected vegetable.

Feature	Tomatoyellow leaf curl virus Trainedvalue	Tomatoyellow leaf curl virus Tested value	Late- blight trained value	Late-blighttested value
Stats	0.0002	0.0002	0.0009	0.0009
Contrast	0.0009	0.0009	0.0009	0.0009
Correlation	0.0003	0.0003	0.0004	0.0004
Energy	0.0009	0.0009	0.0009	0.0009
Homo -geneity	0.0395	0.0395	0.0395	0.0395
Mean	0.0516	0.0516	0.0606	0.0606
Standard deviation	0.0046	0.0046	0.0036	0.0036
Entropy	0.0109	0.0109	0.0092	0.0092
RMS	2.2742	2.2742	3.3285	3.3285
Variance	0.0010	0.0010	0.0010	0.0010
Smoothness	0.0040	0.0040	0.0031	0.0031
Krutosis	0.0013	0.0013	0.0012	0.0012
Skewness	0.2550	0.2550	0.2550	0.2550

4. Classification:

This phase used to classify the disease of the image into one of the class whether it is infected or not.It is dones by using support vector machine(SVM). SVM performs supervied learning for classification. Marked the images to one of the two categories. A SVM training algorithm makes a model that assigns new examples into one category.

IV. CONCLUSION

This paper gives proficient and precise vegetables disease detection and order strategy by utilizing MATLAB picture preparing. The proposed system during this paper relies upon K- means and Multi SVM procedures which are designed for both vegetables and organic product illness discovery the MATLAB software is right for digital image processing. Modified K-means clustering and SVM algorithm provides high accuracy and consumes very less time for entire processing. In future work, we'll extend our database for more disease identification.

REFERENCES

[1] Mandeep Kaur, Reecha Sharma, Quality Detection of Fruits by Using ANN Technique, IOSR Journal of Electronics and Communication Engineering, Volume 10, Issue 4, 2015.

[2] Naganur and sannakki, Fruits Sorting and Grading using Fuzzy Logic, International Journal of Advanced

Research in Computer Engineering & Technology (IJARCET) Volume 1, Issue 6, 2012.

[3] HadiIzadi, Saadat Kamgar, Mohamad Hossien Raoufat, Mass Modeeling of Tomato Based on Phisical Characteristics, International Journal of Agronomy and Plant Production, Vol4 (10), 2013, pp 2631-2636.

[4] Effendi, Z, Ramli, R., Ghani, J. A. Rahman, Pattern Recognition System of Jatrophacurcas Fruits using Back Propagation, signal and image processing applications, IEEE International Conference on Kuala Lumpur, 2009.

[5] Polder, G., van der Heijden, G.W.A.M., Young, Spectral Image Analysis for Measuring Ripeness of Tomatoes, Transactions-American Society of Agricultural Engineers International Journal, 45(4), 2002, pp 1155-1162.

[6] Hetal N. Patel, Dr. R. K. Jain, Dr. M. V. Joshi, Fruit Detection using Improved Multiple Features based Algorithm, International journal of computer applications, Vol 13, No.2, 2011.

[7] S. Arivazhagan, R. Newlin Shebiah, Selva Nidhyan Aandhan and L. Ganesan, Fruit Recognition using Color and Texture Features, Journal of Emerging Trends in Computing and Information Sciences, Vol 1, No.2, 2010.

[8] Saravana Kumar, M., M. Balamurugan, and C. Santhosh Kumar. "High Dimensional Data's sharing in Multi Users Cloud Environment usig Big Data Classification Technique."

[9] Sandoval, Z, Prieto, F; Betancur, J, Digital Image Processing for Classification of Coffee Cherries, Electronics, Robotics and Automotive Mechanics Conference (CERMA),2010 .