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# QUALITY DETECTION OF RICE USING IMAGE PROCESSING

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***Abstract -*** India mainly depends on agriculture but agriculture field is the least explored area in image processing. The important parameters farmer's consider in agriculture sector are yield and quality of product. Quality is one of the most important parameter which is considered in all fields. Quality of food product is based on its physical and chemical properties. But in Food Corporation Of India they are using the oldest method called sieving which is manually done by quality controller and human inspector which is time consuming which gives varying result, less accurate. This paper proposes new method with a high degree of quality detection of rice based on combined measurements using image processing.

***Keywords -*** Rice Quality,Machine Vision,ISFE Edge Algorithm

## I. Introduction

Quality is a key factor for modern food industry because the high-quality of product is the basis for success in today's highly competitive market. The agricultural industry is probably too oldest and most widespread industry in the world. In India to overcome the need of ever-increasing population it is necessary to make advancement in agricultural industry. Due to automation need of high quality and safety standards achieved with accurate, fast and cost effective quality determination of agricultural products.

Quality control is of major importance in the food industry because after harvesting, based on quality parameter a food product has been sorted and graded indifferent grades. Traditionally quality of food product is defined from its physical and chemical properties by human sensory panel which is time consuming, may be varying results and costly. Quality inspection by humans is neither objective nor proficient because the results, sometimes, may not be reliable due to human errors or in experienced technicians. Therefore a quick and more reliable rice quality evaluation system is need as human sensory panel defines different parameters and for assessing quality based on that it is necessary to discover non destructive, accurate and rapid methods.

Now in Food Corporation of India they are using sieving method to check the quality of rice, which is done by human inspectors.

Machine vision is one of the important advanced technological field where significant developments have been made. Machine vision attempts to impersonate sensory perception of human beings viz. vision, touch, smell, taste, hearing etc. Efforts are being geared towards he replacement of traditional human sensory panel with automated systems, as human operations are inconsistent and less efficient . Scientists have successfully endowed computers with machine vision by digital cameras and machines. Extreme research is in progress all over the country on application of electronic eye and nose in food, beverage and agricultural industry.

This paper presents a solution to the problem faced by Indian Rice industry. Section 2 discusses the Particular problem of quality evaluation of Rice. Section 3 talks about the proposed approach for calculating parameters for the quality of rice seeds .The proposed system and proposed algorithm for computing Rice seeds with long seed as well as small seed being present in the sample is also discussed in the same section. Section 4 discusses results based on quality analysis. Section 5 provides the conclusion of the proposed process.

## II. Problem Defination

In agricultural industry quality assessment of product is main problem. Traditionally quality of food product is defined from its physical and chemical properties by human sensory panel which is time consuming, may be varying results and costly.

**Existing system:**

Traditionally quality of food product is defined from its physical and chemical properties by human sensory panel which is time consuming, may be varying results and costly. Traditional human sensory panel, as human operations are inconsistent and less efficient

## III. Proposed Approach

Machine vision is one of the important advanced technological field where significant developments have been made. Machine vision is a immediate, financially viable, steady and objective inspection and evaluation technique which makes available one alternative for an automated, non-destructive and cost effective technique.

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Machine vision systems for grain identification have been used under the controlled conditions of a laboratory

Image processing techniques have been applied increasingly for food quality evaluation in recent years.

Recently advances in image processing techniques for food quality evaluation, which include charge coupled device camera, ultrasound, magnetic resonance imaging, computed tomography, and electrical tomography for image acquisition; pixel and local pre-processing approaches for image pre-processing; thresholding based, gradient-based, region-based, and classification based methods for image segmentation; size, shape, colour, and texture features for object measurement; and statistical, fuzzy logic, and neural network methods for classification.

Image processing- a non invasive technique was used to evaluate the quality of the tomato on the basis of colour, shape, size, firmness. Many techniques such as invasive and non invasive, destructive and non destructive were reviewed. Image Processing techniques such as segmentation, Pattern recognition, Gray scale, Excess green, etc. were also reviewed with a conclusion that image processing is effective, fast measurement method and close to laboratory testing.

Computer vision is the technology for construction of explicit and meaningful descriptions of physical objects from images of that object .Computer vision is both better and worse than human vision. Perhaps the biggest gain of computer vision is its capability to be objective and unfailing over long periods.

**Operating procedure**

Spread the seeds uniformly on the tray of the flat bed scanner which consists of camera (isomorphic or orthogonal type). Capture the image of the rice seeds using camera. After this process and analyse the digital image in computer. Then display the number of normal seeds, long seeds, and small rice seeds. Repeat the above Steps for 10 to 15 samples.

**Proposed algorithm to detect rice seeds**

According to our proposed algorithm first capture image of sample spread on the tray using camera.

1. Select the region of interest of the rice seeds. 2. Convert the RGB image to gray images 3.Apply the edge.

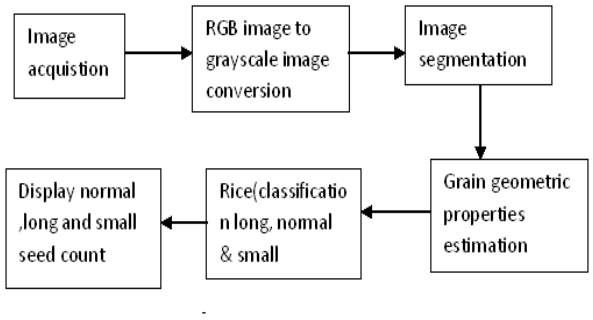


Figure: Block diagram of proposed methodology to detect the quality of rice

Detection operation.4 Calculate the parameters of the rice seeds. 5 Compute the histogram of the parameters of rice seeds and find out the threshold ranges. 6 Display the count of normal, long and small rice seeds on screen.

The image colour is converted to gray scale image as the colour information is not of importance. The identification of objects within an image is a very difficult task. One way to make straightforward the problem is to use optimal edge detector, ISEF, for extracting edges of gray scale image. This phase identifies individual object boundaries and marks the centre of each object for further processing. Thresholding is used to convert the segmented image to a binary image. The output binary image has values of 1 (White areas) for all pixels and 0(black) for all other pixels.

**ISFE edge detection**

The edge can be detected by any of template based edge detector but Shen-Castan Infinite symmetric exponential filter based edge detector is an optimal edge detector like canny edge detector which gives optimal filtered image.

First the whole image will be filtered by the recursive ISEF filter in X direction and in Y direction. Then the Laplacian image can be approximated by subtracting the filtered image from the original image. For thinning purpose apply non maxima suppression as it is used in canny for false zero crossing. The gradient at the edge pixel is either a maximum or a minimum. Now gradient applied image has been thinned, and the problem of Streaking can be eliminated by thresholding with Hysteresis. Finally thinning is applied to make edge of single pixel.

**Parameter calculation**

Here four parameters should be extracted: area, major axis, minor axis length and eccentricity for differentiating normal rice seed from long seed as well as small seed. “The area A of any object in an image is defined by the total number of pixels enclosed by the

boundary of the object." "The major axis length N of an image is defined as the length (in pixels) of the major axis of the ellipse that has the same normalized second central moments as the region. The minor axis length

M of an image is defined as the length (in pixels) of the minor axis of the ellipse that has the same normalized moments as the region." "The eccentricity is the ratio of the distance between the foci of the ellipse and its major axis length. The value is between 0 and

1. For Area calculation, we define area of a normal seed is **A**, area of long seed is **B** and area of small seed is **C**. Area **A** is having a normally less value then area B and area **C** is having a less value than area **A**. Use of Verniercaliper for quality evaluation by human inspector can be replaced by Major axis, Minor axis calculation. For eccentricity calculation along seed is having bigger value than the normal seed and small seed.

## IV. Result

In this section classification of rice seed is to be done based on geometric properties like area, major axis, minor axis and eccentricity and histogram of these

Geometric properties are to be done. Based on these properties and histogram rice seeds are separated as normal seeds, long seeds, small seeds among the samples. Next these results should be compared with the results calculated based on Human Sensory Panel for normal seeds, long seeds, and small seeds of various samples. For finding the number of normal rice seeds, long rice seeds and small rice seeds, threshold values using histogram should be computed. Based on these threshold values quality of rice can be detected.

## V. Conclusion

This paper illustrates new method, which is non destructive for quality analysis. This paper present a quality analysis of Basmati rice seeds via image analysis. Here area, major axis length, minor axis length and eccentricity are calculated for counting normal seed and foreign element in terms of long as well as small seed for a given sample. Traditionally quality evaluation and assessment is done by human sensory panel which is time consuming, may be variation in results and costly.

For quality analysis, more parameters can be calculated to make results that are more accurate. By using soft computing classification can be possible for any unknown sample.

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