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# Quality of Rice Detection Using Machine Earning

**Malla Guruprasad Reddy[1], Dr. Nisha Charaya[2], and Dr. Ved Prakash[3]**

[1] Student, Electronics and Communication Engineering, Amity University Gurgaon, Haryana, India
[2,3] Assistant Professor, Electronics and Communication Engineering, Amity University Gurgaon, Haryana, India

Correspondence should be addressed to Malla Guruprasad Reddy; gpreddy2526@gmail.com

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**ABSTRACT**- As we all know that rice is the most consumed food by everyone in our day-to-day life. In rice manufacturing industries the market demand always depends on the quality of rice. In verifying the rice quality, the physical dimensions like length, width and thickness plays a crucial role. Normal methods used for detection of these factors are time consuming, and not accurate as they are performed manually. This problem had given the way for development of computerized vision in rice quality detection. In the proposed method both image processing and machine learning techniques are clubbed to analyse and grade the quality of rice kernels with the help of classifiers in python platform.

**KEYWORDS**- Rice quality, Image Processing, Machine learning, Python.

## I. INTRODUCTION

Analysing the quality of rice is one of the vital roles in machine vision. Several researchers suggest that object shape is more information than its appearance properties such is more colour vary between objects instances more than the shape. But it cannot give an accurate result. The main purpose of this method is to offer an alternative way for quality control and to analyse the quality of rice which reduces the required human effort, cost and time. The rice quality plays an important role in the production of agronomic and horticultural crops so identification of the quality of rice is very important. Image processing is a significant and advanced technological area where important developments have been made in tradition the farmers know about.

Industrial Factories converts Rice-paddy into actual Rice but checks Paddy quality using Traditional methods (Hand-held). This method cannot judge the right quality analysis. We can predict it using Deep Learning. Here we make a model using Google's Tensor flow object detection to get the Rice-Paddy rating based on various classifications. In building our model, we use custom tensor flow model which gives output as custom classifiers are Bold, Medium and Slender. The fresh rating is given to the Bold with highest rating and a threshold of 80% have lowest ratings. Usually rice mills classify the paddy into different qualities depending on their need to avoid mistakes.

## II. LITERATURE SURVEY

Rice Sample Segmentation and Classification Using Image Processing and Support Vector Machine Nadeesha Nagoda ; Lochandaka Ranathunga 2021 [2].

Rice is one of the most consuming and important grains for human being in the Asian countries. In the national and international rice markets, milling procedure is evaluated by using quality of the paddy/rice. Therefore, rice quality identification is more important. Rice quality identification is done manually by human inspectors which ensures the accuracy at some extent. But it demands a lot of human power, time consumption and results are subjective. Rice sample might be the combination of full rice, broken rice, damaged rice, paddy, stones and different objects. A rice sample need to divide in to these six or many groups in order to detect the rice quality. This paper provides an approach to divide and classify objects of rice sample by considering the colour and texture features with the help of image processing and machine learning techniques. This method starts with collection of images using good camera. After that Gray scale conversion, noise reduction, binarization, and different operations are applied on the collected images. Contours of the objects are imagined by using contour detection. Watershed algorithm is used for segmentation of touching and overlapping rice seeds. Local Binary Pattern (LBP) texture feature and color features extracted from segmented images. These features are used to detect the rice sample objects using Linear Kernel based SVM [2]. The experiment performed on six rice categories to evaluate the suggested solution. The accuracy of segmentation and classification is 96.0% and 88.0% respectively.

Quality assessment of thai rice kernels using low cost digital image processing system Phuvin Kongsawat; Sorawat Chivapreecha; Tomoaki Sato IEEE 2021.

This paper tells about a reduced cost digital image processing [3] system for quality assessment of Thai rice seeds. Nowadays, Thailand is the one of the top countries which export rice into the world rice market, according to the information of the Rice trader, the export volume is 9,883,288 tons in the year 2016 and export value is 154,434 million baht or 4,401 million dollars. Thai rice quality is controlled by rice department, ministry of commerce Thailand in order to guarantee the quality in market including prices base on grade of rice quality. Hence, the quality assessment of Thai rice kernels is required. Quality assessment or grading of Thai rice kernels usually use manual operation by person in cooperating with equipment called micro meter to measure geometrical features such as length, width, and area of rice kernels. This technique requires more time and also gives less accuracy in the results due to eye fatigue size of rice kernels may be very small. That's y an image processing technique is then used to measure size of Thai rice seeds. The proposed system consists of flatbed scanner and image processing algorithm

which is used to measure of Thai rice seeds. The low cost system for quality detection of Thai rice kernels can be given to Thai rice industry, the certainty of results and speed of quality assessment might be significantly improved.

## III. PROPOSED SYSTEM

The main aim of the suggested work is to introduce an automatic structure to identify and classify rice grains as per the market expectations. To meet this expectation and attain a consistent standard quality some of the physical and chemical characteristics of rice [1] have to be analysed. Here machine vision based approach is employed to recognize, process, extract and classify the rice grains in a non-contact manner. To aid this process image processing [6] and machine learning techniques are utilized by applying python language since it is incorporated with number of packages which are helpful for machine learning [7] tasks. The architecture of the system describes the process involved in this work for proper diagnosis of the rice quality. The important processes involved in this are image processing and image classification techniques. Image processing is vast area and sectioned into many sections and each of these sections are explained in detail in this paper.

### *A. Image Acquisition*

This is the first step in any image processing technique. Different variety of rice are identified and taken as samples and image of these rice kernels are captured by high quality camera system with uniform and adequate light [4]. The rice grain size is most important aspect to predict the class of the rice. So proper placement of rice grains is a key point in this module of image acquisition. The rice is randomly seeded on the plane background and the images are captured [5] . These images are further cropped to ensure that no other objects appear along with the kernels.

### *B. Pre-processing*

The pre-processing procedure is used to obtain a new value for brightness and colour in the output image. The term pre-processing of images comprises the following essential steps:

### *C. Resize*

The images captured by a camera vary in size and it is necessary to create a base size for all images. The word image resizing is used to maximize or minimize the pixels of an image to change its size and this helps in zooming of the picture. When decreasing the size of the image we may lose the data in reconstruction process but it helps in reducing the complexity in network by decreasing the time required for training.

### *D. RGB to Gray*

Gray scale images are the one which displays only grey shade colours as multiple shades of black and white colour .In grey scale, the intensity of each pixel will be 8 bit and the image will show 256 levels of intensity for each pixel. Similarly in color images the shades will be in the combination of Red, Green and Blue each with 8 bits summing to 24 bits and 16,777,216 levels of intensity. Thus to provide minimum information for each pixel, color images are converted into gray scale. This can be done either by average method or weighted method.

### *E. Noise Removal*

Removing of unwanted information which is termed as noise from images is also known as smoothing. Here the noise is getting reduced using the median filter. Median filter is a nonlinear filter and it is used in image processing. It shows a better performance when used over noises like salt and pepper, Gaussian and random noise.

### *F. Image Enhancement*

This method is used to enhance the peculiarity and standard of the original image before it undergoes processing. Using this, the minute details which are visualized in the original image can be interpreted. Hence this operation' s output will be useful in the feature extraction segment for the analysis of the rice quality.

### *G. Image Segmentation*

Usually an image may have some region which is not of importance. So segmentation comes here, where the image is divided into many parts and Region of Interest (ROI) is alone considered. This aids to discover the required objects and boundaries in an image. Segmentation is acquired by many techniques like region based segmentation, edge based segmentation, segmentation by clustering and Mask R – CNN. In this proposed work K – means clustering algorithm is used for segmentation. It is a long distance algorithm which is simple and uncomplicated to understand. Here the image is divided into clusters of similar data points and the ' K' represents number of clusters. The working of this algorithm is shown in the below steps:

Step 1: Initially random no of k clusters are selected.
Step 2: Every data point is allocated to any of the k clusters randomly.
Step 3: Center of the clusters is determined .
Step 4: Distance between the center of each cluster and every data point is calculated.
Step 5: Based on this distance now the data points are assigned to the nearest cluster.
Step 6: Again the center for newly created cluster is calculated.
[Repetition of steps 3 to 6 is done till the center of the cluster remains same].

### *H. System Architecture*

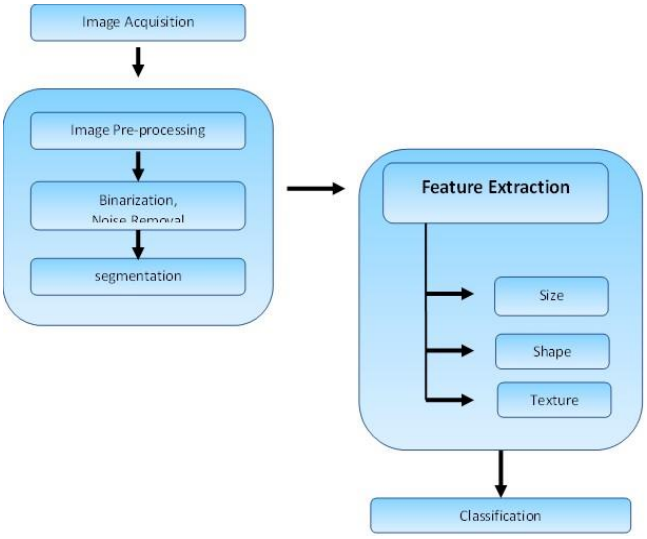


Figure 1: Architecture Diagram

### *I. Image Acquisition*

All the images that are used for the training purpose of the model is the taken from the Kaggle here is the link to that : https://www.kaggle.com/code/mushfirat
Process for predicting the quality of the rice grain:

*1) Sample Image for Prediction*

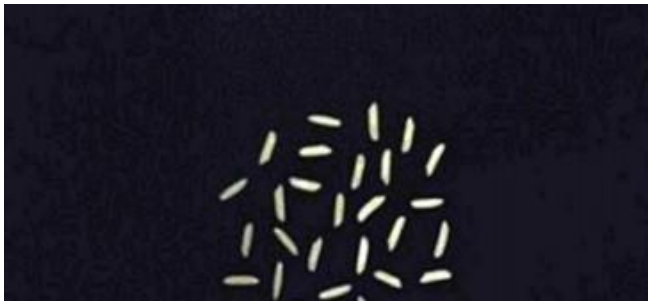

Figure 2: Sample image for prediction

After training the model this is the sample image (Figure 2) using for predicting the quality of the rice grains.

*2) Filtered Image After Noise Removal*

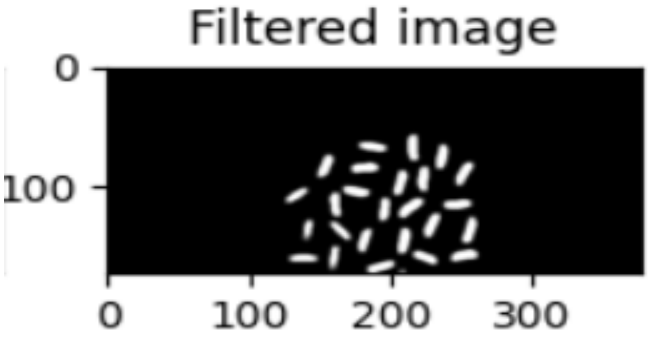


Figure 3: image after filtration

This is how the picture looks like after removal of noise ,resize and image enhancement(Figure 3).

*3) Final Image to get the Edges of the Image*

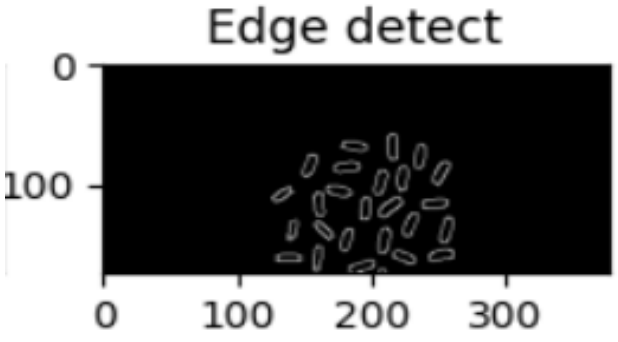


Figure 4: Final image for extracting results

This is the image from where the feature of the grains come out like length by width ratio, edges and size(Figure 4).

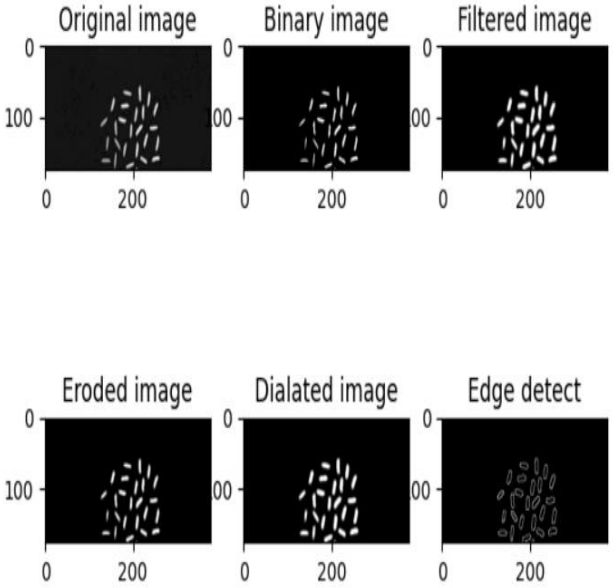


Figure 5: All image processing steps

This picture tells that what all are the steps involved in the whole process step by step (Figure 5).

### *J. Results*

```
No. of rice grains= 26
1.33 (Bold)
1.9 (Bold)
4.0 (Slender)
1.55 (Bold)
2.11 (Medium)
3.5 (Slender)
2.22 (Medium)
2.75 (Medium)
1.14 (Bold)
3.0 (Slender)
2.2 (Medium)
1.91 (Bold)
2.86 (Medium)
1.12 (Bold)
2.86 (Medium)
3.0 (Slender)
1.33 (Bold)
2.11 (Medium)
2.33 (Medium)
3.0 (Slender)
2.38 (Medium)
1.67 (Bold)
1.73 (Bold)
2.62 (Medium)
2.86 (Medium)
3.14 (Slender)
Average Aspect Ratio= 2.33 (Medium)
```

Figure 6: Final results

These are the results (Figure 6) you can notice that there you can find all grains information and it's quality .

## IV. CONCLUSION

The main objective of this project is to develop a model which helps in grading rice grains without labour intensifying work and also in future more data of images can be acquired in future for better results.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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