GUI BASED QUALITY ASSESSMENT OF RICE GRAIN USING OPTICAL AND IMAGE PROCESSING TECHNIQUES

[1]Mr.P. Raghava Reddy, [2]G.Latha, [3]G.Lishitha, [4]K.Nikitha, [5] J.Hari Priya
[1]Professor, Electronics and Communications Engineering,
[2,3,4,5] Final Year, B. Tech, Electronics and Communications Engineering,
[1, 2,3,4,5] Geethanjali Institute of Science and Technology, Nellore, Andhra Pradesh, India

Abstract: In the present world quality inspection of food products is a very important factor for evaluating the grade of food. The image processing has extensive applications in the field of agriculture .One among them is analyzing the quality of the rice grains. Major problem of rice trade for quality assessment is manual assessment done by human inspector. In this paper a method is presented to assess the quality of rice grain. The anticipated method is an application of image processing technique, GUI (Graphical User Interface) and cost effective technique for assessing quality, rating and categorization of rice grains based on the grain size.

Keywords: MATLAB, image acquisition, image preprocessing, image segmentation, GUI, Morphological features.

INTRODUCTION

The agricultural industry is oldest and most widespread industry in the world. Rice is grown in many regions across India .Rice is the most important food crop of the emerging world [1]. Numerous nations are attempting to progress the quality of rice. Along these lines the estimation of rice quality is similarly basic just as quality of rice is an essential prerequisite for the present market to shield the purchasers from substandard item [2]. As new innovation developing, individuals are embracing new innovation as contrast with utilizing old innovation [3]. In the past research, specialist proposed distinctive innovations so as to locate the best quality of rice grain. The assessment of quality rice utilizing stripped eye is in proficient. It is not only time consuming but a laborious technique too. So, in this manner for breaking down the quality and grading of rice proposed numerous calculations and innovations. The grouping of rice can be gotten by employing PC vision and machine vision procedures. In this article, we have dissected the eminence of rice grain utilizing image processing system dependent on their physical properties including length, width, area, angle proportion, shading highlights and chalky in the rice grain.

Grading of rice is necessary in appraising agricultural produce, meeting quality principles there by grasping more value in the market. The features that can be extorted from an image of any rice are its Major Axis, Minor Axis, Width, and Area. These features help the user to classify the rice. In this Paper, an automatic framework is used to analyze the rice quality based on Major Axis, Minor Axis, Width, and Area. Based on the mean area we are going to grade up the rice into different quality classes.

The major intention of the anticipated method is to offer an alternative solution for quality analysis which minimizes the required time and cost. Image processing is very important and advanced technological fields where momentous advances have been completed. More hard work is being geared to replace the traditional human sensory panel.

Related Work:

Numerous analysts attempted to discover the eminence of rice grain. Leng Yan et al (2004) [4], took a shot at the rice grain and discovered the best quality to estimating the length, width just as chalky of the grain. In their work, they utilized Vernier Caliper to quantify the length and width of rice with the accuracy of 0.02mm and determined the heaviness of rice utilizing LA114 type explanatory equalization (0.0001 g). When the information of rice was determined the information was broke down utilizing Excel programming. This technique is convoluted and tedious strategy.

Changming Sun et al (2007) [5], utilized wheat grain for quality appraisal. They utilized stereo vision method to discover the size (length, width and thickness) of grain and distinguish the nearness or nonattendance of wrinkle in the example of the wheat grain. Wrinkle is fundamentally a line or dark recognize that are available in the grain. Stereo vision is essentially removing of 3D data from computerized images.

Jagdeep Sing and Banga (2012) [6], have proposed a technique so as to locate the rice grain quality. They evaluated rice dependent on their size. Images of rice grain were caught by utilizing flatbed scanner (FBS) and high goals camera was likewise utilized. The images were caught by utilizing outside source then the RGB image was changed over into double to which the morphological tasks were connected. At long last by finding the properties of the associated parts in the image, the item include were extricated.

Neelamegam. P et al (2013) [7], broke down the quality of Rice dependent on image processing procedure. They proposed a strategy dependent on neural system so as to arrange the Rice.

Vinita Shah et al (2103) [8], proposed a strategy dependent on image processing and multi-layer feed forward neural system method which accomplished high degree precision. They consider vast seed as well as little and additionally discover the highlights of the Rice grain by utilizing this strategy.

Nandini Sidnal et al (2013) [9], proposed a representation of quality evaluation testing and constructed a distinguishing proof model which depends on appearance highlights, for example, the morphological and shading utilizing neural system along with image processing. The morphological and shading highlights are displayed to the neural system for preparing purposes.

The prepared system is then used to distinguish the obscure grain types, debasements and its quality. Sheetal Mahajan, Sukhvir Kaur (2014) [10], proposed a strategy to discover the quality of Rice grain by utilizing top-Hat change. In this technique, they dissected distinctive highlights of Rice grain. TopHat change was utilized to address the data of Non-uniform light

Proposed Method:

Proposed work focused quality analysis on the source of the measurement of physical parameter i.e. grain shape and size using techniques of image processing. Counting the number of rice seeds and categorizing them into diverse classes like Poor Quality Rice, Satisfactory Quality Rice, Average Quality Rice, Good Quality Rice, Better Quality Rice, Best Quality Rice is done using number of seeds, lengths of major and minor axis, width and area.

Methodology:

Flow chart:

The flow chart of the proposed model is as shown below:

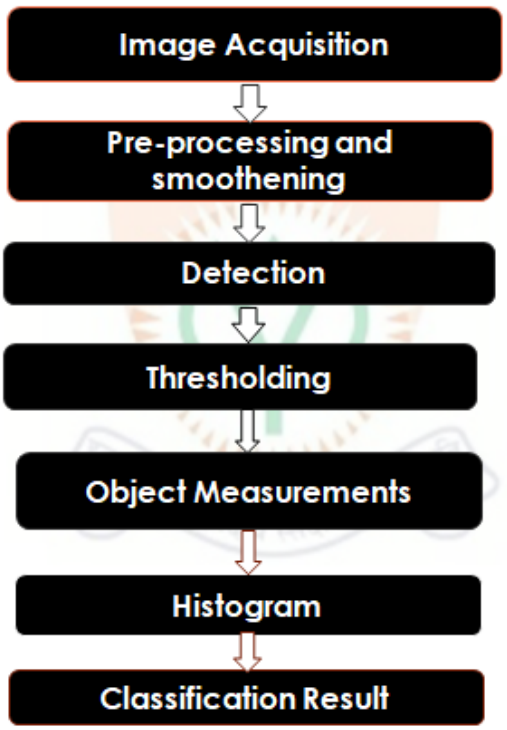

Figure1.1Schematic Process Flow Chart of the proposed Rice Grain Quality Analysis Method

Image Acquisition:

The acquired rice grain image from camera with black back ground under best illumination scenario is shown in fig 1.2. Rice seeds are randomly placed on black background for image acquisition. The acquired image is stored for further analysis.

Figure1.2 Acquired Rice Image

Preprocessing and Smoothening:

Next we perform the preprocessing operation and smoothening on the Rice image. Image is filtered from external factors and progress the visual eminence of the image here we are using Median filter. Sharp signal changes can be preserved using a median filter which is a non-linear digital filter and is very efficient in eradicating impulse noise (or salt and pepper noise) Linear filtering technique is known for signal and for being predominantly efficient in removing impulse noise of rice. It is referred the median filters have rewards over linear filters for this kind of noise. Consequently median filter is commonly used in applications related to digital signal and image/video processing [11].

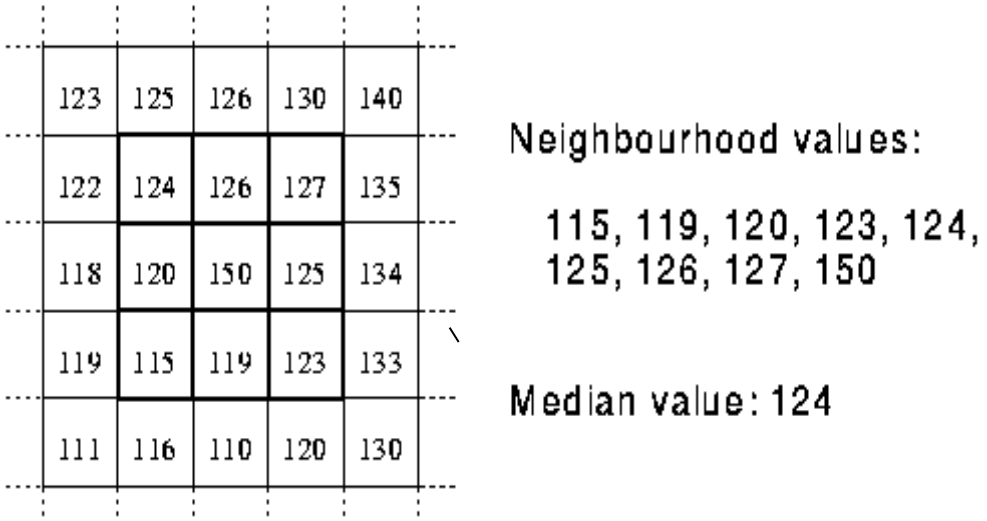

Figure: Calculating the median value of a pixel neighborhood.

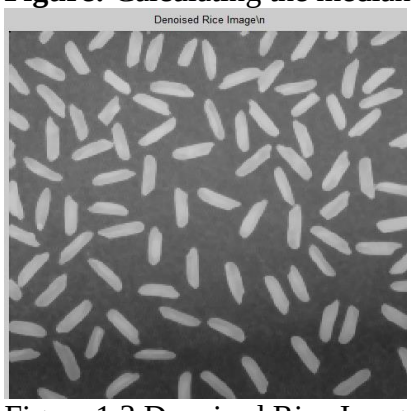

Figure 1.3 Denoised Rice Image

Detection:

Background subtraction, is a method in the image processing field where in an image's foreground is taken out for additional processing (object recognition etc.). A Background subtraction is a foreground detector. Whether individual pixels are part of the background or the foreground can be determined using the Foreground Detector which evaluates a color or grayscale frame to a background model. It then calculates a foreground mask. By victimization background subtraction, you'll be able

to discover foreground objects in an image taken from a stationary camera. The background subtracted rice image is show in fig 1.4.

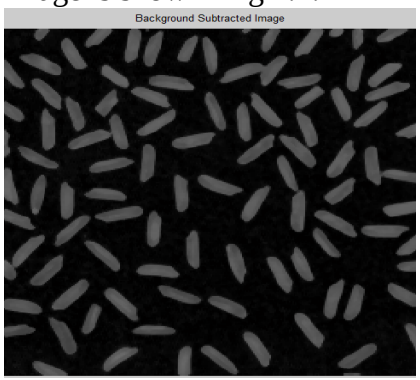

Figure 1.4 Background subtracted image

Contrast Image:

The complete display range of the data type is mapped to image intensity values employing Contrast adjustment .An image with smart distinction has sharp variations between black and white. Contrast is described as the division between the darkest and brightest areas of the image. The background subtracted image as shown in fig 1.5.

Figure 1.5: Contrast Adjusted Image

Threshold Image:

Image thresholding is a way of partitioning an image into a foreground and background. This image analysis technique may be a form of image segmentation that isolates objects by changing grayscale image into binary image.

If pixel value is lesser than a threshold rate, it is allocated zero value (may be black), else it is allocated another value (may be white).

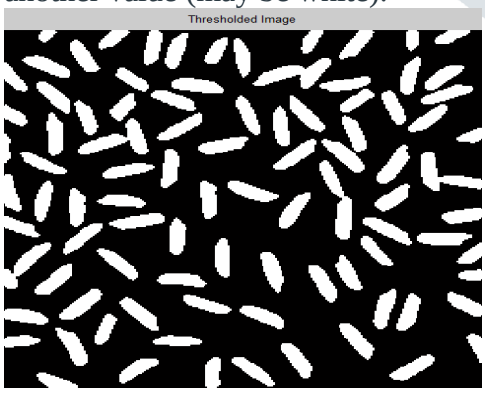

Figure 1.6 Thresholded image

Labeled Grain Image:

It assigns a color to each object based on the number of objects in the label matrix. RGB (stands for Red, Green and Blue) color image for the purpose of visualizing the labeled regions. Fig 1.7.

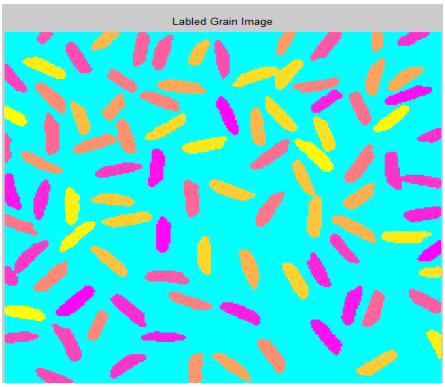

Figure 1.7 Labeled Grain Image

Object Measurements:

Each separated rice grain object is examined and different parameters of each rice grain object are determined. The following features were extracted from rice sample images:

Area: The total number of pixel covered by grain.

Length of Major axis (L): The greatest line that can be drawn through an object is called major axis length.

Length of Minor axis (I): The greatest line that can be drawn through an object, perpendicular to the major axis.

Length (l): Rice grain is enclosed in rectangular bounding and the length of this rectangle bounding box gives the length.

Width (w): Width of rectangle bounding box is known as width.

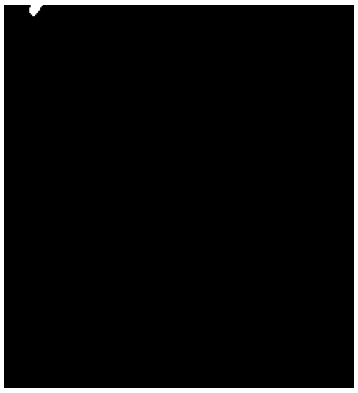

Fig 1.8 Rice Grain with Minimum Area

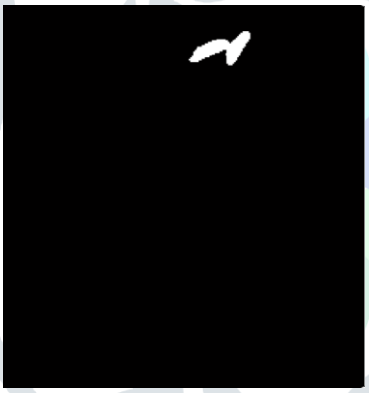

Fig 1.9 Rice Grain with Maximum Area

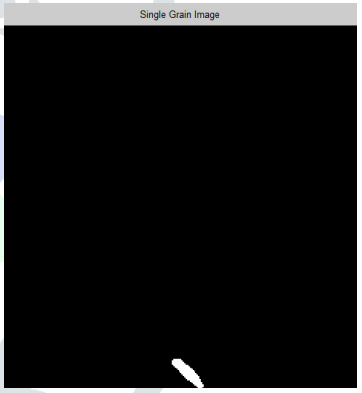

Fig 1.10 Single Rice Area

Histogram:

An image histogram is a chart that shows the distribution of intensities in grayscale image. Histogram for image describes the frequency of intensity values that occur in an image. After calculation of rice grain area, the histogram is shown in below figure1.11.

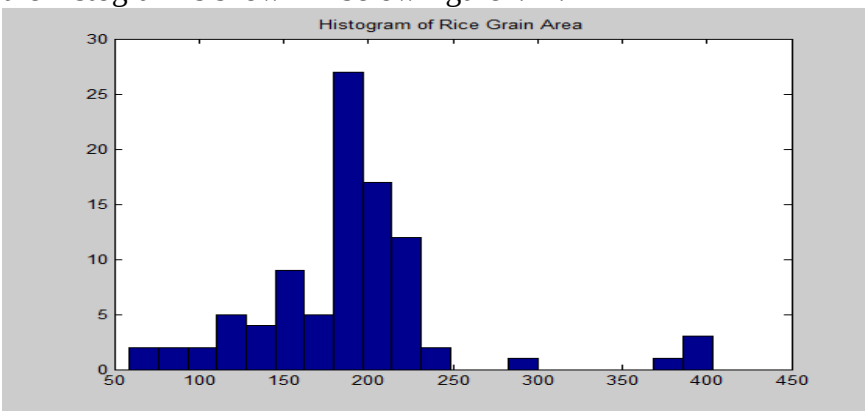

Fig 1.11: Histogram of Rice grain area

Classification of Results:

Finally based on the mean area the quality of rice is graded into six different classes.

Poor Quality Rice: Percentage of poor quality rice = (Number of poor quality rice grain/Number of objects in rice quality rice)*100.

Satisfactory Quality Rice: Percentage of satisfactory quality rice = (Number of satisfactory quality rice grain/Number of objects in rice quality rice)*100.

Average Quality Rice: Percentage of poor quality rice = (Number of average quality rice grain / Number of objects in rice quality rice)* 100.

Good Quality Rice: Percentage of good quality rice = (Number of good quality rice grain/Number of objects in rice quality rice)*100.

Better Quality Rice: Percentage of better quality rice = (Number of better quality rice grain/Number of objects in rice quality rice)*100.

Best Quality Rice: Percentage of best quality rice = (Number of best quality rice grain/Number of objects in rice quality rice)*100.

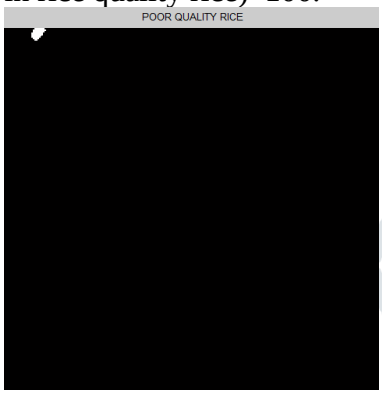

Fig 1.12 Poor Quality Rice

Fig: 1.13 Satisfactory Quality

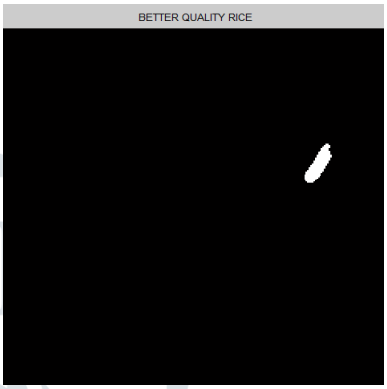

Fig 1.13 Better Quality Rice

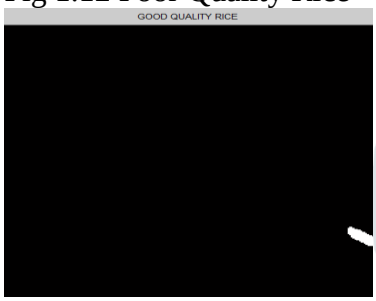

Fig 1.15 Average Quality Rice

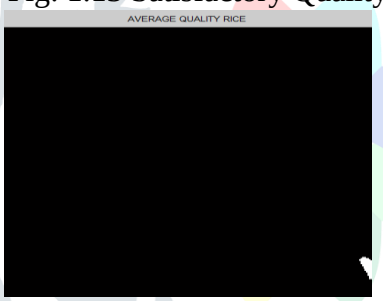

Fig 1.16 Good Quality Rice

Graphical User Interface:

With MATLAB we can make our own particular Graphical User Interface, or GUI, which comprises of a Figure window containing menus, catches, content, representation, and so on. That a client can control intelligently with the mouse and console. A graphical user interface (GUI) is a human-computer interface (i.e., a path for people to interact with computers) that utilizes windows, icons and menus and which can be controlled by a mouse (and regularly to a constrained degree by a console too). A GUI uses a blend of advances and gadgets to give a stage that the client can interface with, for the assignments of get-together and creating data.

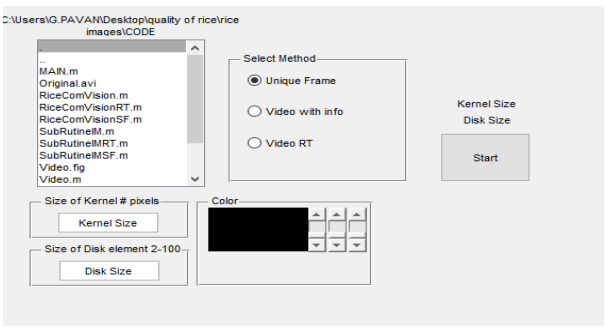

Fig 1.17 Graphical User Interface

Fig 1.18 Video based Rice Grain quality control.

Advantages of Proposed System

1. It provides the strong quality assessment of rice grains based on its size.
2. It gives better and accurate result.
3. The cost of such system is less.
4. Time require to analyze rice quality is minimum as compared to traditional and manual method.

Future Scope

The present work could be extended for remaining food grains also and few other features can also be extracted to increase accuracy.

Conclusion

The system identifies the quality of grains which is based on morphological features such as the area, color and shape, with image processing technique. A much uncomplicated technique is planned for categorization of food grains which necessitates limited features and thus overcoming the disadvantages like time consumption. The varieties of rice grains will be taken and calculated the length, area and shape analysis in digital image processing.

REFERENCES

[1] http://ricepedia.org/rice-as-food.

[2] B. S. Anami, D. G. Savakar Improved Method for Identification and Classification of Foreign Bodies Mixed Food Grains Image Samples" 2005.

[3] N.S. Visen, J. Paliwal, D.S. Jayas and N.D.G. White Image "Analysis of bulk grain samples exploitation using neural networks" 2004.

[4]Qing Yao, Jianhua Chen, Zexin Guan "Inspection of rice appearance quality using machine vision," Global Congress on Intelligent Systems. 2009.

[5]Siriluk Sansomboonsuk and Nitin Afzulpurkar, "The Applicable Algorithms of Image analysis for Rice Kernel Quality Evalution, " 20th Conference of Mechanical Engineering Network of Thailand18- 20 October 2006, Nakhon Ratchasima, Thailand

[6]Oliver C. Agustin, O.C., Byung-Joo Oh," Automatic Milled Rice Quality Analysis", Future Generation Communication and Networking", 2008.

[7] G. van Dalen "Determination of the size distribution and share of broken kernels of rice using flatbed scanning and image analysis", Unilever Research Laboratory, Foods Research Centre, Olivier van Noortlaan 120, 3133 AT Vlaardingen, The Netherlands, 2 September 2003.

[8] S. Anami1, D. G. Savakar, "Improved Method for Identification and Classification of Foreign Bodies Mixed Food Grains Image Samples" 1K. L. E. Institute of Technology. Hubli- 580030, .India anami_basu@hotmail.com, ICGST-AIML Journal, ISSN: 1687- 4846, Volume 9, Issue I, February 2009.

[9] Aggarwal, Amit K. and Mohan, Ratan) "Aspect Ratio Analysis Using Image Processing for Rice Grain Quality", International Journal of Food Engineering: Vol. 6: Iss. 5, Article 8, 2010.

[10] Sanjivani Shantaiya , Mrs. Uzma Ansari," Identification Of Food Grains And Its Quality Using Pattern Classification "M.tech (CSE) –IV Sem, RITEE, CSVTU, Raipur sanjivaninice@gmail.com Reader (CSE), RITEE, CSVTU, Raipur arshi.uzma@gmail.com, Special Issue of IJCCT Vol. 2 Issue 2, 3, 4; 2010 for International Conference [ICCT-2010], 3rd-5th December 2010.

[11] R. Vinoth kanna, Amitabh Wahi A Novel Approach for Extracting Fingerprint Features from Blurred Images.2012