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# QUALITY OF GRADING OF GRAINS BY IMAGE PROCESSING

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***Abstract — The purpose of this paper is grading of grains by image processing technique. Commercially the grading of grains is done according to the size of the grain kernel (full, half or broken). The food grain types and their quality are rapidly assessed through visual inspection by human. The decision making capabilities of human-inspectors are subjected to external influences such as fatigue, vengeance, bias etc. with the help of image processing we can overcome that. By image processing we can also identify any broken grains mixed. Here we discuss the various procedures used to obtain the percentage quality of grains.***

***Keywords- Image Processing, grading, grains, pixel Area, quality***

## I. INTRODUCTION

The quality of the world's most important staple food crop can be determined based on the shape size and texture of the grain. In India the ever increasing population losses in handling and processing and the increased expectation of food product of high quality and safety standards there is need for the growth of accurate fast and objective quality determination of food grains. Now days we are using the chemical methods for the identification of rice grain seed varieties and quality. The chemical method used also destructs the sample used and is also very time consuming method. On the other hand the machine vision or the digital image processing is a non destructive method, it is also very fast and cheap process compared to the chemical method. In the early days of machine vision application to grain quality evaluation. Wheat is the major food crop of India. It is grown in the cooler regions of the country during the mild winter months from November to mid-April. After china, India is the second largest wheat growing country of the world approx. 12% of the total wheat production. But along with this India is also the second largest wheat consuming country making wheat the most important part of the diet. So, it becomes necessary to meet the quality standards of the wheat. Introduction of impurities such as husk, granules are the major reason for the decrease in the quality of the yield of wheat. The major aim of this technique is to remove the impurities so as to make sure that the wheat is of up to the grade. In India specially, the food related health problems are increasing day by day.

## II. LITERATURE REVIEW

The poor illumination effects were removed from the background and the image is converted to binary image, by labeling the connected components the grains were counted, area of each connected components is found using region props, the maximum grain length is found and is used as a criteria for separating the grains, then finally grading formulae is applied which gives the percentage of full length grains in the given sample. The grading formula & standards were acquired from the analysis procedure followed in India for grading rice. The images were captured using a Flat Bed Scanner (FBS), image acquired is then converted to binary image to apply the morphological operations, and by finding the properties of the connected components in the image the objects features were extracted and based on the objects' features stem graphs were plotted and the grain kernels which have lesser values than threshold were discarded, finally they calculate the percentage of full length grains in the sample image to grade the quality.
Automatic evaluation method for the determination of the quality of milled rice. Among the milled rice samples the quantities of broken kernels were determined with the help of shape descriptors, and geometric features. Grains were said to be broken kernels whose lengths were 75% of the grain size. Morphological processing on image were carried, minimum rectangular method was used to find physical parameter of individual grain sample. Bhavesh B et al., proposed algorithm for quality analysis of Indian Basmati Rice using image processing techniques. Here they say with the help of this algorithm, an automated software system can be made to avoid the human inspection and related drawbacks. They used a photographic enlarger to measure the dimensions to obtain the average length and width ratio of the basmati

grains. Chetna V. Maheshwari et al., proposed image processing techniques for identifying two varieties of rice based on their shape and size. Image of a sample spread on the black or butter paper were captured using a digital camera, the edge detection operation were performed to calculate the Geometric parameters. Based on these parameters they classified rice seeds into three parts namely normal, long and small rice seeds and displayed the count of normal, long and small rice seeds on screen. L.A.I.Pabamalie, H.L.Premaratne "A Grain Quality Classification System" IEEE 2010. Approach used here is focused on providing a better approach for identification of rice quality by using neural network and image processing concepts. Today a great deal of effort is focused on the development of neural networks for applications such as pattern recognition and classification. Neural Networks, with their remarkable ability to derive meaning from complicated or imprecise data can be used to extract patterns and detect that are too complex to be noticed by either humans or other computer techniques. This research has been done to identify the relevant quality category for a given rice sample and it was based on texture and color feature extraction are used to measure the quality of a rice sample. Yong Wu and Yi Pan "Cereal Grain Size Measurement Based On Image Processing" IEEE 2010. Approach used here is measurement of grain size using image processing. In older to measure the cereal grain size rapidly and objectively, a measurement method based on digital image processing technology was proposed. Firstly, the grain images acquired by a scanner were pre-processed by using the methods of image enhancement and morphological reconstruction. Finally, through image analysis technology the grain size parameters were measured, including grain number, area, size, roundness and size distribution etc. This paper presents a cereal grain size measurement method based on image processing, measuring the cereal number, area, size and size distribution etc parameters so that the grain quality can be evaluated more correctly. D. M. Hobson, R. M. Carter, Y. Yan "Characterization and Identification of Rice Grains through Digital Image Analysis" IMTC 2007.

## III. METHODOLOGY FOR GRADING OF GRAINS

The samples of Basmati rice grains were collected from stores and a Nikon camera is used to attain and trace the imagery for rice granules of diverse sizes. The camera is mounted on a plunk which provides vertical movement. When the camera is fixed, distance between the lens and the sample table with uniform background, is 30 cm. The back ground is black. The uniform intensity lighting on the sample table is provided. Inside the field of view, the grains were arranged in random point of reference and arrangement. Images were stored in jpg format and diverse parameters of rice were extracted from the image for added scrutiny. With the parameters interpreted we set up a Neural Network system using Scaled Conjugate Gradient for grading of rice granules.

The basic steps for grading of grains and classification using image processing are as follows.
1. Image capture
2. Image acquisition and smoothing
3. Feature extraction in image
4. Detection and classification

1. Image capture: Flat Bed Scanning (FBS) this process uses the desktop scanner. In this the rice grain is placed on the glass plate of the scanner and covered with a black sheet of paper. Digital camera of high pixel resolution rate can also be used. To collect image data the camera should be placed at a location situated with a plane normal to the object's path. The black background was used. The environment was controlled to improve the data collection with simple plain background. The images acquired were 319 x 300 pixels in size. Images were captured and stored in JPG format automatically. Through data cable these images has been transferred and then stored in disk.
2. Image Acquisition and Smoothing: The first step in image processing is Image Acquisition. Acquirement of an image is done by using Nikon camera beneath homogeneous lighting arrangement. Customary measures are applied for improving the value of an image through Pre-processing techniques. In this paper, smoothing is done using Median Filters. Median filtering is extensively used in digital imaging since; it conserves the ends of the image during noise exclusion. Speckle noise and salt and pepper noise are which with, median filters are predominantly effectual. Using median filter the noise in the input gray color image is removed.
3. Feature Extraction**:** Extraction of quantitative information from segmented images is dealt with Feature Extraction. Object identification and classifications are performed based on diverse algorithms of morphological features. The features which were extracted from images of rice kernels are Perimeter, Area, Minor-axis Length and Major-axis Length using Contour detection. The collected data were then used in Neural Network Pattern Recognition system for grading of rice kernels.
4. Detection and classification: The whole system process consists of following steps for the detection of the wheat grains (All steps of algorithm are implemented on MATLAB 7.5.0(R2007b) platform) and hence the quality of grains:

a) Acquiring Quality Images: The manner in which the system is set up depends on the type of analysis and processing you need to do. The image capturing system should produce images with high enough quality so that one can extract the information which is needed from the images. Five factors contribute to overall image quality, which are given below:
1. Resolution
2. Contrast
3. Depth of field
4. Threshold value
5. Noise

Then the image is converted to the binary image, so as to reduce the response time and memory consumption. After that image is scanned from top left corner to right bottom corner to find black bunches of pixels in the image. A range is fixed for the size of bunches which decides which bunches are to be selected and rejected.

b) Binarization: The first step to localize the eyes is binarizing the picture. Binarization is converting the RGB image to a binary image. For obtaining the binary image first of all only red component is extracted from the original image. Then, using a proper threshold value, it is converted into black and white image to detect the wheat grains. Here, for calculation of best suited threshold value, the concept of histogram has been used.

c) Removal of Noise: The removal of noise in the binary image is very straightforward. Starting from the top, (x1, y1), by moving right on pixel by incrementing x1, and in the same way, y value up to the end of picture, the whole picture is scanned.

## IV. CONCLUSION

Image processing based on Matlab is effectively used to determine count of different grains. Traditionally grain counting is done manually or may involve costly electronic systems. This can be replaced by proposed system. The developed method is quick and low cost as there are no costly equipment and software. Good accuracy has been achieved in experimental results. It has been observed that for bigger grains the counting accuracy is more. Size of disk structuring element has more effect on accuracy. Smaller the grain is, less the size of disk structuring element should be. Accuracy can be increased by separating conglutination among the grains.

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