Rice Grading Quality Analysis for Agmark Standards

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Abstract- *The quality inspection method of rice grain which is followed by AGMARK is based on manual inspection by the assigned inspectors which proves to be an improper way and outcomes that results are inaccurate. A digital inspection method for AGMARK Standards for quality assessment of rice is required. So this paper proposes a digital method which can be used to evaluate the quality of rice for the present AGMARK Standards. The proposed method is formulated with the help of digital image processing technique on MATLAB. In this paper three parameters; Broken Grain, Foreign Particle and Admixture of Agmark Standards are converted to digital form for digital quality inspection of rice. The outcomes of inspection of the samples studied, showed that our model was an effective way for digital inspection of AGMARK Standards.*

Keywords- AGMARK, Binarization, Grayscale, MATLAB, Region Props.

I. INTRODUCTION

The quality inspection method of rice grain which is followed by AGMARK is based on manual inspection by the assigned inspectors which proves to be an improper way and outcomes that results are inaccurate. A digital inspection method for Agmark Standards for quality assessment of rice is required. So this paper proposes a digital method which can be used to evaluate the quality of rice for the present AGMARK Standards. The proposed method is formulated with the help of digital image processing technique on MATLAB. In this paper three parameters; Broken Grain, Foreign Particle and Admixture of AGMARK Standards are converted to digital form for digital quality inspection of rice. The outcomes of inspection of the samples studied, showed that our model was an effective way for digital inspection of AGMARK Standards. Rice is the most important and widely grown food crop in the world. It is the staple food of more than 65 percent of the world population .Rice is mainly produced and consumed in the Asian region. India has the largest area under rice in the world and ranks second in the production after china. It has also emerged as a major rice consumer. Rice is primarily a high energy calorie food. The major content of rice consists of carbohydrate in the form of starch, which is about 72-75 percent of the total grain composition. In India to overcome the need of ever increasing population it is necessary to make advancement in agricultural sector. Due to automation need of high quality and safety standards achieved with accurate, fast and cost effective quality determination of agricultural goods. Quality check is of great importance in the Grain industry because after harvesting, based on quality parameter a grain product has been sorted and graded according to the standards. AGMARK is a set of Standard Guidelines establish by Food & Drug Department where by all food products which are listed under AGMARK Division should comply with the benchmarks stated for their production & packaging etc. AGMARK is an acronym for Agricultural Marketing. This organization used to approve the food products for their quality. This has been dominated by other quality standards including the non-manufacturing standard ISO 9000. Food and Drug Administration FDA also approves certain quality standards for food items.

II. PROPOSED SYSTEM

Image Quality control is the most important factor for any manufacturing industries. Since the conventional defect detection methods are slow, subjected to errors and time consuming, most of the industries now opt for automatic inspection systems. Also, the increasing production speed and high labour charges also paved way for the fast existence of this new trend. Increased expectation of high quality products from customers made the industries more responsible. As a solution to these problems, artificial vision based automatic inspection systems arrived. The field of machine vision, or computer vision, has been growing at a fast pace. As in most fast-developing fields, not all aspects of machine vision that are of interest to active researchers are useful to the designers and users of a vision system for a specific application. Computer vision is a novel technology for acquiring and analysing an image of a real scene by computers to control machines or to process it. It includes capturing, processing and analysing images to facilitate the objective and non-destructive assessment of visual quality characteristics in agricultural and food products. The techniques used in image analysis include image acquisition, image pre-processing and image interpretation, leading to quantification and classification of images and objects of interest within images. Images are acquired with a physical image sensor and dedicated computing hardware and software are used to analyse the images with the objective of performing a predefined visual task. Through continual innovations in computer vision processing algorithms, this wealth of visual

data can be exploited to identify more subtle changes and distinctions between objects, enabling a wide array of evermore sophisticated applications.

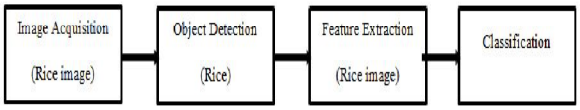


Fig 1: Computer vision system

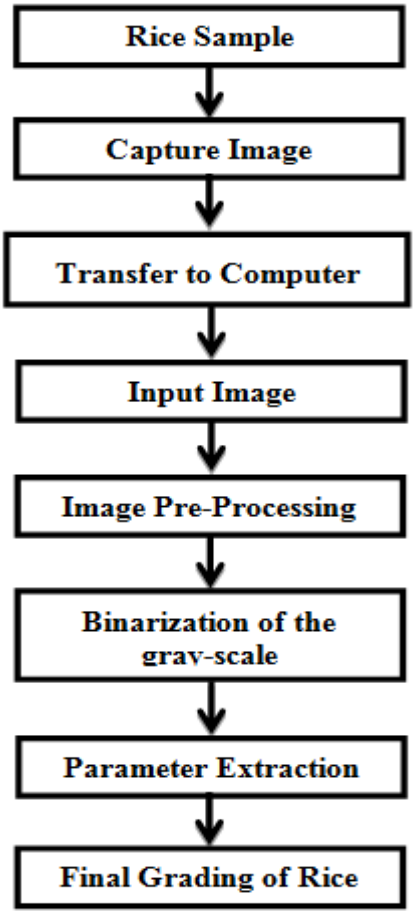
Computer vision system Image Processing is widely used in biological and agricultural research with the improvement of Digital technology and significant reduction of the cost of hardware and software of digital imaging. There are many researches applied machine visions to estimate rice quality inspection. The objective of this research is to propose a Machine Vision System for AGMARK which would help in identify the grains and foreign matter according to their Area, Perimeter and Major Axis Length from the rice sample images.

III. AGMARK STANDARDIZATION FOR RICE

1. Foreign Matter: It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.
2. Broken: Brokens shall include pieces of kernel, which are less than ¾ of a whole.
3. Admixture: The Presence of inferior quality grains in the sample.

IV. SOFTWARE IMPLEMENTATION

In this Morphological processing first we "Read Image" from data base or appropriate file. Then implement morphological opening function to background lighting. Morphological opening is erosion followed by dilation, for this operations we use the same structuring element. In this opening operations that can remove contains of structuring element object. To create a surface display of background we use surf command. To view mathematical function in rectangular region we surf command to generate colored surfaces. However, by using double command we can convert unique background, From original image we subtract background image. A uniform background image is generated after performing the subtraction but it now too dark. To adjust constrast of image we use imadjust. It stretching value of intensities to required dynamic range by saturating 1% to high & low intensities.



We have the function to count no of grains so we create the image in binary version. Use the im2bw function translate gray image to binary image by thresholding function. By using bwareaopen we can remove background. This function find all connected objects/components from binary image. The size of object affect on accuracy of result, the connectivity parameter whether or not any objects are touching (in which case they could be labeled as one object).

Then here we perform a sophisticated operation that computes physical parameters of individual grain. In this first connected components are identified. By creating label matrix we can visualize connected components and then it shows it as a pseudo-color indexed image. Therefore bw contain 95 objects, as a uint8 label matrix can store In cc structure components of rice grains are connected. To compute the area we use regionprops on cc. Create a new vector all grains to hold the area measurement for each grain.

Methodology:

1. Take a high quality image of basmati rice sample with the help of high quality camera \ scanner. A black sheet was used which gives the black background to the image which helps in parameter extraction from the image.

2. Input the image into the system. The interface between the Camera/scanner and PC is provided through USB Cable.
3. Now covert the High Quality Image into Grayscale Image. Show in fig. 2.

Fig 2. Gray Image

4. Image was pre-processed by removing the background and adjusting the contrast of the image showing fig 3. Most of these operations compute result based on weighted sum of a pixel value and its neighbours values.

Fig 3. Contrast Image

5. The binarization process converts the grayscale image into two values 0and 1. In general, these values are zero and the maximum value in the image.

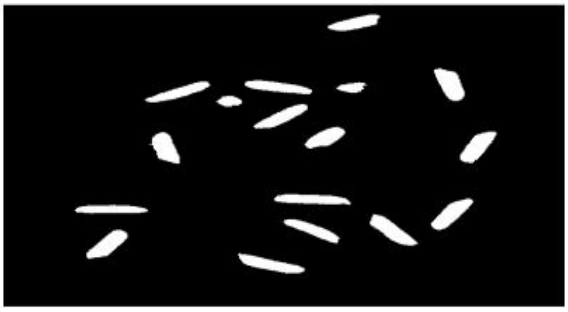


Fig 4. Binarization Process

6. Values of various Morphological parameters of sample grain are extracted with the help of Region Props.
7. Repeat above steps for different samples.

Sample no	Total grain(present)	Foreign particle(present)	Broken grain	Admixture (present)
1	15(13)	2(1)	9	3(2)
2	20(19)	3(2)	4	5(4)
3	22(21)	4(3)	3	6(3)
4	25(20)	1(1)	7	4(2)

V. ADVANTAGES

1. Easily check the quality of rice.
2. Complexity is less compared to traditional methods.
3. Due to gray scale & binary image, detection of rice image is fast.

VI. CONCLUSION

A digital system for AGMARK Standardization of Rice has been proposed on the basis of machine vision. We used Image Processing Toolbox of MATLAB for grading of rice grains. The paper illustrates a new method, which is non-destructive for quality evaluation. With proper use of commands and tools, we can design a low cost detector which helps in extracting the morphological features of grains like area, perimeter and length etc of an object.

VII. RESULTS

All 4 samples were scanned or captured to generate the image to obtain all the required parameters. After getting these parameters, Rice grains were classified into different categories and proposed AGMARK standards were evaluated to get the results as shown in Table. In the Table, we can see various characteristics parameters observed for all 4 rice samples are given. The Table shows the grains and foreign matters detected and also which are actually present in the sample are represented in the bracket.

REFERENCES

[1] R. Kiruthika, S. Muruganand , Azha Periasamy "MATCHING OF DIFFERENT RICE GRAINS USING DIGITAL IMAGE PROCESSING" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, Issue 7,July 2013

[2] B.K. Yadav, V.K. Jindal "Monitoring milling quality of rice by image analysis" Computers and Electronics in Agriculture 33 (2001) 19–33
www.elsevier.com/locate/compag

[3] XuLizhang , Li Yaoming, Multi-Scale Edge Detection of Rice Internal Damage Based on Computer Vision, Proceedings of the IEEE International Conference on Automation and LogisticsQingdao, China September 2008

[4] YangYiShan ChenLiYun, XuYaoWu. From rice quality evaluation criteria of change to see our rice breeding for quality development [J].Journal of hybrid rice, finance (cicf 3) : 5-10.

[5] Bhavesh B. Prajapati1, Sachin Patel2 "Algorithmic Approach to Quality Analysis of Indian Basmati Rice Using Digital Image Processing" International Journal of Emerging Technology and Advanced Engineering Website:www.ijetae.com (ISSN 2250-2459, ISO 9001:2008Certified Journal, Volume 3, Issue 3, March 2013)

[6] Yao, Chen, Guan, "Inspection of rice appearance quality using machine vision", Global Congress on Intelligent system, 2009 IEEE

[7] R. M. Carter, PhD Thesis: On-Line measurement of size distribution and volumetric concentration of pneumatically conveyed solids using digital imaging techniques. 2005, University of Kent, UK.

[8] R M Carter, Y. Yan., Measurement of particle shape using digital imaging techniques. Journal of Physics Conference Series, V. 15, pp. 177-182, 2005.

[9] Rohit R. Parmar, Kavindra R.Jain, Dr.Chintan K.Modi, "Image Morphological operation based quality analysis of coriander seed (Coriandrumsatavum L.)," ETNCC © 2015, IERJ All Rights Reserved Page 4 (International Conference on Emerging Trends in Network and Computer Communications), 2011.

[10] Gonzalez, R.C., Woods, R.E., 2008. Digital Image Processing. Prentice-Hall, Upper Saddle River.

[11] Zhang, G., Jayas D. S., White N. D.G.., 2005.Separation of touching grain kernels in an image by ellipse fitting al-gorithm. Biosyst. Eng., 92(2):135-142.