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Quality Testing of Rice Grains Using Image Processing Applications

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Abstract: ***Quality Testing of Rice Grains is testing of grain to evaluate the planting value and the authenticity of the certified lot. There are certain limitations to human eye to observe the Grain. So, the electronic world helps us to separate the faulty Grains from quality Grains. The specific target to be achieved is the development of a rice quality detection system that can assess the quality of rice using digital image processing. The evaluation of the rice grains on the basic grain size and shape using image processing edge detection algorithm is used to find the region of boundaries in each grain. Grain testing is done mainly for moisture, germination and physical purity of Grains. The performance of Image Processing reduces the time of operation.***
Keywords: Grading, OpenCV, Pandas, Matplotlib

I. INTRODUCTION

The agricultural industry is oldest and most widespread industry in the world. Traditionally quality of food products is defined from its physical and chemical characteristics by human sensory panel. Physical parameter includes grain size and shape, moisture content, chalkiness, whiteness, milling degree and bulk density. Moisture content is nothing but the water content in the grain. For better storage purpose moisture content should be in between 12–14%.

This mainly focused on grain size and shape analysis using image processing techniques. For the measurement of grain size and shape dial micro-meter, graphical method and grain shape tester are used. But all these methods are time consuming and some of them are costly. Grain quality is very important factor in whole world. For the purpose of import or export of any food grains, its quality analysis should be done. But many time's quality is analyzed by manually which includes many disadvantages and shortcomings, To overcome these limitation image processing techniques is an alternative and best solution. The main objective of the proposed method is to provide an alternative solution for quality analysis which minimizes the required time and cost.

II. LITERATURE SURVEY

Certain experiments have been Performed from past few years by different research and development groups . Here are some of the following groups:

1) Nagoda, Nadeesha, and L.Ranathunga. are proposed "Rice Sample Segmentation and Classification Using Image Processing and Support Vector Machine." In IEEE International Conference on Industrial and Information Systems (ICIIS), pp. 179-184. IEEE, 2022. It acquired image of Basmati rice grains by using CCD camera with black background, uniform illumination and constant distance between camera and rice sample. They are performed adaptive thresholding for segmentation. Edges are detected by applying Sobel edge detection. Disadvantage is it is costly and ineffective.

2) Parveen, Zahida, Muhammad Anzar Alam, and Hina Shakir. are proposed "Assessment of quality of rice grain using optical and image processing technique." In International Conference on Communication, Computing and Digital Systems (C-CODE), pp. 265-270. IEEE, 2022. Optimal and image processing-based technique presented for the characterization and quality analysis of rice grains. White chalky area of grains is detected by the use of extended maxima operator. Disadvantage is Proposed algorithm's time complexity is high.

3) Ali, Syed Farooq, Halima Jamil, Razia Jamil, Iqra Torij, and Saira Naz. are proposed "Low-Cost Solution for Rice quality analysis using Morphological parameters and its comparison with Standard measurements." In International Multi-topic conference (INMIC), pp. 1-6. IEEE, NOV 2021. Low cost solution for the replacement of SATAKE RSQI10A. Locally developed software minimizes all features and operations of SATAKE grain analyser with overall efficiency of 95%. Disadvantage is it is only based on nutrient content.

III. PROPOSED SYSTEM

The Traditional Method requires high degree of accuracy to satisfy customers need and to overcome limitations of manual inspection new and advanced method is proposed which is image processing techniques. The image processing technique is used for counting the number of rice grain and classifies them on the basis of length, breadth and length - breadth ratio. Length is the average length of rice grain while breadth is the average breadth of rice grain and length-breadth ratio is calculated as:

L/B = [(Avg. length of rice) / (Avg. breadth of rice)] * 100

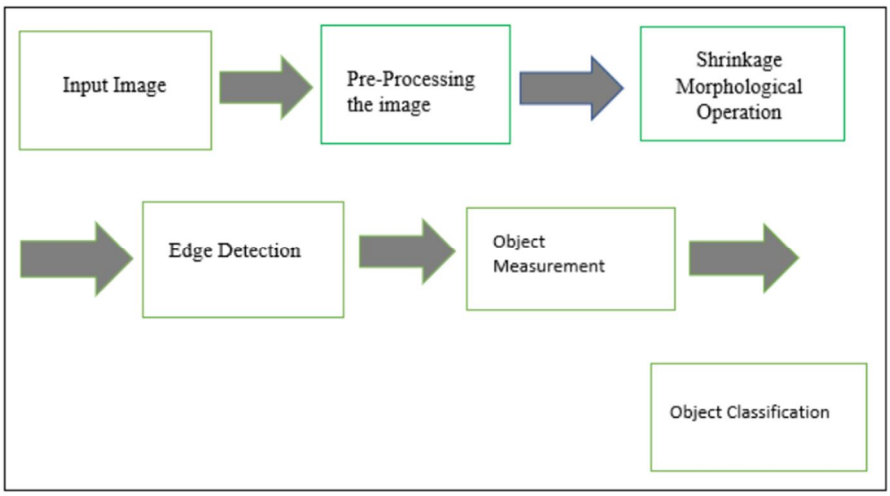
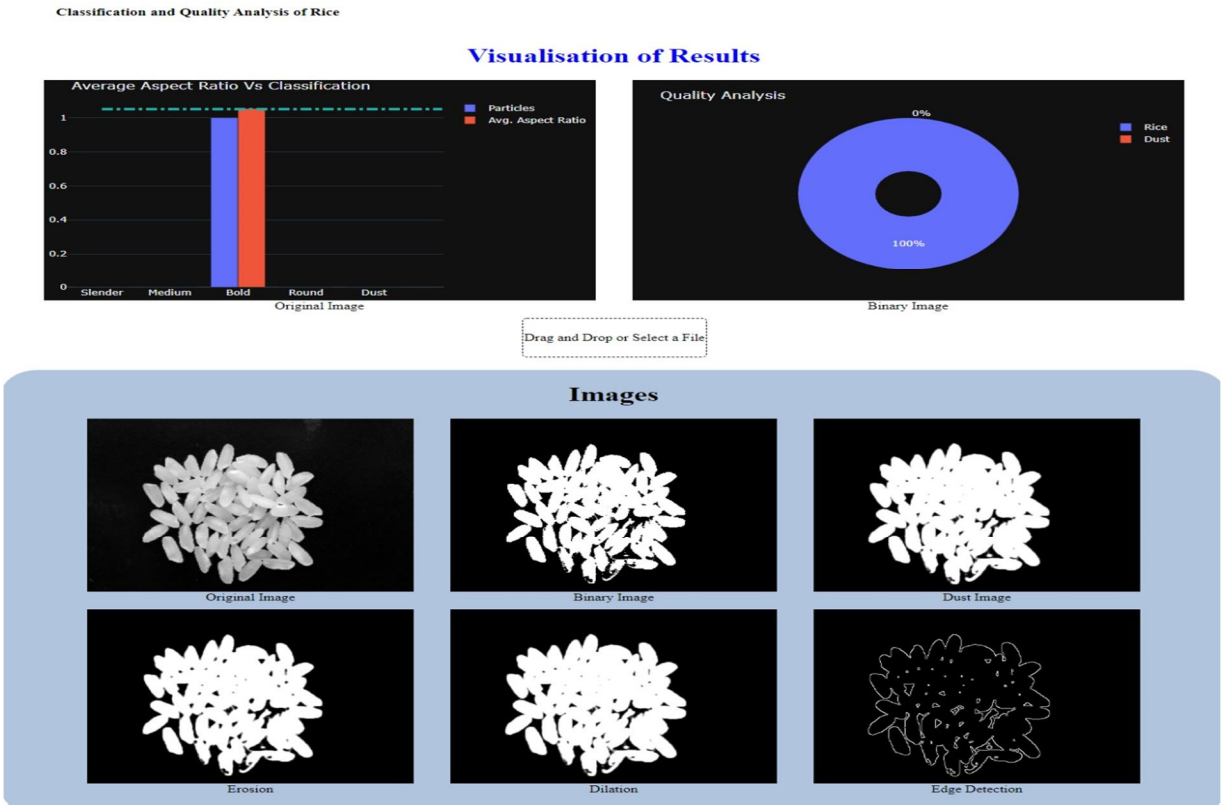
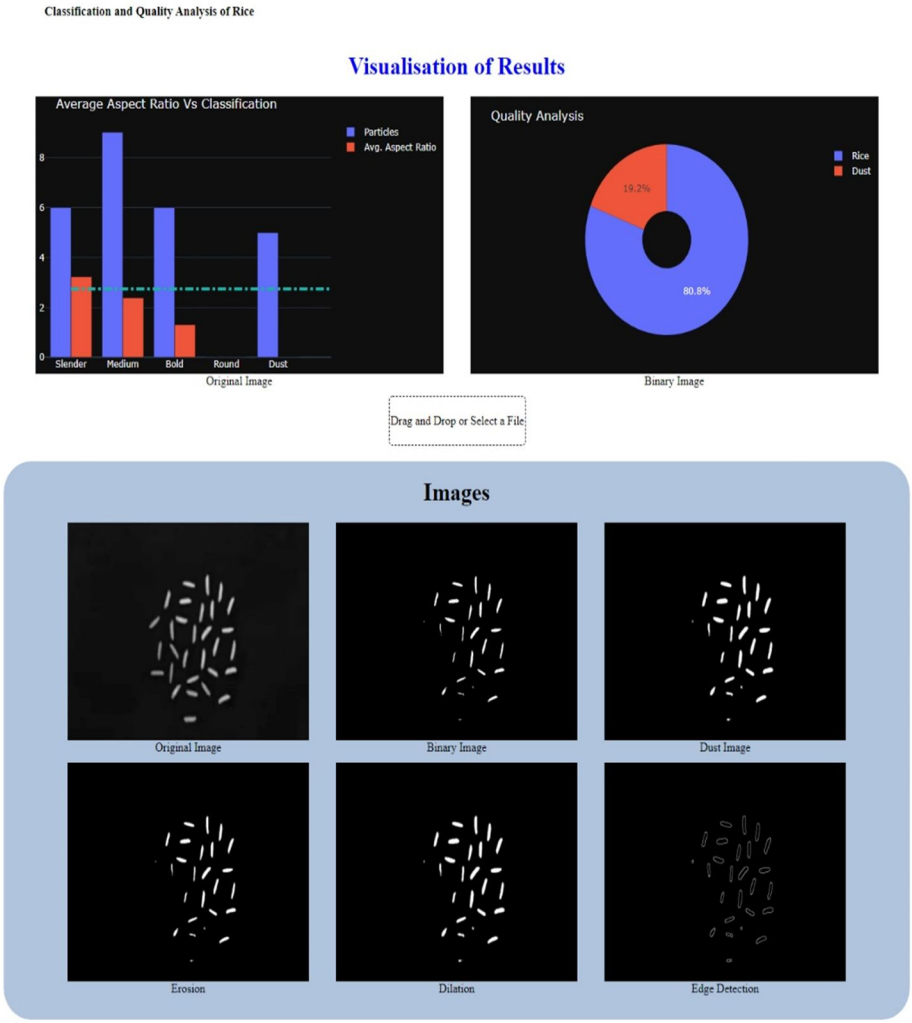


Figure 3.1: Architecture of the Model.

IV. RESULT





In this project, we are classifying the rice grain sample taken into various categories and also analysing its quality based on its aspect ratio, so it is not possible to compare with other works. Existing works only detect the rice grains, or calculate number of rice grains in the given sample but our work helps to analyse the quality of rice sample and classify them into particular category.

Grouped Bar chart – Used for Classification purpose

- Blue Bar indicates the Number of Rice grains.
- Red Bar indicates Average Aspect Ratio.

Pie chart – Used for Quality Analysis purpose

- Blue Section indicates percentage of Rice grains in the given sample.
- Red Section indicates percentage of Dust in the given sample.

V. CONCLUSION

Edge detection is performed to find out the region of boundaries and endpoints of each grain; and then after that using calliper length and breadth can be measured. After getting the values for length and breadth, length-breadth ratio is to be calculated. If the error occurs like touching kernels shrinkage operation works efficiently for separating the connecting part from point touching kernels. By the aspect ratio grain quality analysis is determined. Different types of grain and its varieties are used for the detail analysis of quality products related to the accuracy and efficiency performance. The main benefit of proposed method is it requires minimum time; cost is less and gives better results compared with traditional methods.

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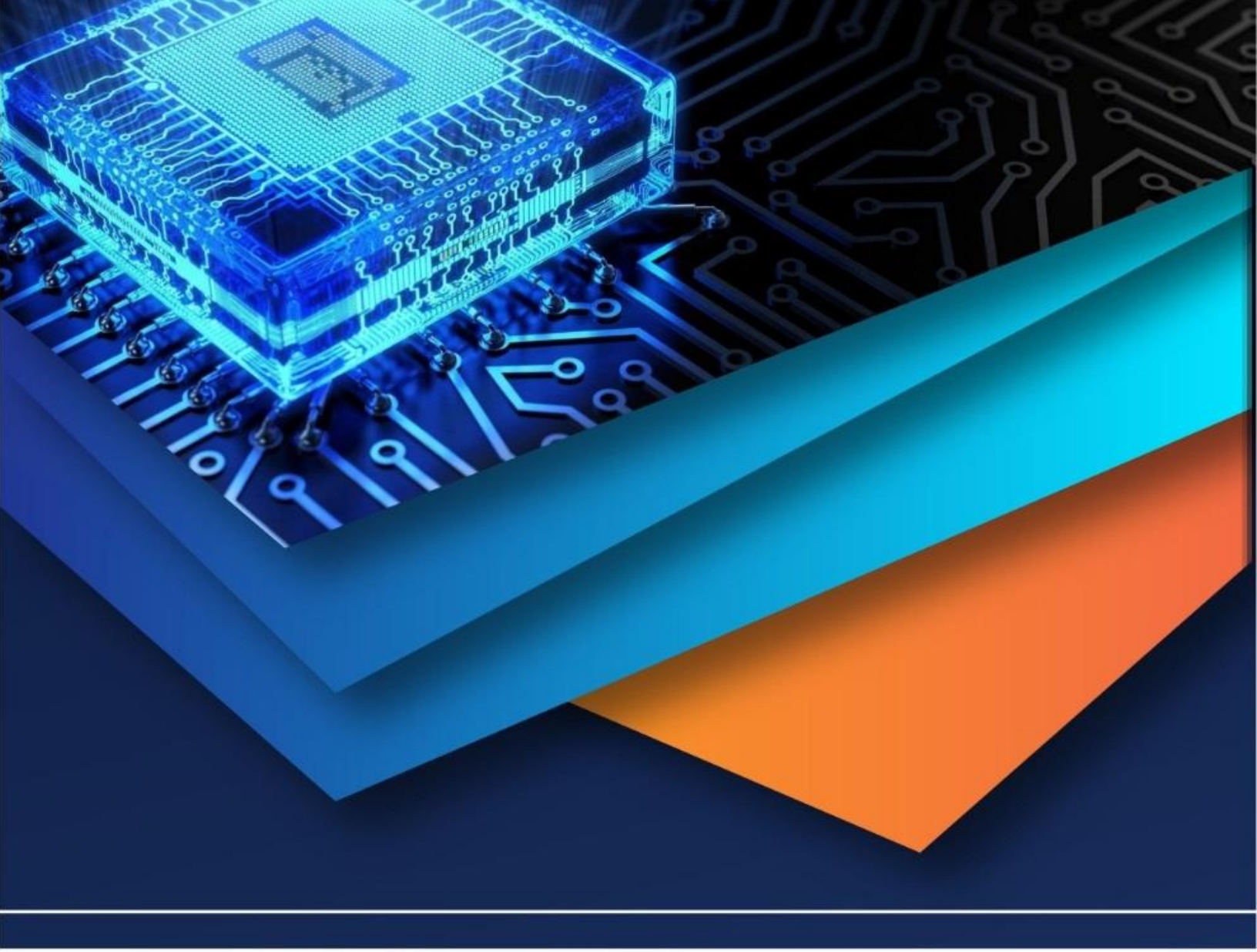
[4] "Vishnu, Devraj, Gunjan Mukherjee, and Arpitam Chatterjee", are proposed "A computer vision approach for grade identification of rice bran." In International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN), pp. 10- 14. IEEE, SEP 2020. Computer visionbased quality analysis. A technique based on PCA and K- mean cluster analysis. Rice bran can be defined as the wastage collected during the rice milling process and can be used for oil manufacturing. On the basis of oil contents there are different types of rice bran e.g. oil contents of boiled rice bran is ranging from (20~26%), and oil contents for raw rice bran are ranging from (16~18%). Disadvantage is Needs quality images and also high processing machines.

[5] "Pratibha, Nikhade, More Hemlata, M. Krunali, and S. T. Khot", are proposed "Analysis and Identification of Rice Granules Using Image Processing and Neural Network." Dept. of Electronics and Telecommunication, Bharati Vidyapeeth's College of Engineering for Women (MAR 2020). System is based on features extraction from rice particles. Features which extracted from image of rice particles are Area, perimeter, major axis, minor axis. Disadvantage is also detects stones with same dimension and colour

[6] "Wan Putri N. W. M. Tahir, Norhaida Hussin, Zaw Zaw Htike and Wai Yan Nyein Naing" ,are proposed "Rice Grading using Image Processing". ARPN Journal of Engineering and Applied Sciences. VOL:10 No 21 PP:1899-1914 MAY(2019). Disadvantage is its accuracy is ineffective.



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