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A Survey on Rice Quality Analysis and Classification Using Image Processing Techniques

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ABSTRACT

More than half the world's people consume rice every day and fulfills over 21% calorific requirement of world population. It is considered the whole grain which is rich in fiber and it contains 80 percent with protein, phosphorus, and potassium. There are hundreds of different varieties of rice and each rice grain has a unique shape, texture, and flavor that make it just right for certain dishes. The quality of rice between various types has different standards. Therefore, you must select the best quality rice because rice with best quality is not only good for consumption but also good for health. Analyzing grain sample manually is a tedious task and also time consuming. The paper presents the solution to analysis and grading of rice grains using image processing techniques. Image reduction, image enhancement, and image increment, object recognition in spatial domain is applied on grain by grain of different samples of rice to determine its size, color and quality as whole to grade the grain of rice. We find the endpoints of each grains and after we measure the length and breadth of rice grains.

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I. INTRODUCTION

Quality can be defined as the combined features and characteristics of a product or service to satisfy stated or implied needs. Grain quality is a combination of many factors such as smell (aroma), size, cooking characteristics, color, nutritional value and percent whole grains. In the rice market, key determinant of milled rice is quality. The quality measurement becomes more important with the import and export trade.

Rice samples contain different dispensable objects like paddy, chaff, damaged grains, weed seeds, stones etc. Rice quality is varying according to these impurity content. Rice grain shape is evaluated with length, width, and the 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. But for measuring length and width of even few seeds, by placing them in one grain tray and measure the length and width of each seed one by one, is very tedious task and takes lots of time.



Fig 1. Original Resized Image of basmati rice

A. Motivation

The main purpose of the proposed method is, to offer an alternative way for quality control and analysis which reduce the required effort, cost and time. Image processing is significant and advanced technological area where important developments have been made. Image processing manipulates image for performing some operations on targeted image to get an improved and desirable image. And extort some valuable information from input image. Nowadays, image processing is hastily growing technologies. All types of data have to go through three general phases while using DIP technique which are preprocessing, enhancement, and display, information extraction. India is enforcing the use of rice grain standards to ensure that producers get paid maximum value for their grain according to the quality of the grain. The analysis of

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grain type, grading and their quality attributes is still performed manually by skilled personnel. This method is prone to many problems such as (i) It is highly subjective and is influenced by human factors and working conditions (ii) Human perception can easily be influenced by external factors that results in inconsistent results (iii) The rate of cleaning and recovery of salvages is limited. This may be overcome using computer vision based techniques to analyze images [1]. Digital image processing is the method of using computer algorithms to perform image processing on digital images, which are very fast, efficient and cost effective.

B. Problem Definition and Objectives

The objective of the project is to detect the quality of rice efficiently. The project is aimed to reduce the efforts, costs and time. Here the system must perform the following: • Use of image processing algorithms to analyse grains quality by its size and shape. • To analysis and classify the quality of rice grains.

II. LITERATURE SURVEY

[1] "Assessment of quality of rice grain using optical and image processing technique." 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.

Merit: It only requires deep knowledge in the subject like machine learning techniques.

Demerit: Proposed algorithm's time complexity is high.

[2] "Low Cost Solution for Rice quality analysis using Morphological parameters and its comparison with Standard measurements." 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%

Merit: Automatic classification and grading of rice based on its nutrient contents.

Demerit: Only based on nutrient content.

[3] "Analysis and Identification of Rice Granules Using Image Processing and Neural Network." Neural Network Pattern Recognition Tool System is based on features extraction from rice particles. Features which extracted from image of rice particles are Area, perimeter, major axis, minor axis.

Merit: Algorithm is light weighted and more efficient in terms of time complexity.

Demerit: Also detects stones with same dimension and colour.

[4] "A computer vision approach for grade identification of rice grain." Computer vision-based 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%.

Merit: Uses Neural networks. So, it can be more precise under difficult circumstances.

Demerit: Needs quality images and also high processing machines.



Fig 2. System architecture

The work finds application in grain handling operations at Agriculture Produce Market Committee (APMC), which is an important organization that deals with farmers, produce, measures quality and finally values the produce. Different food grains like wheat, horse gram, corn and rice are considered in the study. Considering example of rice, rice is one of the most important cereal grain crops. The quality of rice has distinct effect on the yield of rice, so the proper inspection of rice quality is very important. During grain handling operations, information on grain type and grain quality is required at several stages before the next course of operation can be determined and performed. The varietals purity is one of the factors whose inspection is more difficult and more complicated than that of other factors. In the present grain handling system, grain type and quality are rapidly assessed by visual inspection. This evaluation process is, however, tedious and time consuming. The decision-making capabilities of a grain inspector can be seriously affected by his/her physical condition such as fatigue and eyesight, mental state caused by biases and work pressure, and working conditions such as improper lighting, climate, etc. Hence, these tasks require automation and develop imaging systems that can be helpful to identify rice grain images, rectify it & then being analysed.

IV. CONCLUSION

The image analysis algorithms are applied on image in which rice grains are randomly placed and spread in one layer. If the error occurs like touching kernels shrinkage operation works efficiently for separating the connecting part from point touching kernels. 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 www.ierjournal.org

calculated. In this study, the image processing algorithms are developed to segment and identify rice grains. use of image processing algorithm is an efficient method to analyse grains quality by its size. The main benefit of proposed method is it requires minimum time; cost is less and gives better results compared with manual results or traditional methods. We have successfully executed all the steps proposed. Last two steps include calculating the size of the grains and then classifying them according to the Table provided. Here we conclude that grading of rice can effectively be done by using the image processing techniques. With our coding we can calculate that how pure is our sample. The setup used is also very common and easily available. This is also more accurate than the human visual inspection. All this leads to better quality in food processing by image processing.

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