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Matching and Grading Of Different Varieties of Rice Grains through Digital Image Processing

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ABSTRACT

Rice is the one amongst the most important cereal grain crops. The quality of rice has distinct effect on the yield of the rice, so the proper inspection of rice quality is very essential. During grain handling operations, the details on grain type and its quality is required at several stages before the next course of operation can be determined and performed. The varietals purity is one of the major factors whose inspection is most difficult and complicated than that of other factors. In the present grain-handling system, grain type and quality are rapidly assessed by visual inspection. This evaluation process is, however, tedious and time consuming. The decision-making capabilities of a grain inspector can be seriously affected by his/her physical condition such as fatigue and mental state, eyesight caused by biases and work pressure, and working conditions such as climate, improper lighting, etc. The farmers are affected by this manual activity. Hence, such tasks require automation and develop imaging systems that can be helpful to identify rice grain images, rectify it & then being analysed.

Keywords:- Matching, Grading, Image Acquisition, Image Enhancement, Threshold, Image Segmentation, Probability Neural Network..

I. INTRODUCTION

Rice is a staple food and hence grown in many regions across India. for about 65% of the people living in India, rice is a staple food for them. Rice is essential food to life in India and it is grown on a majority of the rural farms. It determines the aspect ratio distribution which is very essential for elongation. the rice has been used as a sample. The samples examined were from existing standards for rice geometrical features and colour features. From the analysis reference aspect ratios were assigned to classify the rice grains. It provides cropping pattern, irrigate area, and rice productivity. In this observation, high resolution multi data from various rice's were selected for analysis. In this paper, a new approach for identification of rice grains variety using logic algorithm was investigated. It was found that it is possible to know the undesired content within 81% accuracy. according to the author Liu Zhao-Yan, Cheng fang, Ying Yi-Bin, Rao Xiu-Qin [1] in the identification of rice varieties using neural network, they used a machine vision based on digital image processing which resulted to be much faster and hence a new approach for identification of rice seed varieties using feed-forward-neural network [1]. and according to the authors Sanjivani Shantaiya, Mrs.Uzma Ansari [2], the identification of food grains and its quality using pattern classification, they used a machine vision application for grain quality evaluation in which they suggested some pattern recognition techniques for identifying and classifying the cereal grains and they also used an canny and sobel detector (mask) for edge detection, and found that the sobel detector resulted more accuracy than using canny edge detector. Edges were also being detected by applying laplacian of gaussian filter [2]. A new approach for identification of basmati rice grains varieties using feed forward neural network was investigated and also used as a machine vision application for basmati rice grain quality evaluation in which they suggested some pattern recognition techniques for identifying and classifying the basmati grains [3]. according to the author Dayanand Savakar [4] in the recognition and classification of similar looking food grain, many challenges were faced by them initially as the decision making capabilities of human inspectors which are being affected by external influences such as fatigue, vengeance, bias etc. So to overcome this they developed a machine vision system (mvs), which was he used as an alternative to this manual practice and also they used a back propagation neural network (bpnn) which was used

to classify and recognize the food grain image samples using three different types of features sets viz., colour, texture, combination of both colour and texture features [4].

II. PROPOSED METHODOLOGY

The block diagram illustrating the procedure for Matching and grading of variety of rice grain image samples is shown in Fig 1. And methodology is given Algorithm 1.

Algorithm 1: Matching and grading of variety of rice grains.

Input: Original 24-bit Color Image

Output: Classified food grains

Start

Step1: Acquire the food grain images.

Step2: Preprocessing of a grain image

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Step3: Enhance the image to remove noise and blurring by filtering an image.

Step4: Do the image segmentation.

Step5: Extract Area, major axis, minor axis, aspect ratio, red mean, green mean, blue mean features of the grain.

Step6: Use these features to match and grade the rice grains image samples using Probability Neural Network.

Stop

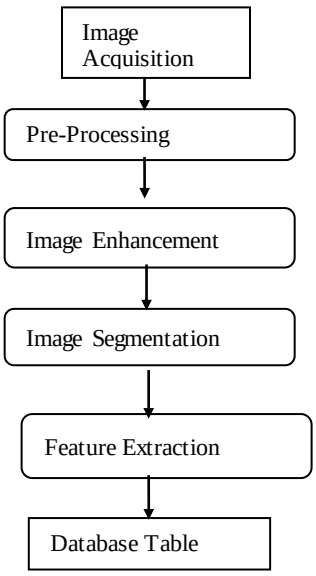

Fig. 1 Flowchart of the systemdesign

A. IMAGE ACQUISITION

A total of around 70 food grain images are acquired under standardized lighting conditions. The images are acquired with a colour Digital Camera with 3.0 mega pixel and CCD Camera that is used to capture images of rice grain samples keeping fixed distance of approximately 700 mm. Orientation 0 degree on focal length 3.2mm. To collect data a camera has been placed at a location situated with a plane normal to the object's path. The pink background is used. The environment was controlled to improve the data collection with simple plain background. The images acquired were 3264 x 2448 pixels in size. Images were captured and stored in JPEG format automatically. Through data cable these images has been transferred and then stored in disk managing proper sequence.

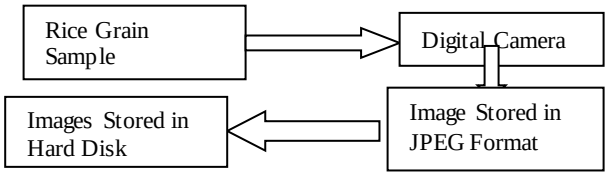

Fig. 2 Block Diagram for Image Capturing

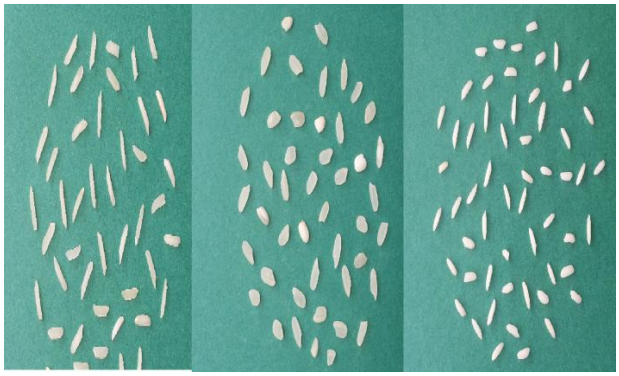

Fig. 3 Input Images of Rice

The proposed system determines the aspect ratio distribution which is very important for elongation. The rice has been used as a sample. The samples examined were from existing standards for rice geometrical features and colour features. From the analysis, reference aspect ratios were assigned to classify the grains. In this observation, high resolution multi data for various rice grains and also mixed rice data were selected for analysis. This Technique is used to analyse the rice grains machine vision system using Probability neural network algorithm was investigated. Our

system gives us computerized results to classify and determine the quality of rice grains, whose accuracy pertains to be high.

B. PRE PROCESSING

Multichannel information processing has assumed great importance of late due to the evolution of the fields of remote sensing, GIS, biomedical imaging, multispectral data management, to name a few. Retrieval and analysis of object specific features from such a diverse range of channel information are essentially complex tasks primarily due to the complexity of underlying data. Colour image pre-processing and segmentation are classical examples of multichannel information processing.

Pre-processing, which is a data preparation step for contrast enhancement, noise reduction or filtering, Out of the existing image enhancement procedures, filtering techniques have become very popular over the years for addressing the problem of noise removal and edge enhancement. Image filtering operations, such as removal of small objects or noise from an image.

1) **Gray Scale Image:** Gray scale image is an image that each pixel of rice's holds a single sample, the rice intensity information, also known as black-and-white image. After processing the gray scale level for image, it has only black and- white. It varies from black at the weakest intensity to white at the strongest.

2) **RGB to Gray:** Each pixel in an image is specified by three values that is red, green and blue. The array of class single, or double whose pixel values specify intensity values. So it converts into RGB to Gray scale conversion. For single or double arrays, values range from [0, 1]. For uint8, values range from [0, 255]. For uint16, values range from [0, 65535]. In this work, the image has been taken from the RGB color in jpeg format. it has much of pixel rate, due to pixel rate error been occur for that reason RGB image is converted into gray scale image . It is only a two dimensional as pixel rate also reduce easily get real image.

3) **Binary Image:** It converts the gray scale to a binary. The output image replaces all pixels in the input image with luminance greater than level with the value 1 (white) and replaces all other pixels with the value 0 (black).It specifies the level in the range [0,1], regardless of the class of the input image. The function gray thresh can be used to compute the level argument automatically in order to separate an object in the image from the background. The colour of the object (usually white) is referred to as the foreground colour. The rest (usually black) is referred to as the background colour.

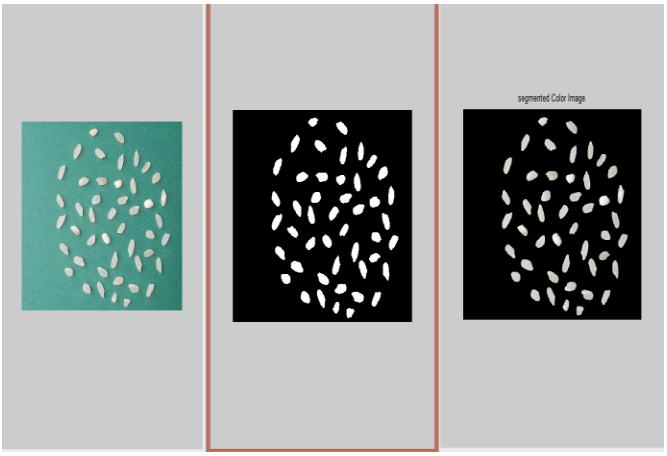

Fig. 4 Pre-Processed Image

C. IMAGE ENHANCEMENT

Image enhancement is among the simplest and most appealing areas of digital image processing. Basically, the idea behind enhancement techniques is to bring out detail that is obscured, or simply to highlight certain features of interest in an image. It is important to keep in mind that enhancement is a very subjective area of image processing. Improvement in quality of these degraded images can be achieved by using application of enhancement techniques. Texture feature used out of the five senses sight, hearing, touch, smell and taste which humans use to perceive their environment, sight is the most powerful. Receiving and analysing images forms a large part of the routine cerebral activity of human beings throughout their waking lives. In fact, more than 99% of the activity of the human brain is involved in processing images from the visual cortex [5]. A visual image is rich in information. Confucius said, “A picture is worth a thousand words.” Image Enhancement is simple and most appealing area among all the digital image processing techniques. The main purpose of image enhancement is to bring out detail that is hidden in an image or to increase contrast in a low contrast image. In image Retrieval various enhancement schemes are used for enhancing an image which includes gray scale manipulation, filtering and Histogram Equalization (HE). Histogram equalization is one of the well known image enhancement technique. The basic idea of HE method is to re-map the gray levels of an image. Many image enhancement

schemes like Contrast limited Adaptive Histogram Equalization (CLAHE), Equal area dualistic sub-image histogram equalization (DSIHE), Dynamic Histogram equalization (DHE) Algorithm has been implemented and compared. The Performance of all these Methods has been analysed and a number of Practical experiments of real time images have been presented. From the experimental results, it is found that all the three techniques yields Different aspects for different parameters. In future, for the enhancement purpose more images can be taken from the different application fields so that it becomes clearer that for which application which particular technique is better both for Gray Scale Images and colour Images.

D. IMAGE SEGMENTATION

Thresholding also plays a significant role in colour image segmentation process. After image Thresholding, the image has been segmented. Image Segmentation is subdividing an image into different parts or objects which is a first step in image analysis. The image is usually subdivided until the object of interest is isolated from their background. There are generally two approaches for segmentation algorithms. One is based on the discontinuity of gray-level values and the other is based on similarity of the gray level values. The first approach is to partition an image based on abrupt changes in the gray level. The second approach uses Thresholding, region growing, region splitting and merging. Segmentation was performed as three steps procedure, starting from the captured RGB image. The first step is Thresholding of the colour image, in order to separate foreground (rice grains) from the background. The optimal threshold for each channel was selected with the "Optimal Threshold Selection". The Second step is aimed to identify each individual grain. The binary mask produced at the first step usually as compact regions formed by more than one grain, which we separate into individual components using Component Labelling.

Fig. 5 Segmented Grain Image

E. FEATURE EXTRACTION

Algorithms were developed in Windows environment using MATLAB 08 programming language to extract morphological features of individual rice seeds. The following morphological and colour features are extracted from images of individual rice seeds:

Area (mm2): The algorithm calculated the number of pixels inside, and including the seed boundary, and multiplied by the calibration factor (mm2/pixel).

Major axis length (mm): It was the distance between the end points of the longest line that could be drawn through the seed. The major axis endpoints were found by computing the pixel distance between every combination of border pixels in the seed boundary and finding the pair with the maximum length.

Minor axis length (mm): It was the distance between the end points of the longest line that could be drawn through the seed while maintaining perpendicularis with the major axis.

Aspect ratio: Major axis length/Minor axis length.

Red Mean: Average or mean value of red colour rice grain image is been calculated.

Green Mean: Average or mean value of green colour rice grain image is been calculated.

Blue Mean: Average or mean value of blue colour rice grain image is been calculated.

F. COUNTING GRAINS

The purpose of the present study was to develop a fast, user-friendly, low-cost image processing method of counting grains of known identity.

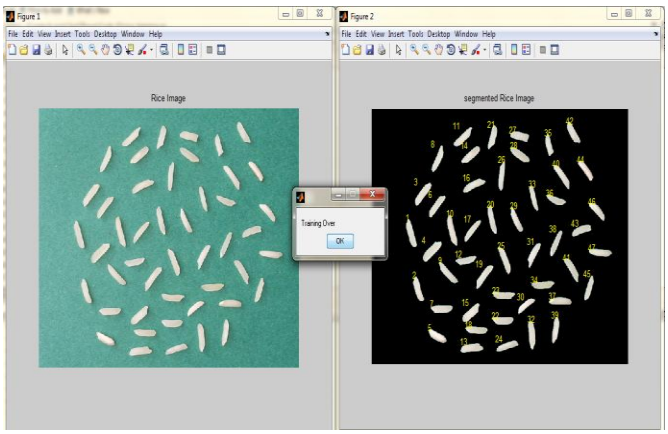

Fig. 6 Grain Count Image

G. DATABASE TABLE

A table is an organized set of data elements (values) using a model of vertical columns (which are identified by their name) and horizontal rows, the cell being the unit where a row and column intersect. The data in a table does not have to be physically stored in the database. Views are also relational tables, but their data are calculated at query time. Another example is nicknames, which represent a pointer to a table in another database. In non-relational systems, hierarchical databases, the distant counterpart of a table is a structured file, representing the rows of a table in each record of the file and each column in a record. This structure implies that a record can have repeating information, generally in the child data segments. Data are stored in sequence of records which are equivalent to table term of a relational database with each record having equivalent rows.

III. CONCLUSION

In the present work a digital imaging approach has been characteristics to identify the rice varieties. Two different common rice varieties were used in tests for defining. These include existing standards for rice length, area and aspect ratio features of rice. It successfully shows the effectiveness of compactness as its features. When the data base of this work can recognize the rice's, which has been trained the data in number of time; and hence it has been identified. With proper selection of software tools, we can design a low cost tool for quality analysis of rice grains which provides all relevant parameters about rice grains by image analysis. Hence we aim for the accurate classification of micro calcification of different types of rice varieties for using in the testing and producing the accurate result. The proposed system determines the aspect ratio distribution which is very important for elongation. The rice has been used as a sample. The samples examined were from existing standards for rice geometrical features such as area, major axis, minor axis, aspect ratio features and colour features such as red mean, green mean and blue mean colour features. From the analysis, reference aspect ratios were assigned to classify and match the rice grains.

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