International Journal of Soft Computing and Engineering (IJSCE)
ISSN: 2231-2307, Volume-2, Issue-6, January 2013

Quality Evaluation of Rice Grains Using Morphological Methods

G.Ajay, M.Suneel, K.Kiran Kumar, P.Siva Prasad

***Abstract*—In this paper we present an automatic evaluation method for the determination of the quality of milled rice. Among the milled rice samples the quantity of broken kernels are determined with the help of shape descriptors, and geometric features. Grains are said to be broken kernels whose lengths are 75% of the grain size. This proposed method gives good results in evaluation of rice quality.**

Keywords- Rice, Morphological Processing, Parameters, broken rice.

1. INTRODUCTION

Rice is first mentioned in the *Yajur Veda* and then is frequently referred to in Sanskrit texts. In India, there is a saying that grains of rice should be like two brothers, close but not stuck together. Rice is often directly associated with prosperity and fertility. Therefore there is the custom of throwing rice at weddings. Since a large portion of maize crops are grown for purposes other than human consumption, rice is the most important grain with regard to human nutrition and caloric intake, providing more than one fifth of the calories consumed worldwide by the human species [1].

Rice constitutes the world's principal source of food, being the basic grain for the planet's largest population. For tropical Asians it is the staple food and is the major source of dietary energy and protein. In Southeast Asia alone, rice is the staple food for 80% of the population

Motivation: Image segmentation has a vital role to play in image processing. There are methods like morphological methods which are used for efficient segmentation of images where physical parameters like length, width, perimeter etc. are key features.

Contribution: In this paper we had given particular threshold value for the classification of broken rice for improving computational efficiency. The segmentation of the rice kernels is done by first determining the morphological features like length, width, area, perimeter, compactness ratio.

The digital images were processed and morphological features were extracted from an individual grain. The grain features extracted were: length, width, area, and perimeter and compactness ratio. The images were pre-processed before extracting the above features. The measurements in each dataset were then saved in Microsoft Excel and later retrieved for analysis.

Manuscript received on January, 2013.

G.Ajay, ECE Department, Bapatla Engineering College, Bapatla, A.P., India.

M.Suneel, Lecturer, ECE Department, Bapatla Engineering College, Bapatla, A.P, India.

K.Kiran Kumar, Lecturer, IT Department, Bapatla Engineering College, Bapatla, A.P., India.

P.Siva Prasad, Lecturer, ECE Department, Rvr&Jc college of Engineering, Guntur, A.P, India.

Thus each rice variety of the six rice varieties were represented by corresponding labels of size, shape and varietal types.

II. RELATED WORK

Machine vision and pattern recognition using morphological features have been reported by Paliwal 1999; Keef and Draper, 1986; Zayas 1989, 1985, 1986; Shahin and Symmons, 2001; Draper and Keef, 1986, 1989; Newman 1987; Romaniuk 1983; Majumdar 1999, and Churchill 1992, 1993 [2].

Artificial Neural Network (ANN) has been reported in numerous studies as an effective solution for object recognition and classification problems of food and biological materials by Paliwal, 2001; Lou 1995; Majumdar and Jayas, 1999; Wang, 1999; Romaniuk , 1993: Sayeed 1995; Dowel, 1993; Burks, 2000; Lou et al.1999, Paliwal 1999 and Jayas 2000 made extensive studies on the classification of agricultural products and found that a multilayer neural network trained using the back propagation learning algorithm generally performed better than the statistical pattern recognition methods. In 2002 Wang and Shephard worked on the broken rice quality analysis [4].

III. MORPHOLOGICAL IMAGE PROCESSING FOR BROKEN RICE CLASSIFICATION

In this section we discuss about the proposed method of classification of rice. It contains Morphological processing for detection of shape parameters.

Morphology is the study of the shape and form of objects. Morphological image analysis can be used to perform the operations like,

i. Object extraction
ii. Image filtering operations, such as removal of small objects or noise from an image
iii. Image segmentation operations, such as separating connected objects
iv. Measurement operations, such as texture analysis and shape description

In this Morphological processing first we "Read Image" from data base or appropriate file. Then we perform morphological opening operation to estimate the background illumination. Morphological opening is erosion followed by dilation, using the same structuring element for both operations. The opening operation has the effect of removing objects that cannot completely contain the structuring element.Use the surf command to create a surface display of the background. The surf command creates colored parametric surfaces that enable you to view mathematical functions over a rectangular region. However, the surf function requires data of class double, so you first need to convert background using the double command To create a more uniform background, subtract the background image, background, from the original image. After subtraction, the image has a uniform background but is now a bit too dark. Use imadjust to adjust the contrast of the image. imadjust increases the contrast of the image by saturating 1% of the data at both low and high intensities and by stretching the intensity values to a required dynamic range [3].

Create a binary version of the image so we can use functions to count the number of rice grains. Use the im2bw function to convert the gray scale image into a binary image by using thresholding. The function graythresh automatically computes an appropriate threshold to use to convert the gray scale image to binary. Remove background noise with bwareaopen.The function bwconncomp finds all the connected components (objects) in the binary image. The accuracy of our results depends on the size of the objects, the connectivity parameter whether or not any objects are touching (in which case they could be labelled as one object).

Then here we perform a sophisticated operation that computes physical parameters of individual grain [5]. In this first connected components are identified. One way to visualize connected components is to create a label matrix, and then display it as a pseudo-color indexed image. Use label matrix to create a label matrix from the output of bwconncomp. Note that label matrix stores the label matrix in the smallest numeric class necessary for the number of objects. Since bw contains only 95 objects, the label matrix can be stored as uint8 Each rice grain is one connected component in the cc structure. Use region props on cc to compute the area. Create a new vector all grains to hold the area measurement for each grain [6].

IV. PROPOSED ALGORITHM

Problem definition:

Consider image of mixed rice samples, the objectives are to:

1. Morphological processing on image
2. Physical parameters are obtained using minimum rectangular method [7].

Proposed algorithm:

Input: image of mixed rice samples

Output: Morphological image
.min rectangular image.
.broken rice image

1. Morphological operations applied to analyse shape parameters.
2. Minimum rectangular method to find physical parameter of individual grain sample.
3. Calculation of pre-processing data of known samples, data of test samples.
4. If the length of the rice kernel is less than 70% then it is treated as broken rice [8].

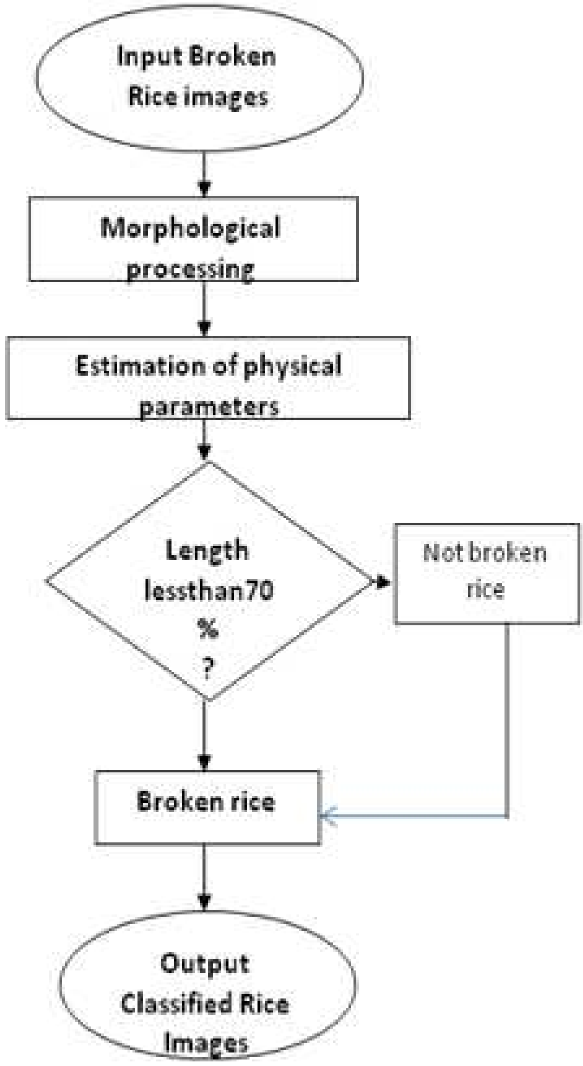

Fig.1. Flow chart of Rice Classification using proposed method.

V. COMPUTER SIMULATIONS:

The computer vision system designed to grade and classify rice kernels whether they are broken or not accurately and that too at a nominal cost. A few of the grading reports generated by the system are listed below.

Fig.2.a.Original Image

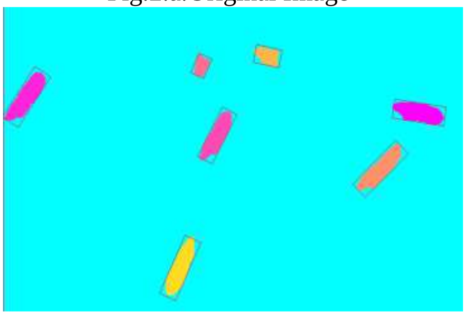

Fig.2.b.Morphological Image

Fig.2.c.Broken Rice Image

Here A represent the original image of rice granules .B represent morphological image by applying minimum bounding rectangle method. C represent image of broken rice grains after classification basing on comparison of length [8].

VI. CONCLUSION:

In this paper we proposed a morphological processing based method for classification of broken rice grains. This method is computationally efficient and improved method compared to all previous methods. Hence we suggest that this is an efficient method. To perform the rice classification whether broken or not by the proposed method is faster and simple. In future, we are planning to implement a classification method for chalkyness of rice and can be extended to other granules like wheat and Barley.

REFERENCES

1. Qing Yao, Jianhua Chen, Zexin Guan "Inspection of rice appearance quality using machine vision",Global Congress on Intelligent Systems. 2009.
2. Siriluk Sansomboonsuk and Nitin Afzulpurkar, "The Appropriate Algorithms of Image analysis for Rice Kernel Quality Evalution",- 20th Conference of Mechanical Engineering Network of Thailand18-20 October 2006, Nakhon Ratchasima, Thailand
3. Agustin, O.C., Byung-Joo Oh, "Automatic Milled Rice Quality Analysis", Future Generation Communication and Networking, 2008. FGCN '08. Second International Conference.
4. Zhao-yan Liu, Fang Cheng,Yi-bin Ying, and Xiu-qin Rao,"Identification of rice seed varieties using neural network" -J Zhejiang Univ Sci B. 2005 November
5. Sakai N, Yonekawa S, Matsuzaki A, “Two dimensional Image Analysis of the shape of Rice and its application to separating varieties”Journal of Food Engineering vol. 27, pp.397-407, 1996. Elsevier Science Ltd.
6. Yadav, B. K., & Jindal, V. K. ‘Monitoring milling quality of rice by image analyses. Computers and Electronics in Agriculture, 33(1), 19–33.2001.
7. Yanagihara, T. ‘Measurement of the visual characteristics of cooked rice using image analysis’. Nippon Shokuhin Kagaku Kaishi, 47(7), 516–522Cereal Chemistry, 75(5), 738–741.2001.
8 Dalen G.V.”Determination of the size rice distribution and percentage of broken kernels of using flatbed scanning and image analyses:”Food research International(37)51,2004 Elsevier