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Analysis of Rice Grains Through Digital Image Processing

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ABSTRACT

In the food analysis there are various foodstuffs in the form of grains. Rice is of particular importance being a commodity crop. There are issues in identifying different varieties of rice. Digital imaging approach has been devised in order to investigate different types of characteristics to identify different rice varieties. Four different common rice varieties were used in tests for defining features. These include aspect ratio, length, Chalky and Paddy rice etc. There are different techniques in image processing to analyze rice which shows the dissimilarity between different varieties to a degree that would allow successful identification.

Keywords : Aspect Ratio, Chalky, Paddy Rice

I. INTRODUCTION

Some properties of rice with low percentages of stress cracks and broken kernel are desirable for food or milling et al. Physical and mechanical stresses developed in rice kernels as they are harvested, dried, stored and handled induce various quality defects.

The image analysis here centers on the shape and Length, Chalky and Paddy features of grains. The following parameters are determined for the present work.
Average Length (La) is the simplest feature considered. Using the per pixel length of the image it is possible to determine the absolute length of each grain. This per pixel area and length is determined through calibration. Lm is determined from the image by measuring the Euclidean distance between the two most distant points on the perimeter of the rice grain.

Shape features using diameter lengths are devised from the recorded chain code of each shape. Here, using pixels on opposing halves of the chain code as opposing diameter distances provided a reasonable standard of internal diameter.

II. METHODS AND MATERIAL

A. Imaging system setup

A commonly used static imaging approach is adopted here to capture images of rice grains [4,5]. The actual implementation is illustrated in Figure 1. Tray, Scanner, Computer, Entry and Exit point for rice and communiation port.

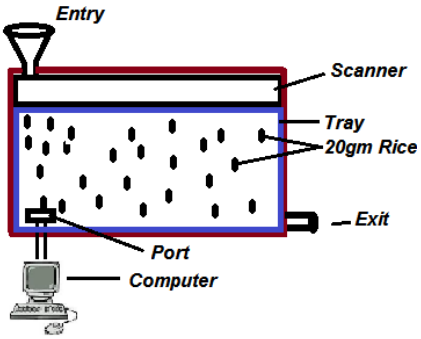

Figure 1: Imaging setup

Here computer is attachted with system to get image and do apply image processing techniques to identify the charactristics of rice grain.

B. Image processing algorithms

Image processing is used to analyse the grain images acquired. Final correction of any physical issues that occur in hardware is also possible, such as removing noise, determining uniformity of illumination and adjusment of rice on tray.

The image analysis here centers on the shape and texture features of grains. The following parameters are determined for the present work.

Aspect Ratio (Ra) feature is defined as the ratio between the shortest (d_{min}) to the longest (d_{max}) diameters: d.

$$Ra = \frac{d_{\min}}{d_{\max}}$$

Grain appearance is largely determined by the endosperm opacity and this is commonly classified as the amount of chalkiness. Opaqueness has an overall chalky texture caused by interruption of final filling of the grain. Though chalkiness disappears upon cooking and has no direct effect on cooking and eating qualities, excessive chalkiness downgrades the quality and reduces milling recovery. A visual rating of the chalky proportion of the grain is used to measure chalkiness based on the standard Evaluation System SES scale presented below: Select, segregate and weigh the chalky grains (SES Scale 9). Determine the % chalky grain using the equation

$$\%\ Chalky\ grain = \frac{Wt\ of\ \ chalky\ grains}{Wt\ of\ \ milled\ rice} x100$$

Table 1: Area of chalkiness in Rice

Scale	% area of chalkiness
1	less than 10
5	10-20
9	more than 20

Follow the procedure of determining grain shape of paddy. Based on the length to width ratio, the shape of the milled rice will be determined. The ISO Classification is as follows:

$$L/W\ ratio = \frac{Avg.\ length\ of\ \ rice}{Avg.\ width\ of\ \ rice}\ x\ 100$$

Table 2: Length and width ratio of Rice

Scale	Shape	L/W ratio
1	Slender	Over 3.0
3	Medium	2.1 – 3.0
5	Bold	1.1 – 2.0
9	Round	1.0 or less

Here in above all mathamatical equestions are used to identify charactristics of rice grain using image procesing techniques.

III. RESULT AND DISCUSSION

Experimental tests were conducted using the imaging setup (Figure 1). The first adjust rice in tray, then it has produced a set of images of rice grains using scanner. Algorithms identified characteristics of rice grain and produce result data which includes aspect ratio, length, Chalky and Paddy of rice grain.

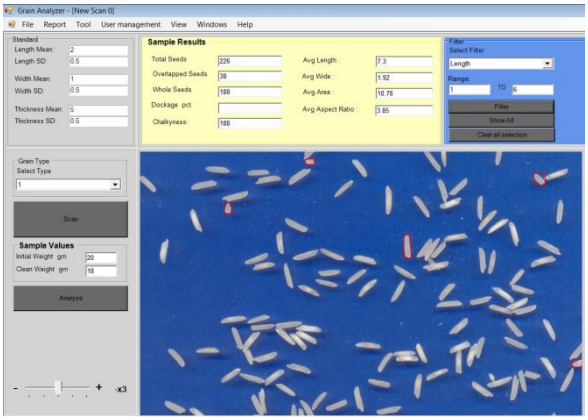

Figure 2: Length of Rice Grain

Process: Calculate Length and highlight the rice of given range

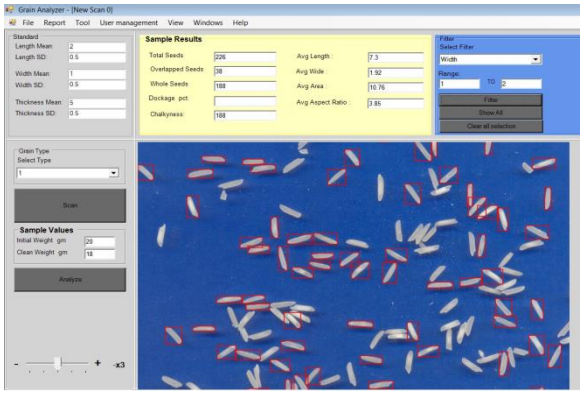

Figure 3: Width of Rice Grain

Process: Calculate width and highlight the rice of given range

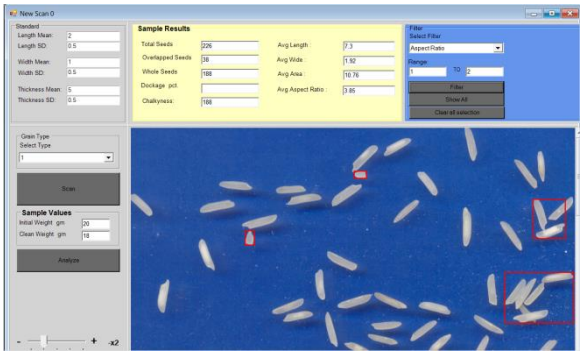

Figure 4: Aspect ratio of Rice

Process: Calculate Aspect ratio and highlight the rice of given range

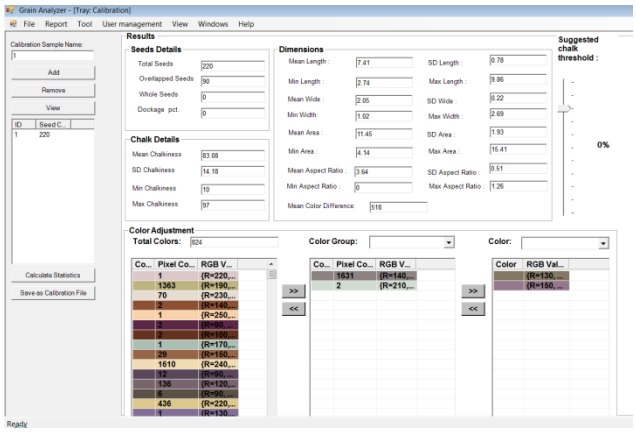

Figure 5: Statistics of 20gm Rice Image

Process: Calculate Statistics and produce result which includes Total Seeds, Overlapped Seeds, Whole Seeds, Dockage pct., Chalky seeds, Chalk impact, Mean Length, Mean Width, Mean Area, Mean Aspect Ratio, Color Details.

IV. CONCLUSION

Digital image analysis has proven to be a viable approach to the quantitative characterisation of rice grains. The results presented have demonstrated that the separation of short, medium and long, as well as brown and white rice varieties is achievable using a combination of the descriptors including aspect ratio, length, and Chalky and Paddy rice. Expansion on this work can target identification of rice based on more specific guideline requirements for certain rice varieties, such as Basmati. Also the use of surface texture and intensity features is applicable to the identification of white area in milled rice, known as a factor in grain chalkiness. It is clear, given the serious role of organizations such as the IRRI, that effective feature identification for the characterisation of rice grains could play a vital role for the food industry in the future.

V. REFERENCES

[1] 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

[2] 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

[3] Xu Lizhang , 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

[4] 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.235-240, 2005.

[5] 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.

[6] Rice Doctor, International Rice Research Institute, Philipines, www.irri.org, 2003.

[7] 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.

[8] 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

[9] 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

[10] Matsler, A. and T.J. Siebenmorgen. 2005. Evaluation of operating conditions for surface