Size and Color Based Quality Assessment of Maize Grains

JaspreetKaur
Department of Electronics and Communication Engineering,
GNDU RC FattuDhinga
Kapurthala, India.
gill_jas8@hotmail.com

Kuldeep Singh
Department of Electronics and Communication Engineering,
GNDU RC FattuDhinga
Kapurthala, India.
Kuldeepsinghbrar87@gmail.com

***Abstract* –Image Processing have a number of applications in different fields like in medical, pattern recognition etc. In this paper a method is proposed having application related to agriculture field. In this paper detection of corn grain is done from other impurities such as wild plant seeds, mouse or bird droppings or bad corn grain etc. This Paper proposed a method which will detect the required grain from impurities on the basis of size which includes major and minor axis test. Once the grain cleared this test then it has to pass the color based detection test. After all processing this algorithm also tells the amount of impurity present in the corn grains.**

Keywords- Major Axis; Minor Axis; Corn quality; Image Mask; bunch numbering.

I. INTRODUCTION

Image processing has a wide range of application in a number of fields like medical, technical field, object detection and edge detection etc. The object detection on the basis of size or color is a very useful technique of image processing used in many fields of daily life. The application is used in agriculture field for many helpful purposes. During harvesting of maize field many waste materials are added which are of same size, that effects on it quality rating so it is required to extract the healthy corn size from the waste material either of same size. So in this paper a new method is proposed which will extract the required corn from the waste material based on size and color detection.In the recent years, lots of studies have been done which helps in uncovering of good quality grains. First paper explains the way of detection of particular color from the image which can be used in many application of agriculture, floriculture etc [1]. Next study is done by using GUI approach in which the box is built around the color required to be detected, but the only disadvantage of this is another portion of not required field is also captured in the box [2]. Another study is done using neural network approach decision depending upon membership probabilities assigned to red, blue and green color component of an image [3]. A lot many another studies which include the detection of wheat or rice grain quality, skin color detection which helps in designing the approach for color detection of corn [4- 10].

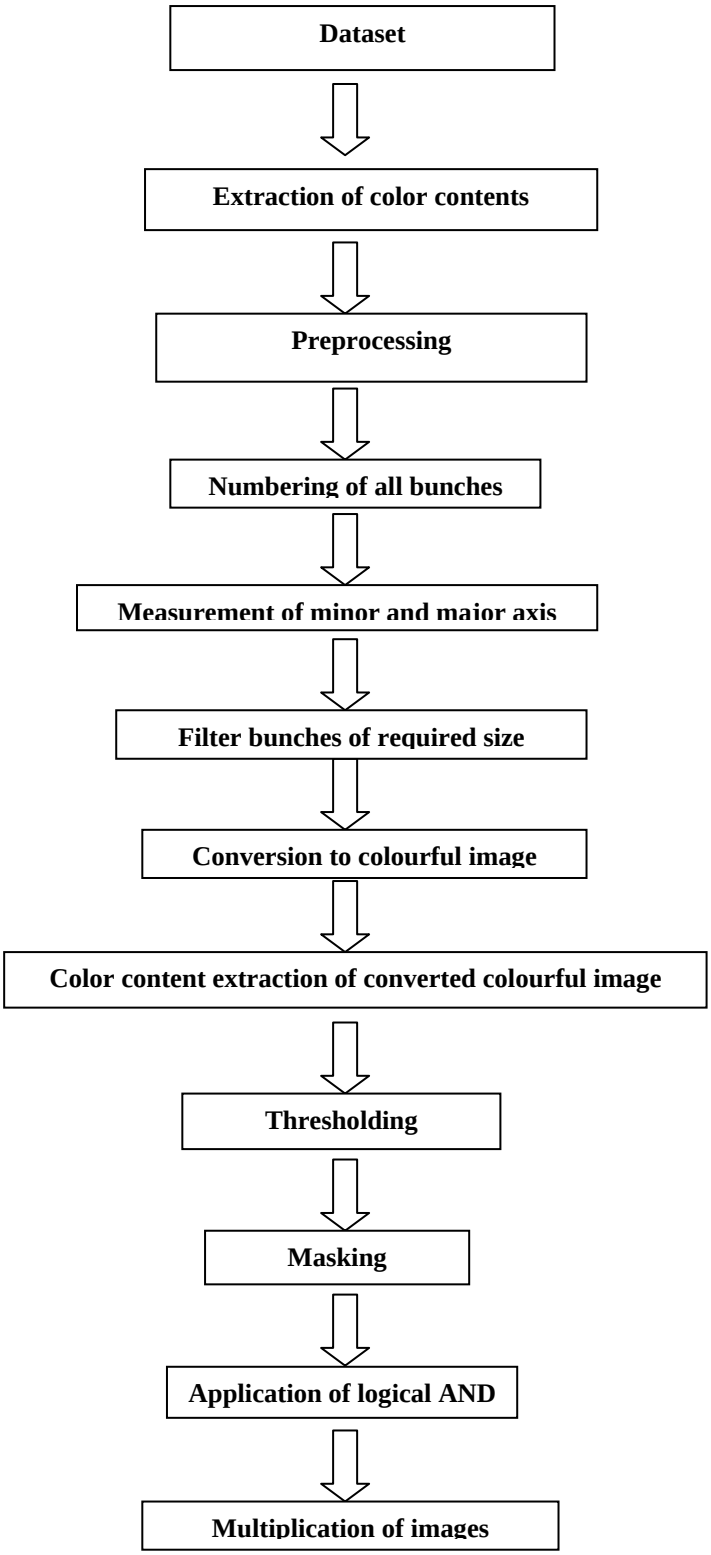
II. METHODOLOGY

In this section an algorithm is proposed for the detectionof interested corn from an image consisting of waste materials and some bird droppings. All he steps are implemented using MATLAB 2014.

The flow chart above gives the detailed description of an algorithm.

A. Dataset

Capture two images of, one image of a single in good physical shape corn on a white paper and a number of corns with some squander materials. These images are captured by using an image capturing device with same characteristics like resolution power and quality of image captured etc. Other conditions like lighting condition and height to capture these images should be same. The images used in this paper are captured by a device of 13 mp resolution power.



B. Extraction of color contents

A RGB image is a blend of three different color layers (red, blue and green). In this step, extract these color contents differently. These color contents are extracted by using some inbuilt functions or some commands in MATLAB.

C. Pre-processing

In pre-processing process there are some specified operations that are performed on an image so that to lessen the processing time of the algorithm. It contains some basic operations like binarization, filtering and resizing etc. This pre-processing is executed as:

i. Binarization: Binarization simply means,translate the original RGB image into binary format. It reduces the processing time of an image because the number of pixel values is decreased.
ii. Image filtering**:** Impurities are removed from this binary format image on the foundation of size to remove the unwanted data from the image. For better results this binary image is complimented.

D. Numbering of all bunches

The preprocessing results a binary image having impurities containsall bunches independent of size and color either it is corn bunch or waste material. Now numbering is done of all bunches in the resulted image that helps while doing the comparison process.

E. Measurement of minor and major axis

Measure the length of minor and major axis of a healthy corn because to filter out bunches which are approximately equal to corn bunch size, these properties of healthy corn bunch should be defined because these have to be used further in comparison.

F. Filter bunches of required size

The minor and major axis length of a healthy corn bunch is calculated in previous step which is used as a standard size to filter bunches of required size. Compare the size of all bunches either it is a corn bunch or waste material in the image with the standard size that is size of a healthy corn bunch in this case. Thisstep results an image containing bunches having size approximately equal to standard size.

G. Conversion to rgbimage

Convert the binary image to anrgb image by multiplying it with the original RGB image so the further filtering of healthy corn bunches according to the predicted corn must be done.

H. Color content extraction of converted rgb image

The colorful image that resulted in the last step contains the filtered colorful bunches of desired size. Now this image is used to extract the corn bunches from the waste material on the basis of predicted color by using some simple few steps. So the color content of this colorful image is extracted first.

I. Thresholding

A tool named as data cursor is available in the figure window of MATLAB used to know the exact value of color content for any particular pixel. By using this cursor the average value of the color content values of a healthy corn bunch is determined, which is used is used as threshold value needed in masking process. The average value of red, green and blue color content for a healthy corn bunch is used as the threshold value which is supplementary used in the masking process.

J. Masking

Masking of these values is done by using comparator operators for the color content that is required to extract. This process mask all the pixels that satisfy the threshold values calculated above.

K. Application of logical AND operation

A logical AND operation is performed after masking the color content. This AND operation is executed as mapping of image resulted of masking and original image. Logical AND results 1 if the inputs are same. This process is performed pixel by pixel, if the pixel of the RGB image and masked image has same color content value, it results logical 1 either 0. This operation results logical 1 for the region has same color content value as the threshold values which are average color content values of healthy corn bunches. As a result the region contains only the corn bunches is extracted.

L. Multiplication of images

In the final step, the binary image resulted after AND operation is multiplied with the original RGB image that contains only the colorful healthy corn bunches.

III. SIMULATION AND RESULT

This section of paper includes all the images obtained after applying operations proposed in the algorithm. First and foremost step is to capture the image which is having good quality information and illumination. After

capturing the image, read this image to MATLAB platform using imread instruction as defined in methodology section.

Fig1: Original Image

Fig1 represents the captured RGB image from which the healthy corn bunches has to extract. This image contains some corn bunches of different sizes along with some waste material bunches. The RGB color content of this original RGB image is extracted; these color contents are used while converting the binary formatted image to colorful image.

Fig2: RGB color content extraction of captured RGB image

Fig2 represents the extraction of RGB color content of original captured RGB image. The original RGB image is preprocessed in next step to convert this to binary format and to remove impurities from the image. It reduces the values of pixels that results in reducing the processing time of the image

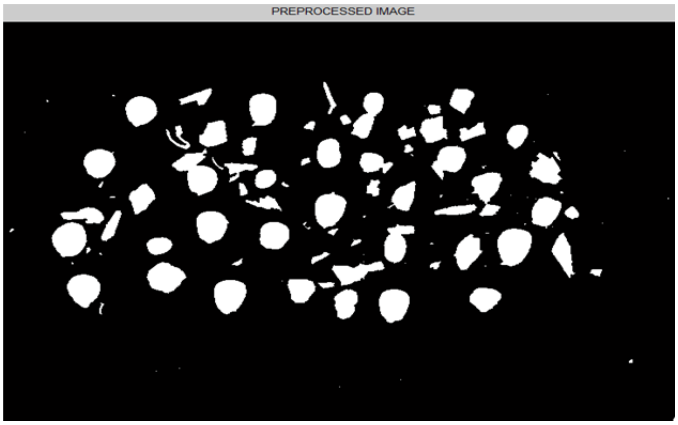


Fig3: Preprocessed image

Figure 3 represents the preprocessed image in which the impurities are removes and the image is converted to binary format to reduce the image processing time. From image the bunches of desired size are filtered on the basis of a defined standard size

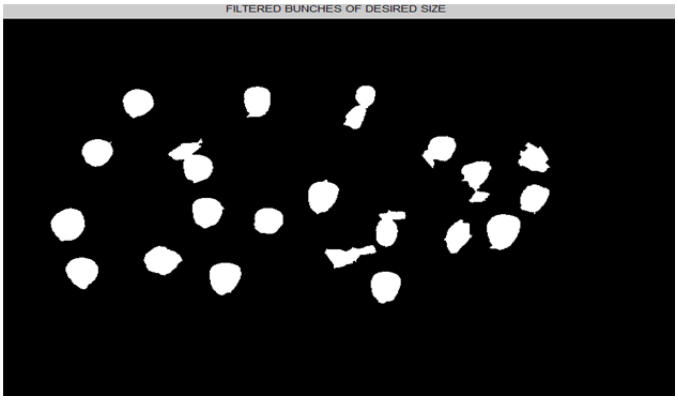


Fig4: Filtered bunches of desired size

Figure4 represents the image having bunches of desires size that are filtered on the basis of a defined standard size, which is a size of healthy corn bunches in this case. Now conversion of this binary format image to colorful image by multiplying it with RGB image is done.

Fig5: Colorful image of filtered bunches

Figure 5 represents the colorful image of bunches that are filtered on the basis of desired size. This is used in the further processing to filter out the corn bunches on the basis of predicted color. The color contents of this image are extracted in the very next step to get proper information on the subject of the amount of these colors present in the image.

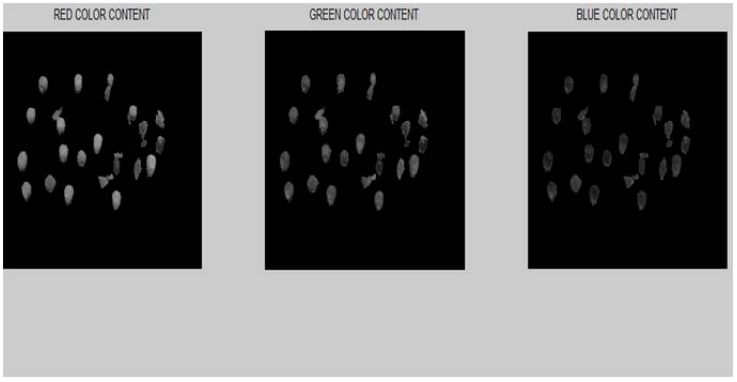


Fig6: RGB content extraction

Figure 6 represents the image in which each color contents are extracted and shown in different plots using subplot.

Fig7: Data cursor showing RGB value

Figure 7 represents image showing application of data cursor showing the average value of RGB color contents that are used as threshold value to extract that particular colored corn bunches.

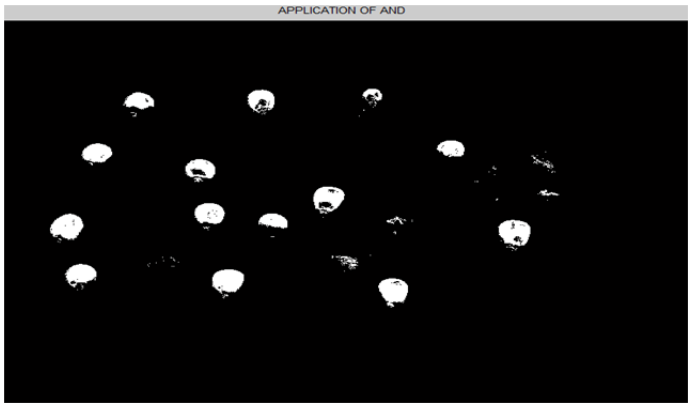


Fig8: Image showing application of AND operation

This image shown above defines the masking process which is implemented on the image using the threshold value defined using the data cursor. This process will extract the area of interest from the whole image.

Fig9: Final resulted image

Figure 9 shows the final result of the algorithm in which the corn bunches from the RGB image is extracted. This process is done using multiplication of the images after masking process. Main problem of this method is the data type of the image. So to implement this step first thing is to change the data type of image. After that, the final result is obtained using looping commands and multiplication process.

After implementing the proposed algorithm accuracy to detect the corn is about 98% as some of corn is below the geometrical features defined according to the good quality corn.

IV. CONCLUSION AND FUTURE SCOPE

In this paper a method is proposed which will detect the corn from lot many impurities like other weed seeds, bird or rat droppings etc. by using geometrical features and on the basis of color. As some of impurities may pass the geometrical feature test but they are removed by color test. Main feature of this algorithm is speed. Also the accuracy to detect the corn from all type of impurity is about 98%.

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AUTHORS PROFILE

Er. JaspreetKaur received her B. Tech degree in Electronics and Communication Engineering from Punjab Technical University Jalandhar in 2008 and Masters degree in Electronics and communication Engineering from SLIET, Longowal in 2011.She has 5 years of teaching and research experience. She is presently working as assistant Professor in Guru Nanak Dev University Regional Campus FattuDhinga (SultanpurLodhi) Punjab, India. She has 12 research papers in international journals and proceedings of international conferences to his credit. Her area of interest includes DSP and Image processing.

Er. Kuldeep Singh received his B. Tech degree in Electronics and Communication Engineering from Punjab Technical University Jalandhar in 2009 and Masters degree in Electronics and communication Engineering from Panjab University Chandigarh in 2011.He has 5 years of teaching and research experience. He is presently working as assistant Professor in Guru Nanak Dev University Regional Campus FattuDhinga (SultanpurLodhi) Punjab, India. He has 25 research papers in international journals and proceedings of international conferences to his credit. His area of interest includes wireless and mobile communication, wireless sensor networks and applications of machine learning techniques.