IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 6, June 2022
Impact Factor: 6.252

Rice Grains Quality Assess and Categorization using Image Processing Technique

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Abstract: Rice is the most consumable food. Rice quality assessment in manually is complex, time consuming, and prone to inaccuracy due to human perception. The most crucial factor in rice is the quality. Image processing techniques offer a wide range of applications for overcoming these manual processing difficulties and achieving good quality. To assess the quality of various grains samples, to process and enhance the digital images with in a spatial domain on each grains of different samples is to determine its quality, size used, assess the quality of rice. However, the quality is handled automatically. Each grain's boundary area is identified by evaluating the Rice grains are classified based on their fundamental grain size and shape utilizing an image processing approach with edge detection. The efficiency of image processing minimizes the time required to execute a task.

Keywords: Quality, grain evaluation, Grading, Rice grain, Image processing, length, breadth.

I. INTRODUCTION

In these days the usage of rice is increasing and it is the most popular and widely consumable and available food on our planet. After China, India is the biggest producer and consumer of rice, accounting for 17.95 percent of global rice output. Rice productivity, area, and yield have all increased significantly in India. Rice grains are also great for storing for a long time. It is utilized to make a variety of high value items for humans, including as cereals, kheer and flour, India, china, Indonesia, are the key rice producing countries [1].

As a result, measuring rice quality is equally vital and rice quality is for today's market key need in order to safeguard customers from inferior products [2]. The focus of this work is on rice grain quality ensures and classification.

Digital photography has been identified as a useful technology for automating the extraction of characteristics from rice grains without the need for physical contact or human interaction [3].

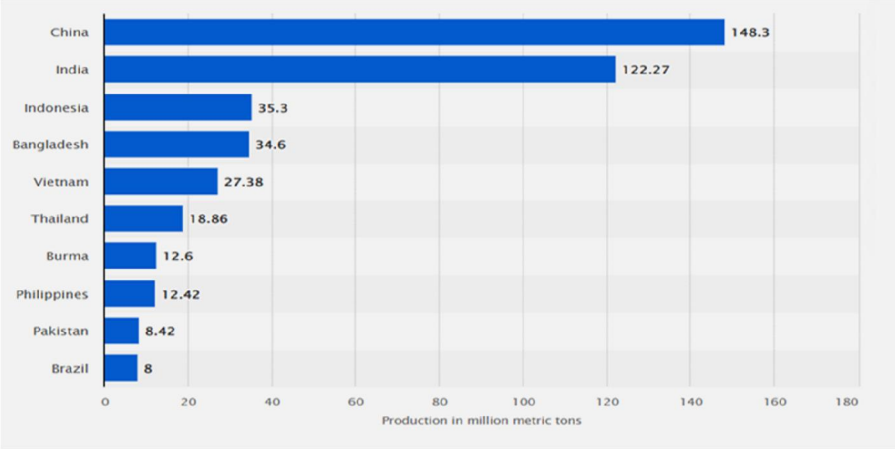

Fig. 1.Top nations based on milled rice output in 2020/21(in million metric tons) [9]

The majority of proposed classifiers used morphological parameters such as length, width, shape and internal damage of rice to distinguish across rice varieties [4].

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Image processing technology is to count the number of rice seeds and categorize them on length, breadth and their length and width ratio. These classifiers accomplish their goals by employing shrinkage, morphological operation, and edge detection strategies [5].

Furthermore, the proposed methodologies aid in the identification of several damaged seeds as well as dust in seeds, thereby enhancing the quality of the product supplied on the market. The following fig.1 highlights as various nations need the milled rice.

II. RELATED WORK

Many researchers have worked to determine the rice grain's quality. For example, *LengYan et al* (2004) [6] studied rice grain and determined the most effective technique for evaluating the grain's length, breadth.

Following the calculation of rice information. They employed a stereo vision approach to determine grain size and identifying Crease absence, presence in a grain sample. Crease is a term used to describe a line or black patch within grain grain's, finding three-dimensional information from digital images is called stereo vision. In 2012, *Banga and JagdeepSing* [7], have presented a method for determining rice grain quality. Rice was graded according to its size. To A high-resolution camera and a flatbed scanner were used to take pictures of the rice grains. Using a third party, the pictures were taken, then transformed to binary before being subjected to the morphological processes. Lastly, the object characteristics were recovered by determining the attributes of the image's related components. *Neelamegam P* and his colleagues used an image processing approach to assess rice quality. To categorize the Rice, they devised a neural network-based technique. Vinita Shah [8] suggested an approach based on a multi-layer feed-forward neural network with image processing algorithm that obtained great accuracy

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III. MATERIAL AND METHODOLOGY

The programming code was written using spider software. The number of rice seeds are counted and classified using image processing technologies according to their length-to-breadth ratio:

$$L / B = \left[\frac{Avg\_length}{Avg\_breadth} \right] \times 10$$

3.1 Pre-processing

Preprocessing refers to the removal of extraneous variables from a picture such as noise, dust etc,. For the sake of separating the rice grains from the dark background, the threshold method is utilized. 'Threshold' is a technique for selecting regions of interest in an image while disregarding the unwanted sections.

3.2 Shrinkage Morphological Operation

Rice grain properties that make them touchable are separated through erosion, while preserving the consistency of each specific characteristic. Following the erosion process comes the dilation process. Without re-joining the separated components, dilation aims to return deteriorated features to their former shape. The traits were taken from a sample of rice, namely the total number of pixels that were covered with grain in one region. A longer line might be drawn through something. The longest line may be drawn perpendicular to the main axis through an item. A rice grain is surrounded by a rectilinear boundaries box, and this rectangle's enclosing box's length provides the length. A rectangular box boundaries width is measured in units of meters.

3.3 Detection of Edge

On grayscale photos, the canny edge detector is used. It is an effective method for identifying edges and can reduce localization errors. It can also identify weak edges.

3.4 Object Measurements

Measurement demonstrates the number of rice grains. After determining edge detection methods are used on the image to count the quantity of rice grains, yielding endpoint values for each grain. The caliper is used to connect the ends and each grain should be measured for length and breadth.

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3.5 Object Categorization

Classification necessitates the use of all standard, measured, and computed outcomes. The standard source for measuring rice size and form is the Laboratories Handbook on Rice Grain Quality, Directorate of Rice Research Hyderabad. Rice grain categorization is done according to the standard database. The figure 2 depicts the work flow of the entire process.

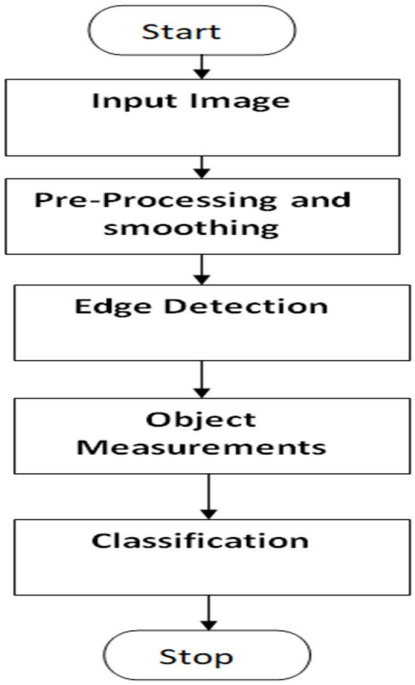

Figure 2: Work flow diagram

IV. RESULTS AND DISCUSSIONS

It divides the rice grain sample into several groups and analyses its quality depending on its aspect ratio. This work focuses on detecting rice grains or calculating the quantity of rice grains in a given sample, however, this research focuses on analyzing the quality of rice samples and categorizing them. Rice quality was determined using factors such as length, breadth, and the length-breadth ratio, as well as whether or not any dust was present. Slender, Medium, Bold, and Round are some of the other categorization based on the size of the sample rice. This feature will be able to save a lot of time and human effort since the quality of grains in the samples should be more than 90 percent correct and it should be appropriate for grading huge quantities of grains effectively, which would otherwise take a lot of time in manual analysis process.

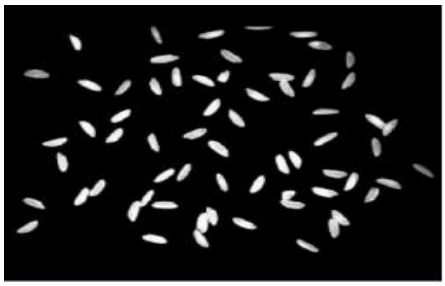

Fig. 3. Input image of Rice Grains Sample

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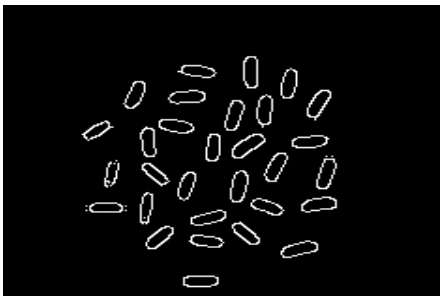

Fig. 4. Sobel edge detector

V. CONCLUSION

This article describes an image processing system for grading rice grains according to the classification upon their length, width, and area. Further on the findings certain rice can be said to be superior based on length, while others are better based on their breadth, and still others can be classified as good in quality based on their area without any damages on it. However, all of the characteristics do not have to exist in each rice grain. Additional data can be collected to help validate the techniques used. You can assess the general quality of the rice grain by its amount of moisture for further investigation. This project work will take its applications in rice mills and big mall shops. The major benefit is that the classification can be done easily with little effort using the machine and is faster as compared to the manual process of separation from a huge mixed rice quantity. This also simplifies the classification as slender, bold, medium and round.

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