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RICE GRAIN QUALITY DETECTION USING MACHINE LEARNING

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***Abstract*— Classification of rice grains is important for human beings as it directly impacts the human health. Rice is one of staple food in some of the continents like Asia, provides most of the carbohydrates in their food diet. Around 90% of the Asian countries prefer rice as their major food, whose demand and economical aspects are increasing day by day which is to be considered. 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. The accurate identification of rice seeds is very important when classifying rise verities. The identification of the level of purity of rice varieties makes the identification task more difficult and complicated. Commercia value, genetic characteristics and quality depend on the rice variety type. The gradeand price of rice is decided by these factors. However, even a trained human can perform quality examinationonly on a few known rice varieties. Hence there is a great need to measure a quality of grain and identifying adulteration and analyzing the grain sample manually is more time consuming and complicated process, and having more chances of errors with the subjectivity of human perception. In order to achieve uniform standard quality and precision, machine learning techniques are evolved. Rice quality is nothing but the combination of physical and chemicalcharacteristics. Grain size and shape, and color are some physical characteristics. This paper obtained all physical features and classification of the rice grains using SVM and CNN. By implementing these two and comparing both SVM and CNN outputs and identifying which technique will perform the classification efficiently.**

***Keywords*— Supervised Machine Learning Techniques, Support Vector Machine, Thresholding, edge detection, Morphological process, delineation process**

1.INTRODUCTION

Devices based food item processing in a country like India is an fascinating concept. India is known to be the country of the villages. The Indian villages people are mainly depend on the profession of the basic agriculture and production of the food items. The purity of grains is the most important factor whose inspection is difficult and complicated than the other factors. In the grain handling system, grain type and quality are rapidly measured by visual examination. Hence, for this the required automation and development systems that are useful to identify grain images, correct it & then being evaluated. The samples examined were from existing standards for rice length, area and aspect ratio features.

Digital image processing comes handy in this process, Digital image processing is an expanding area dynamically in our daily life such as space medical, authorization, exploration, automation industry, surveillance and many more areas of expertise. However, subjective evaluation is usually inconvenient, expensive and time-consuming. At present lot of efforts were made to develop objective image quality metrics that correlate with perceived quality.

We have carried out the experiment of grains detection based on the shape, size and color based components. We have the images are initially trained to get the image properties. The image properties are later used for the recognition. The food grains images are classified by using the SVM algorithms.

2. ABOUT THE PROPOSED WORK

2.1 Literature Survey

Nowadays human deals with the health problems, the cause of these issues are the lifestyle adopted by the human and also mainly food consumption. Many of the doctors suggest a particular food diet plan to the user. The need of the consumption of the suggested food items will increase the total health of the human and also it will increase the user knowledge regarding the diet of the individual. So taking the cause we have developed the project which will be benefited to most of the people around the globe.

In the paper published with title, it explains about the classification of rice grains by using the edge detection. In this the image consists several grains are taken on the sheet or a flat surface and are applied to the edge detection and identified the objects present in the image. For each object the texture features are identified and classified based on threshold values. In that

paper, it only explains about the classification of objects based on shape and detects the edges of each grain. They also categorized the grains based on their length and width. They categorized into five types based on their features and are classified and also calculated the parameters like area, l/b ratio, width, etc.

They also considered the input image consists of White and Red color grains of different shapes. They classified the image using histogram image processing and classified the image into two different classes. Individually each class is applied to the histogram processing and observed the output.

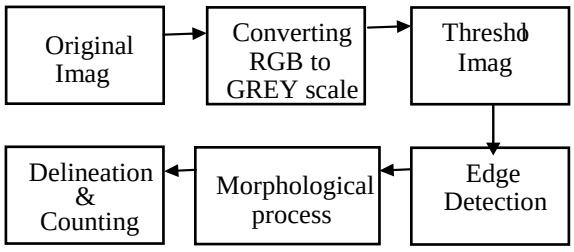
The previous paper also proposes a cost-effective and automated image processing based system to classify the rice samples according to their inferred commercial value. Each grain's boundary has been identified from segmented grayscale image of rice sample. Rectangle fitting has been done over each grain boundary. The geometrical features are extracted from the rectangle fit. The features are averaged over the sample and the feature vector is fed to SVM for multi-class categorization. Experimental result indicates that proposed system provides maximum accuracy which can be considered as a significant contribution in image processing based rice quality assessment.

3. METHODOLOGY

We Used MATLAB software to write the working code. The below block diagram describes the process done in this paper.

Image segmentation is the algorithms that determine the region boundaries that explore many altered approaches of image segmentation like automatic Thresholding, advanced methods, edge-detection methods, and morphological-based methods such as the reconstruction, distance transform that is often used for segmentation connected objects.

The following block diagram depicts the processes done in the paper.



3.1 Image Preprocessing:

In the first step of proposed system. The preprocessing is a sequence of operation that performs on scanned input images. It primarily enhances the image illustration for higher segmentation. The work of preprocessing is to phase the required pattern from the image and perform normalization, noise filtering and smoothing. The preprocessing also defines a solid illustration of the segmented model. After segmentation, binarization procedure is used where it convert a grey scale to a binary image.

3.2 Image Enhancement:

Image Enhancement is the most important and difficult technique in the image study. The image enhancement is used to Enhance or improve the clarity of an image, and provide a better transform representation for image processing by contrast adjustment. The image enhancement technique is different from one field to another field according to its objective. Enhancement of the image involves the color transformation (if needed), image contrast enhancement imadjust() based on the base of the user requirement.

3.3 Edge Detection: In Edge-detection algorithms we will identify the object boundaries in an image. The algorithms that include canny method, Sobel method, Previtt method, Roberts method and Gaussian methods. The Canny method is the perfect method for detecting the edges in an image accurately as shown below.

3.4 Morphological Operators: Morphological operators are segmented to enable an image into regions, detect edges or perform sketch on regions. Morphological functions include:

1. Reconstruction
2. Distance Transform
3. Watershed segmentation and
4. Labelling of connected components.

3.5 Feature Extraction: Feature Extraction is the default method for extracting the quantitative information from segmented Images. Classifications and object recognition are performed based on various algorithms of morphological features. Some of the classified morphological features can contain irrelevant and redundant noisy information.

3.5.1 Geometrical Features:

The geometrical parameters gives basic information about the shape and size of grains.

Area: It refers to the amount of pixels that are present in the region, i.e. the pixels with level "1".

Major Axis Lenght: The object at which the Length of the major axis of ellipse with respect to the same second order normalized central moment.

Minor Axis Lenght: The object at which the Length of the minor axis of ellipse with respect to the same second order normalized central moment.

ConvexArea: The object enclosing the Area of the smallest convex shape.

Eccentricity: The relation between the distance of the focus of the ellipse and the length of the principal axis is known as eccentricity.

The delineation process was done to the input image and the morphological processed image.

3.6 Image Flattening:

The neighbour clustering technology has been used to similar grouped containers 'K' as follows:

I(x,y)={image(p1,p2..pn = K(1,2,3..n)}

Each of these pixel will exhibit the property based on the individual color band. But due to range of the color value(data) in the RGB color band is 0 to 252. The data values are having neighbour values are more of the same mean value hence it make less efficient in the exact grouping of the pixels. Clustering by using the Feature Extraction of the pest images are performed by using function regionprop**().** Feature extraction is of two types.

- Extraction of Feature in pattern.
- Extraction of Feature in Texture.

3.7 Procedure and Algorithm:

1.Here we Take a picture of Rice grain samples.

2. Then This image is resized due to high resolution and its size.

3. The image is now converted to grey scale and increasing the grey scale image pixel values for thresholding.

4 In threshold I use Otsu's method for converting into binary image.

5. The morphological process is done for the binary image that will compare the pixel values of binary image and the input.

6. The Gray color adjustment is done to the morphological image.

7. Now the gray color adjusted image is subjected to Back ground subtraction

8. The Required Features are extracted frmo the image.

9.Finally the svm classification algorithm is used to classify the features.

10. The Classified Image is presented here.

3.8 Block Diagram of Proposed System :

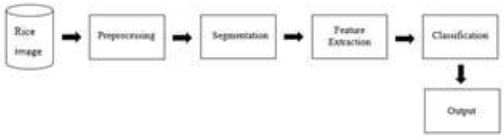


Fig 3.8.1 : Block Diagram

4. RESULTS :

4.1 Results of color based classification :

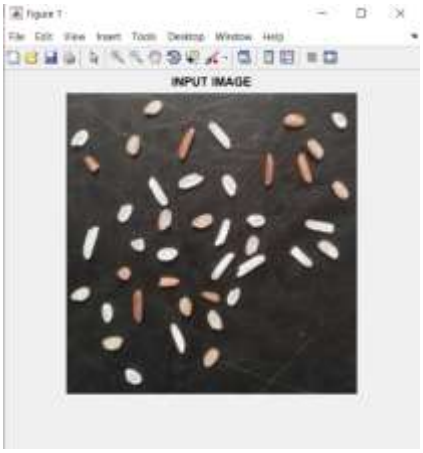


Fig 4.1.1 Input Image

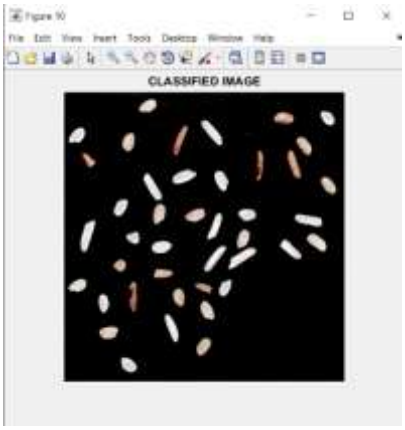


Fig 4.1..2 Classified Output

4.2 Results of Shape based classification :

The Shape Based Classification is also follows same preprocessing as that of color based classification.

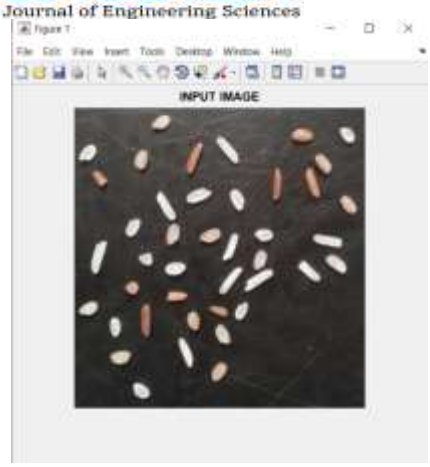


Fig 4..2.1 Input Image

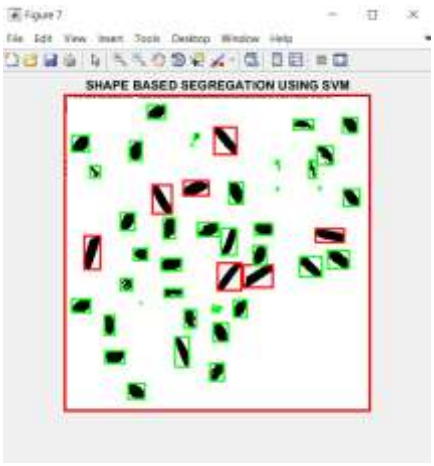


Fig 4..2.2 Classified Output

5. ADVANTYAGES

The Following are the Advantages of the proposed system

1.Helps to ease the labor intensive work which is highly complicated.
2.Provides us with the best consistency in the quality of product.
3.Very Useful In categorization grades of grains.
4.Less Time Consuming.
5.Cheap And Effective solution.
6.Does not require additional human involvement.

CONCLUSIONS

In this article, the image processing algorithm is graded to rice on the basis of length, width, area and also worked on color identification. From the results, it was concluded that some are better while comparing with other in quality that is based on area. However it is not essential to find the over lapping of grains.so, for further research the moisture in grains and to do for more food grains (or) species. In liquids generally the purity was known by finding the pixel values. Further the improvement on liquids are done for identifying the quality that was mixed in it.

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