

Grading of Rice Quality by Chalky area analysis Using Simple Digital Image Processing Techniques

S.Durai¹, M.Thanjai Vadivel², T.Sujithra³

¹ duraitrichy@gmail.com, ² thanjaivadivel@gmail.com, ³
sujimecse@gmail.com

Department of Computer Science and Engineering,

Veltech Dr.RR & Dr.SR University,

#42 Avadi-Vel Tech Road, Avadi, Chennai – 600062,

Tamil Nadu, India

Abstract

In the modern world all are busy with their works even we don't have time for analyzing and considering our food materials. Most educated and those who are living in urban areas they blindly believe with the branded names. Even though the originality of Brand is there but considering commercial the same brand duplicates available with markets. There is no 100 percent assurance of quality. In South India rice is the major Food source, but we don't know the purchased rice baggage is worth for the quality and money. Because we don't know the mechanism of checking the quality of rice and for the fast world we are not ready for that also. But in village side, the experienced people can easily analyse it manually, it is good only but there is no accuracy as well as time consuming, it depends upon the person. Here for that case we are going to use image processing technique. By considering the chalky area of rice we can say all rice in the baggage is same variety or some mixed is there. In future we apply this technique to classify the rice as well as grading them.

Keywords: Rice quality, Grading System, Chalky area finding, Rice grading.

Introduction

Our present life situation in the world is very hurried as well as there is no time to take care of our health. In the recent survey most disease caused only because of the food habit. The Indian most famous proverb is food is the solution of the disease but now tablets and syrups are becomes food. This is only happens because of we don't know how to choose the food materials. Even though we care about our food but we don't know how to analyze it such that whether it contains the good quality as they promised. The one solution is that, each state government they have food quality analyze council, they randomly checking the food materials which are available in market but the checking also not frequent. So there are lot of chances for the duplicate products and low quality things. On the other side the only solution the branded name, because of the branded name we blindly go for the product. Because they have some quality certificates like ISO, ISI etc.

Even they have the certificates due to the lack of awareness in the society about the brand. The same brand product is available in market with low quality. So there is no promising of brand quality. So what is the solution for that? The simple answer we know that we must depends on our ancestors who know agriculture. But unfortunately in most of the families we missed old and experienced people. In village side the former people can easily find the quality of most of the food products. But they are doing it by manually by taking number of multiple samples, even though their results are satisfactory but the results there is no 100 percent accuracy as well as taking lot of time.

Agriculture is the major job and the basic job in India. But now it's quickly vanishing because of no resources as well as there is no correct value of the product which the formers cultivating. So most of the formers give up agriculture. And they sold their agricultural lands to real estate business people and moved to cities for other work. So ultimately the food product cultivation decreased, so we need to import those from other countries. Due to the import and less productivity it will increase the price of food products. But people are expecting food products with low price, but sellers cannot do this, so simply they mixing cheap products. Without knowing the quality of products the buyers consumes it.

In south India rice is the major food source and most of the food varieties are only depends rice like they named it meals, briyani, idly, dosa, pongal, etc.. So there is a huge demand for the rice in south india but most cheap and low rated rice varieties are sold in markets. A good quality rice must contains same shape, same weight , same chalky area, grain length, stickness and aroma.Usually for measuring rice length and breadth , we need to use vernier calliper.But it is very time consuming and measuring more number of sample values not possible. Here we are going to analyze the chalky area of the rice grains by using Digital Image Processing Techniques.

Bhagyashree Mahale, Prof. Sapana Korde proposed methodology to analyze the quality of rice by considering its length and breadth ratio values. They used Lab view software to implement their ideas and techniques. They got their results as expected but the samples they took is less because of labelling the rice objects in the image as well as for each rice length and breadth scales . So it gives overhead for the system. As well as their results depends on the data collected from other research centres. And they simply proved that we can use Image Processing methodology to analyze the quality of rice.

Vidya Patil, V. S. Malemath proposed analysis the quality of rice and Rice grading for Grain Images. They extracted the geometric features such as major axis, minor axis and area of rice objects in the image. And they perform quality analysis of rice using the average values of the features. And finally they classify the sample for the Type and grade based on the analysis like rice variety name and the accuracy percentage.

Proposed Methodology

A good quality rice must contains same shape, same weight, same chalky area, grain length, stickness and aroma. Here we are going to analyze the chalky area of the rice grains by using Digital Image Processing Techniques. For calculating the chalky area of rice, in matlab already predefined functions are there, here we just going to use it for our work. Before we going to start our work, for all digital image processing we need to do the following flow.

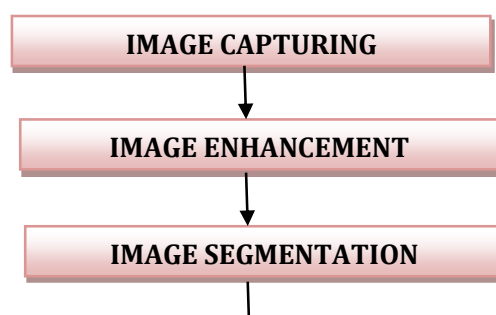


Fig 1.0 Image Preprocessing Steps

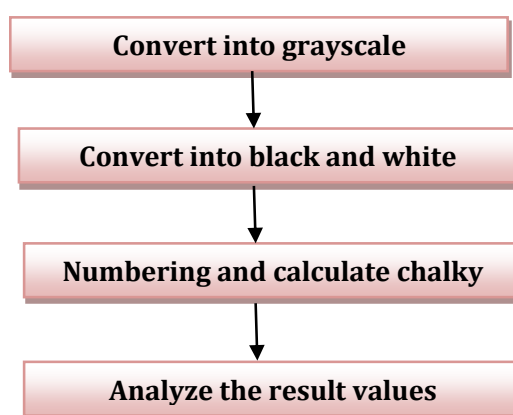


Fig 2.0 Processing and Analyze the Image

A. Image Pre-processing

In Digital Image Processing before processing any image some pre-processing steps

are there. For getting the input image we used scanner and saved image as jpeg file, there are different number of samples which contains minimum of 50 and maximum of 100 rice objects were taken and stored it for analysing. Because for analysing rice baggage, one sample will not decide the quality. So we took five samples.

Fig 1.0 shows Image Pre-processing steps any Image in Digital Image Processing. The first step is we need to create a background approximation image for that, by using morphological opening we must remove all the foreground. The opening operation has the effect of removing objects that cannot completely contain the structuring element. For good result we enhance the image by using Histogram equalization, wiener filter, Linear contrast adjustment, Median filtering Unsharp mask filtering were applied. After Applying all the above said methods applied we got quality image, now the image is ready for the next major part called Processing and Analyzing the pre-processed image it shown in fig 2.0.



Fig 3.0 original input image



Fig 4.0 Pre-processed image

In the above fig 3.0 is our original input image, and Fig 4.0 is the enhanced and pre-processed image. After applying equalization, wiener filter, Linear contrast adjustment, Median filtering Unsharp mask filtering we got the high quality image. Now it is ready for the next major part.

A. Processing and Analyze the Result

For getting the chalky area of the rice grain the image must be in black and white, so we must convert the RGB image into black and white. For that we cannot directly convert into black and white, first we need to convert our original image (RGB) into gray scale image then convert into black and white (Binary image). Fig 3.0 Shows the converted binary image for Fig 3.0.

Still if any noise is there with the image, check it with draw histogram of the binary image then remove that by using `bwareaopen()` function in matlab software. Then we find the number of connected components in the converted image. Finally we create one 2-D matrix which contains all the areas of rice grains nothing but white area in the image.



Fig 5.0 Binary image

B. Grading policy

After getting the chalky area of rice, we need to classify the areas with respect to range. Based upon the area generated from the matlab we draw chart. Fig 6.0 shows the graph for the taken sample. For the taken input we took totally 68 rice grains in the image. Out of 68 the major chalky areas are in the range 401-500 , 301-400 and 501-700. When come to analyze the rice quality, we already got the exact chalky area of particular variety from the agricultural research centre, based upon that area we come to giving grading for the taken sample. But we assign the grade for the single image sample, we need to take more number of samples and come to the decision for that quality.

$$SAP = (TRV/TG)*100$$

SAP - **Similarity Area Percentage**
TRV - **Total Number of Rice obtained in the Range of Variety**
FCA - **Total Number of Grains in the sample**

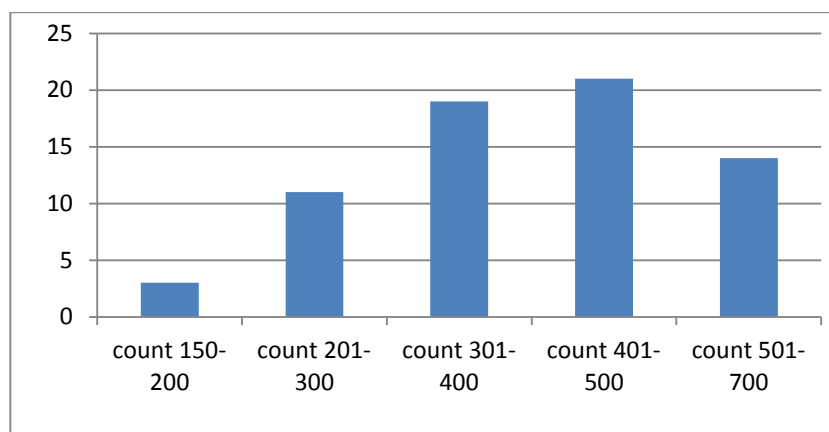


Fig 6.0 Range VS Count analysis chart

For Our example taken sample,

$$\begin{aligned}\text{SAP} &= 40 / 68 * 100 \\ &= 59 \%\end{aligned}$$

For the above taken sample we got 59 % of similarity area, like that we need to calculate for the different number of samples we took. And finally we need to find the average of samples SAP % and provide the grade regarding percentage of similarity we obtained. For our example we keep the grading policy by following.

Above 95 %	-	First class
75 % to 94 %	-	Second Class
Others	-	Third Class

CONCLUSION AND FUTURE ENHANCEMENT

This proposed methodology is a simple and time efficient and we got 90 percentages of accuracy results when compared to the manual analysis of grain quality. Here we took only the chalky area of rice for grading. By considering the chalky area of rice we can say all rice in the baggage is same variety or some mixed is there. For the taken samples we got the expected results when compared to other classical analysis methods. In future we are going to apply the same technique to classify the rice variety also, and we will give the verity.

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