

# A Review Paper on Grain Quality Analysis Using Edge Detection

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**Abstract** – Grain is very important part in human life. Grain is the leading source of nutrients, vitamins and minerals in human food. In human life food is very important for nourishment and sustenance. Consuming whole grains as part of a healthy diet may reduce the risk of many disease also help in weight management. Sometimes the collections of rice looks so similar that differentiating them becomes a very monotonous and analyzing the grain seeds sample manually take too much time and it is complicated process also it takes more chances of errors. To overcome this problem, the technology (canny edge detection technology) can come for rescue here with the help of MATLAB. In this paper the visual inspection is replaced by the image processing technique and implement a method for grading (full, medium, small) on the basis of grain characteristics (size, weight, length and area).

**Key Words:** Grain quality, Grain characteristics, Image processing, canny edge detection, MATLAB.

## 1. INTRODUCTION

Agriculture is the most important sector of Indian Economy. Indian agriculture sector accounts for approx 18% of India's domestic production and large employment of the countries workforce. India is the world's largest producer of pulses, rice, wheat, spices and spice products. Machine vision and image processing are widely used in biological and agricultural research with the improvement of computer technology and significant reduction of the cost of hardware and software of digital imaging.

When the quality of grains (rice, wheat and pulses etc) measured with micrometer, graphical method and grain shape tester, all these methods are time consuming and some of them are costly. To overcome these limitation image processing techniques is an alternative and best solution [7].

Rice Chalkiness is also observed by naked eyes of an examiner, in which the chances of error. Grain shape is evaluated with length, width and ratio of length and width of rice grains. At present, the length and width of rice grains are usually measured by an inspector using a ruler or a micrometer. For measuring quality of grain sample, examiner needs to get few seeds from sample and do the analysis. Rice chalkiness is also estimated by the naked eyes of an inspector. The results from different examiners or inexperienced inspectors may vary at an unacceptable range. So it is a neither objective nor efficient way in evaluating rice appearance quality relying upon manual method [2]. Many researchers are working to provide good quality of grains in agricultural industry. In a system to achieve uniform standard quality and precision, machine vision based

techniques. This paper obtained all physical features and graded the rice grains using canny edge detection. The image processing algorithm is applied on the grain samples through MATLAB. The classification has been done according to colour, shape and size. It results good, bad and medium quality by using Neural Network classifier. Number of researcher around the world working in the field of grain seeds quality inspection but still there are a large number of scopes to carry out further study of materials in this field. These exploration depends on different morphological, textural and colour features for categorizing of seeds. This proposal is mainly included in machine vision. Machine vision is the technology and methods used to provide imaging-based automatic inspection and analysis [4]. One of the method that determine the length of Thai rice kernels efficiently and also use low-cost equipment in order to assess the grade of Thai rice kernels. The time processing of this method saves more time about sixtyfold when compare to the manual analysis and also has stability than manual analysis [1].

### 1.1 What is edge detection?

Edge detection is one of the most critical and hot topic for digital image. Edge detection is an image processing technique for determine the boundaries of objects with images. Edge detection removes unnecessary information in the image, at the same time preserving the important structural properties in an image. Common edge detection algorithms include Sobel, Canny, Prewitt, Roberts and Fuzzy logic methods. In this paper, canny edge detection method is used to grade the rice grain. Canny is most powerful edge-detection. The canny method differs from other edge-detection methods in that it uses two different thresholds (to detect strong and weak edges), and includes the weak edges in the output only if they are connected to strong edges. The main objectives of the canny edge detection [5]:

- Low error rate: The number of chances of analysing all edge points should be found, with a minimum of spurious response.
- Localization: The detected edges should be as close as possible to the true edge points.
- Number of response: Only one should be detected for each real edge point.

### 1.2 Importance of Edge Detection in Image Processing

Edge detection is a basic and important tool in the main area of image processing such as feature detection and feature extraction. In an image processing, to detect the edges of

image is very difficult and time consuming especially when an image is corrupted by noise. Edges define the boundaries between the regions in an image, which help with segmentation and object recognition. Edge detection is used for image segmentation and data extraction in area such as image processing computer vision and machine vision.

## 2. RELATED WORK

Many researchers are worked in image processing to determine the quality of grain seeds by using different-different algorithms on the basis of size, colour, length, width and weight. The related researches of quality of grain seeds as below:

**N.A Kuchekar and V.V. Yerigeri, 2018** discussed the quality of grain sample manually is more time consuming and some of them are costly. To overcome this problem, they obtained all physical features (size, shape, bulk density and whiteness) and graded the rice grains using canny edge detection. This paper proposed a method for grading (full, medium and small) and identification of different varieties of rice grains by extracting the features of the grain such as colour, length, shape and texture properties from the images obtained from flat bed scanning of gains by using digital image processing technique. In this paper an attempt is made to grading of rice grains based on morphological techniques using image processing.

**Deepika Sharma and Sharad D. Sawant, 2017** proposed a system that worked on wheat and rice samples to test the quality. The image processing algorithm is applied on the grain samples through MATLAB. The databases of hundred images are trained for classification. The classification has been done with the help of NN classifier.

**Bhagyashree Mahale and Sapana korde, 2014** proposed a method for rice quality analysis which minimizes the required time and cost by using image processing. The paper presents a solution of grading and evolution of rice grains on the basis of grain size and shape using image processing techniques. They used edge detection algorithm to find out the region of boundaries of each grain seeds.

**Zahida Parveen, Dr. Muhammad Anzar Alam and Hina Shakir, 2017** proposed an image processing algorithm to grade the rice on the basis of length, width, area and area of chalky and also worked on the colour detection on the rice grain. They worked on image processing technique by using extended maxima operator to detect the dimensions in the rice.

**Shraddha N. Shahane and S.D. Sawant, 2016** proposed a system that assesses the food grain (wheat) quality using image processing. It is proposed to work at ration shop to avoid the distribution of low quality grain. The visual inspection for quality assessment is replaced by image processing technique on the basis of grain size, area, major axis length, minor axis length and parameter.

**Ece Olcay Gunes, Sercan Aygun and Murvet, 2014** proposed a method to determine the wheat seeds grown in Turkey by using image analysis techniques and developing a fully automatic grain type and variety identification system. This paper based on texture analysis Gray Level Co-

occurrence Matrix (GLCM) and Linear Binary Pattern (LBP) method.

## 3. OBJECTIVE OF STUDY

- To analyse the importance of image processing in assessing quality of grain seeds.
- To analyse percentage quality of grain seeds sample.

## 4. PROPOSED METHODOLOGY & CLASSIFICATION

The quality of good rice much contains same shape, same weight, same chalky area, grain length, aroma and stickiness. Digital Image Processing Techniques are used in MATLAB. The first step is to create a background approximation image for that, by using morphological opening and remove the entire foreground. [2]. Edge detection in color image is more challenging than edge detection in gray color. Once the image is captured by camera and is given as an input, it is processed in MATLAB and image processing algorithm is applied on it giving the results according to trained database [4].

- Firstly capture the image of rice grains.
- Pre-processing the image of grains to remove background noise by image subtraction.
- Enhance the image by using Gaussian filtering for removing noise
- Apply canny edge algorithm

The classification of rice can be measured with the rice length and length-breath ratios depending on grains are classified as slender, medium, bold and round which decides shape of that grain [7].

Grain quality is important factor in whole world. For the purpose of import or export of any food grains, its quality analysis should be done. For exportation purpose, while analyzing quality of grains there are some standard database which has to be satisfied by each variety of grain. But the detection of grains done by manually takes too much time to overcome these problem be designed new and developed techniques are to be designed [10]. The quality of grain seeds can be checked with the help of dial micrometer and shape tester, this is the traditional method. Dial micrometer and grain shape tester is used to measure length and breadth of single grains. The outcome of this analysis is also relative, time consuming, having variable results and costly. So it 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 [8].

## 5. IMPLEMENTATION AND RESULTS

The image analysis algorithms are implemented on image in which rice grains are randomly placed and spread in one layer. From the output, it is concluded that some rice are good on the basis of their length, width some are good in quality on the basis of their area and chalky [3]. In this study, the quality analysis of rice grains can be improved by using grain parameters like Major Axis Length and Minor Axis

Length. The Grains parameter can be calculated with the help of MATLAB 17a tool for each and every grain is selected sample images. The classification of grains can be observed with the help of size i.e. normal, long and small rice grains [2].

## 6. CONCLUSIONS

After analyzing the research work done by various researchers in the field of quality inspection of grain seeds (rice and wheat) varieties and applications of Image research in agricultural industry, the conclusion is that the image processing technique has potential to become a vital component of automated food processing operation. In this paper an attempt is made to grading of rice grains based on morphological techniques using image processing. Based on the length of grain the rice is graded. Image analysis based on texture, morphology and grains. The results are found to be encouraging also it is reliable and less time consuming.

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