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A Review Paper on Rice Quality Analysis Using Image Processing Technique

Mohd. Kaif Khan[1], Mukund Mohan[2], Pradyumn Jaiswal[3], Prashant Kumar[4], Prerna Srivastava[5]
[1, 2, 3, 4] *Electronics Engineering, Dr. Ambedkar Institute Of Technology for Handicapped, Kanpur, UP*
[5]*Assistant Professor, Electronics Engineering, Dr. Ambedkar Institute of Technology for Handicapped, Kanpur*

Abstract: ***In rice production industry as per the market demand, good quality rice evolution is very important in the present time. The factors for rice quality such as its whiteness, shape, milling degree, chalkiness, cracks and polish are the important factors for to evaluate the rice quality. Quality of rice becomes necessity nowadays for to defend the consumers from using sub standard products, the quality of rice is an important necessity. In the world population more than half people are the primary consumer of rice. It is one of the most important foods to provide energy, protein, essential vitamin and minerals, fiber grain, beneficial antioxidants, and carbohydrates. It is complicated by using the rice kernel manually for rice quality analysis because due to time consuming and having a chance for error with the bias of human perception. To overcome such issues and achieve the rice quality, the image processing technique has a wide scope. The main motive of this paper is to review different techniques that calculate the quality of rice using the image processing technique.***

Keywords: Rice quality, Chalkiness, Crackiness, Whiteness, Image Processing

I. INTRODUCTION

Rice grain plays out a very vital role to fulfill human needs. They are real source products of Asian populace and numerous different nations. The quality of rice is characterized in its surrounding of its extent components, for example, Protein, Carbohydrates, etc.
In figure 1 represents the cross sectional of rice seed. The rice kernel is contained bran coat and a hull, both of them which are withdrawn by shining is known as white rice.

1) *Rice shell, hull:* Hull bounded the bran coat, and the endosperm

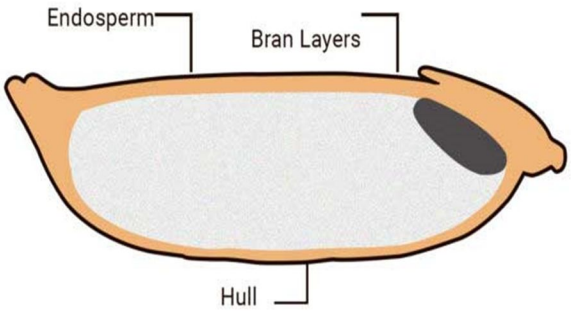


Figure 1 Cross section of Rice Seed.

2) *Bran Layers:* Bran consists of the pericarp, the seed coat and the aleurone layer
3) *Endosperm:* The endosperm is the most commonly consumed portion of the rice grain and mediates the transfer of nutrients from the vegetative tissues to metal rich environment

II. LITERATURE SURVEY

In the research methodologies, the main research area is the Systematic Literature Review (SLR). To review the existing information about rice quality evaluation is the main cause for undertaking the SLR methodology. Additionally, it provides detail information about our domain existing techniques, research questions and future challenges for the rice quality based on the image processing technique. The main aim is to examine or detect the relevant literature based on image processing technique. In Systematic Literature Review, we followed different steps. The SLR process phases illustrated as follows:

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A. *Research Papers*

1) B.S. Anami. et al., (2015), proposed a method for recognition of paddy varieties from bulk paddy grain image samples based on color texture features extracted from color co-occurrence matrices. The color texture features are extracted from H, S and I color planes and their combinations. The color texture features are used for recognition of 15 paddy varieties. The reduced feature set of the HS plane includes Energy, Entropy and Correlation features from Hue plane and Energy, Entropy, Contrast, and Correlation features from Saturation plane. The paddy grain images are recognized using a multilayer feedforward artificial neural network. The considered fifteen paddy varieties have given the recognition accuracy of 92.33%.
2) Guzman. J.D et al., (2011) proposed the use of a machine vision system and multilayer neural networks for automatic identification of the sizes, shapes, and variety of samples of 52 rice grains belonging to five varietal groups of rice in the Philippines. Thirteen grain features extracted from each sample image using multilayer neural networks. The Artificial Neural Networks classifiers developed were able to identify the grain sample sizes and shapes at overall average accuracies of 98.76 per cent and 96.67 percent, respectively.
3) Verma, B., (2010) proposed relatively faster computer vision system to analyse and sort rice kernels. A series of measurements were done using image processing techniques namely smoothing, binarization, etc. on three varieties of Indian rice namely Marked Supreme, Marked Golden (export quality), Half Basmati. The extracted parameters area, perimeter, maximum length, maximum width, compactness and elongation from processed images were measured.
4) Rad. S.J.M, et al., (2011), proposed an algorithm for classifying five different Iranian varieties of rice, using the color and texture features. The proposed algorithm consists of several steps: image acquisition, segmentation, feature extraction, feature selection, and classification. Sixty color and texture features were extracted from rice kernels. The set of features contains redundant, noisy or even irrelevant information, so features were examined by four different algorithms. Finally twenty-two features were selected as the superior ones.
5) Mousavi Rad. S.J. et al., (2012), proposed an algorithm for identifying five different varieties of rice, using the morphological features. The proposed algorithm consists of several steps: image acquisition, segmentation, feature extraction, feature selection, and classification. Eighteen morphological features were extracted from rice kernels. The set of features contains redundant, noisy or even irrelevant information, so features were examined by four different algorithms. Finally six features were selected as the superior ones. A back propagation neural network-based classifier was developed to classify rice varieties.
6) Aulakh. J.S. et al., (2012), have proposed image processing techniques for grading of rice samples based on their sizes. The images were captured using a Flat Bed Scanner (FBS) and then converted to binary image to which they apply morphological operations and by the objects features were extracted by finding the properties of the connected components and get the information regarding connectivity, image size, numobjects, pixelidxlist.
7) Silva.C.S et al., (2013), proposed a classification of rice seeds obtained through a machine vision combined with neural network architecture. A total of 9 different rice verities were considered for the study. Algorithms were developed to extract thirteen morphological features, six color features and fifteen texture features from color images of individual seed samples. A different neural network models were developed for individual and combined feature set. High classification accuracy was given by textural features than morphological and colour features. Out of these feature sets, texture features produced high classification accuracy. Especially texture features obtained from red colour band produced better predictions.

III. METHOD FOR QUALITY ANALYSIS OF RICE

In this section, we review some existing method of quality analysis of rice.

A. *Based on Whiteness*

Chalkiness is one of the most important appearance quality indicators. Therefore, clarification of the heredity of chalkiness and its molecular mechanisms will contribute to reduction of rice chalkiness. Although a number of QTLs related to chalkiness were mapped, few of them have been cloned so far.

B. *Based on Size & Shape*

Simply speaking, long grain rice will have a longer cylindrical shape, whereas short grain rice will be shorter and wider. This rice has milled grains that are at least three to four times as long as they are wide. Due to its starch composition, it is separate, light and fluffy when cooked.

IV. FUTURE SCOPE

1) Different types of grain and its varieties are used for the detail analysis of quality products related to the accuracy and efficiency performance.
2) For the experiment purpose instead scanner we can use conveyor belt with vibration mechanism for using the appropriate hardware.
3) The collection, assessment, protection and trade of rice germplasm and circulation of enhanced plant material to various national and local research focus.
4) Development of innovation for incorporated nuisance, illness and supplement the board for different cultivating circumstances.

V. CONCLUSION

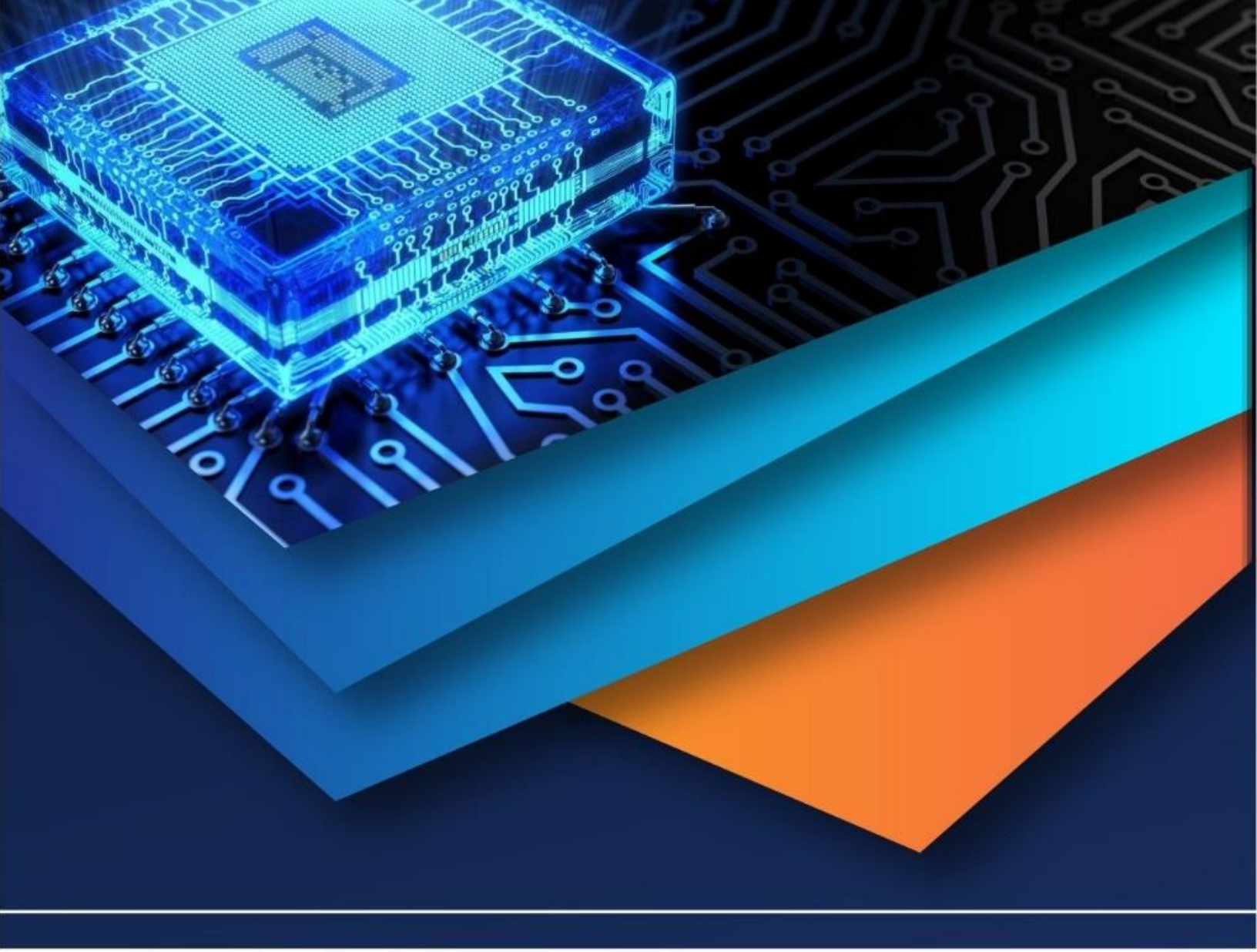
This paper presented a survey on using image processing techniques used in an automated rice grading system in agricultural context. Most of the work in this field use image processing method like background substraction feature extraction and training and classification.

There is number of applications and method to select for implementation to real time need. While the existing rice classification method sustaining the need of today, there are more and more new method are evolving to assist and ease the rice classification.

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