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# Advance Algorithmic Approach to Quality Analysis of Indian Basmati Rice Using Digital Image Processing

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**ABSTRACT**

**In this research, the best Indian Basmati Rice will be selected through the development of one of the algorithms published in this field using digital image processing, where rice of excellent quality, acceptable and bad is detected at the same time.**

**Keywords: Average Precook Length, Broken/fragmented grains, Chalkiness value, Damaged/discolored grains, Indian Basmati Rice, Image Processing Tool, L/B Ratio, L/B2 Ratio, Elongation ratio.**

## I. INTRODUCTION

Image processing is the study of any algorithm that takes an image as input and returns an image as output. Rice is the most important food crop of developing world, so can be developed by using digital image processing. More than 900 million of the world's people depend on rice as producers or consumers. Automated machine based inspection using software system is more speedy, accurate, convenient, harmless and non-destructive in comparison with traditional methods. An algorithm can be developed which can serve as a skeleton to develop software system. Indian basmati rice can be analyzed and classified based on the parameters like length uncooked rice, width uncooked rice, length to width ratio uncooked rice, length cooked rice, width cooked rice, length to width ratio cooked rice, elongation ratio, chalkiness value, broken/fragment grains and damaged/discolored grains. Development an algorithm to measure all such parameters which analyse the quality of rice grain by comparing with given standards.

There are many researches applied machine vision to estimate rice appearance quality inspection. Bhavesh B. Prajapati ,Sachin Patel. (2013) suggest algorithm to qualityanalysis of Indian Basmati Rice using digital processing. Bhavesh B. Prajapati1, Sachin Patel2 (2013) have suggest mobile device for measuring quality parameters of Indian Basmati Rice using image processing techniques. Yan, Chen and Guan et al. (2009) have discussed inspection of quality of rice grain appearance using machine vision. Wan et al. (2002) proposed an automatic inspection machine based on image-processing for sorting of rice grains into sound, cracked, chalky, immature, dead, broken, damaged and off-type categories. Guzman et al. (2008) used Artificial Neural Networks. Guzman and Peralta et al. (2008) suggested Machine Vision Based Classification of Philippine Rice Grains, which represents the classification accuracies of the sizes, shapes, and varietal types of fifty two ice popularly grown in the Philippines using multilayer neural networks. Their system is more effective when compared to human inspection method.

## II. METHODS AND MATERIAL

By measuring the dimensions to obtain the average length and width ratio of the basmati grains before and after cooked rice to obtain the good result. Following equations are used:

$$\text{L/B ratio} = \frac{Average\ \ lengt\ h\ of uncooked\ \ \ rice\ ,mm}{Average\ \text{breath of uncooked rice ,mm}}$$

$$\text{L/B2 ratio} = \frac{Average\ \ lengt\ h\ of cooked\ \ \ rice\ ,mm}{Average\ \text{breath of cooked rice ,mm}}$$

Elongation ratio (ER) means the ratio of the length of cooked rice to that of uncooked rice which measures the expansion length upon cooking. This can be obtained as:

$$\text{Elongation ratio} = \frac{length\ of\ cooked\ \ rice\ ,mm}{length\ of\ uncooked\ \ rice\ ,mm}$$

Percentages of following parameters are obtained by counting the number of parameterized rice grains per 100 rice grains by common equation.

 **Damaged, discolored grains**include rice kernels, broken, fragments of whole that are internally damaged or discolored, materially affecting the quality.

$$\text{Max.discolored grain \%} = \frac{Number\ \ of\ \ diccolored\ \ \ grains}{100\ grains} \times 100$$

 Chalky grains mean the grains at least half of which are milky white in color and brittle in nature.

$$\text{Max. Chalky Grain \%} = \frac{Number\ \ of\ \ chalky\ \ grains}{100\ grains} \times 100$$

 **Broken and fragments**includes pieces of rice kernels which are less than three fourth of a whole kernel.

$$\text{Max. Broken and fragment \%} = \frac{Number\ \ of\ broken\ \ and\ fragment\ \ \ grains}{100\ grains} \times 100$$

## III. RESULT AND DISCUSSION

Following algorithm, the equations were modified and added to which three types of India Basmati Rice were detected.

1: Scan the rice sample

2: Check image size and resolution

3: If [size and resolution as per requirement]

Continue

Else

Discard the image and rescan

4: If [overlapped rice is more than permissible limit]

Rearrange again and rescan

Else

Continue

5: Perform binarization on image

6: Measure average length uncooked rice

7: Measure average width uncooked rice

8: Measure average length and width ratio (L/B)

9: If [Length and width ratio within standard parameters]

10: Measure average length cooked rice

11: Measure average width cooked rice

12: Measure average length and width ratio (L/B2)

13: If [L/B2-L/B >=0]

L/B = L/B2

Else

Rice object is considered damaged/broken grain

14: Calculate percentage damaged/broken grain

15: Measure chalkiness value

16: If [Chalkiness value within standard parameters]

Continue

Else

Rice object is considered discolored grain

17: Calculate percentage discolored grain

18: Calculate Elongation ratio(ER)

19: Store and make a set of parameters

20: If [parameters values are within standard parameters range]

21: If[ER >1]

Rice sample quality is excellent

Else

Rice sample quality is acceptable

Else

Rice sample quality is not acceptable (poor)

22: Generate detailed report

## CONCLUSION

With the development of algorithm approach to quality analysis of Indian Basmati Rice has become possible to identify three types of basmati rice which is "excellent, accepting and poor " where it was obtained at a time faster and in quantities of high quality and with result of a high greater profit return .

## REFERENCES

[1]. www.coe.utah.edu> slides > Lecture0.
[2]. Bhavesh B. Prajapati1, Sachin Patel2, Algorithmic Approach to Quality Analysis of Indian Basmati Rice Using Digital Image Processing, Volume 3, Issue 3, March 2013.
[3]. Bhavesh B. Prajapati1, Sachin Patel2, Proposed Mobile Rice Grain Analyzer Device Based On Digital Image Processing With Related Hardwareand Software Specifications , pp. 217-220,2013
[4]. J. Lisle, M. Martin, and M. A. Fitzgerald, Chalky and Translucent Rice Grains Differ in Starch Composition and Structure and Cooking Properties, Cereal Chem. 77(5):627–632
[5]. Yao, Chen, Guan, "Inspection of rice appearance quality using machine vision", Global Congress on Intelligent system, 2009 IEEE.
[6]. Y. Akiyama, Y. Takahara, and K. Yamamoto, "The application of image analysis to valuation on white-core in grain of rice for sake brewery (In Japanese with English abstract)," Breeding Sci., 1999, vol. 46, pp. 367–371.
[7]. Y. N. Wan, C. M. Lin, J. F. Chiou, "Rice quality classification using an automatic grain quality inspection system," Trans. ASAE, 2002, vol. 45, no. 2, pp.379-387.
[8]. Jose D Guzman, Engelbert K. Peralta, "Classification of Philippine Rice Grains Using Machine Vision and Artificial Neural Networks", IAALD AFITA WCCA2008.
[9]. D. M. Hobson, R. M. Carter, Y. Yan, Characterisation and Identification of Rice Grains through Digital Image Analysis, Instrumentation and Measurement Technology Conference - IMTC 2007
[10]. XuLizhang , Li Yaoming, Multi-Scale Edge Detection of Rice Internal Damage Based on Computer Vision, Proceedings of the IEEE International Conference on Automation and Logistics Qingdao, China September 2008
[11]. R M Carter, Y. Yan., Digital imaging based classification and authentication of granular food products. Institute of Physics publishing, Measurement Science and Technology V.17, pp.235240, 2005.
[12]. R. M. Carter, PhD Thesis: On-Line measurement of size distribution and volumetric concentration of pneumatically conveyed solids using digital imaging techniques. 2005, University of Kent, UK. 8. R M Carter, Y. Yan., Measurement of particle shape using digital imaging techniques. Journal of Physics Conference Series, V. 15, pp. 177-182, 2005.

[13]. Rice Doctor, International Rice Research Institute, Philipines, www.irri.org, 2003.
[14]. V. Balasubramanian, A.C. Morales, IRRI, "Adaptation of the Chlorophyll meter (SPAD) technology for real-time N management in rice", April, 2000, pp. 4-8.
[15]. Xia, Xu; Fan, Chao; Lu, Shu-Jie; Hou, Li-Long, The Analysis of Wheat Appearance Quality Based on Digital Image Processing, 2010 2nd Conference on Environmental Science and Information Application Technology.
[16]. S. Majumdar and D. S. Jayas, "Classification of bulk samples of cereal grains using machine vision [J]," Journal of Agricultural Engineering Research, vol. 73, no. 1, pp. 35-37, 1999
[17]. Matsler, A. and T.J. Siebenmorgen. 2005. Evaluation of operating conditions for surface lipid extraction from rice using a Soxtec system. Cereal Chem. 82:282-186.