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RICE GRAIN QUALITY AND SIZE DISTRIBUTION ANALYSIS BY MORPHOLOGY

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Abstract - The food items like rice consumption is common in the human life on the daily basis. The need of the food is essential for the human organs and also to get the energy to the human body. In the modern life the digital devices like the mobile phones has been in the general usage in human life. These devices will be able to detect the food items and also suggest the human user regarding the content and the consumption based on the human history. The morphology technology has been used in the work to achieve the desired result by using the Pixel analysis. Food grains are important in the food commodities all over the world. India, is the second most populated country is still struggling to feed 800 million people per year. For this purpose, Food items has specific importance to provide balance and healthy diet for the people. Here we processed an image processing technique using morphology to recognize the rice grains. The experiment was performed on sample images of rice grains to test the proposed method has been validated by using the visual inspection.

***KeyWords*: GLCM, Preprocessing, Morphology, Threshold, Segmentation, Flattening.**

1. INTRODUCTION

Digital devices based food item process in country like India is an interesting 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. It is an ancient profession which has been passed on from centuries now. In India especially in the villages the people depend on the profession of the agriculture. 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. Use of the digital image processing technology will help to user to lead a healthy life.

Introduction of the modern technologies in production will help to detect the type of the food seeds and helps in the human diet plans. Detecting the food seeds for the human consumption which may help in the process of healthy diet. By doing this it strengthens the human health and also increase knowledge of the seeds calorie contents of human body need.

Figure 1.1: Samples of different food grains

We have carried out the experiment of siridhanya grains detection based on the shape, size, color and texture 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 K-means clustering algorithms in lab a*b* lab color space model.

2. LITERATURE SURVEY

[1] The two-step method has been proposed in this work, to recognize food images. By using the concept of candidate regions selection with the classifying multiple kinds of features. Initially they have selected the candidate regions by using the Felzenszwalb's deformable part model (DPM). The circle detector and JSEG region based image segmentation has been propose di the later stages. The use of the feature and the fusion based food items recognition by using then type of the technologies by using the bag-of-features spatial pyramid (SP-BoF) HOG.

[2] In this paper the author has investigated the features and the possible type of the combinations for the analysis and classification of the food items. By using the k-nearest neighbors and also by applying the vocabulary trees. The dataset of the 1453 images has been used in the process to extract the feature set to be used later. In the set of the 42 food categories captures the natural eating conditions. Later the images are used for the testing and classification of the other food items.

[3] Energy which is provided by the food items is crucial in human health. The issue like obesity has been the major case as it will lead to diseased like heart failure, bone problems etc. The user are in need of the intelligent system which will make the life easy for them. Hence the author has proposed the assistive calorie measurement based assistance system to help human in need of it. It used the smart phone which will allow user to take the picture of it and will show the amount the calorie in it.

[4] Food grains are the most commonly used type of the food grains in the real life. The quality measurement of his rice has been the field of the intelligence in modern area like hotel, food packing etc. The Chalky is whiteness part which is most important in verifying the quality of the rice. By using the extended maxima in the image processing technologies in detecting the chalky area present in the rice. The color and the dimension has been used to detect the quality.

[5] In the food items the presence of the extra un wanted and impure items like the stones, damaged seeds, broken granules reduces the overall quality of the food. Quality of grains has been the big challenge. Wheat, rice most common of the all. By initially running the grain samples in the conveyor belt images of the grain will be captured by the camera. Use of the Neural Network (NN) classifier helps in classifying the type of the grain as good, medium or the low quality. Output is displayed to the user and information will be sent to the location by using the GSM.

2.1 Existing System

Many of the existing methods are based on the technology which generally includes the dedicated devices like camera. Captured images are trained and the feature based data set vector will be created initially. Later the system will process the image and data to compare result by using the classifiers like AdaBoost, NN, MLp etc. But it is inefficient as human errors will cause problems.

DISADVANTAGES:

- Need more time for the classification.
- The data set has to be ideal which is difficult to have.

2.2 Proposed System

In the proposed system a novel approach for the recognition of the food items by using the texture ,color and shape features and the morphology for the counting and measuring the rice quality and to detect the food items correctly. The system is efficient and considered to be accurate in lab conditions. The data set has been collected in the real time environment and used as a trained dataset.

Advantages:

- Higher accuracy.
- Due to deep learning the past data is used for future.

3. METHODOLOGY

The proposed system for rice grain quality analysis and distribution is done by using following main modules.

3.1 Image Preprocessing

In the initial 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 task 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 Enhancements

Image Enhancement is the most significant and difficult technique in the image study. The image enhancement is used to 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 includes the color transformation (if needed), image contrast enhancement imadjust () based on the base of the user requirement.

3.3 Image Flattening

The neighbor 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 neighbor 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.

3.4 Threshold Estimation by Border crop

The image bordering is also performs the same processing of the pixel values based on the input image type. In the color band pf the RGB. it take sets the pixels in te border of image to Edge 'E' as follows;

$$E[z_{ij}] = \frac{p(x = x_i \mid \mu = \mu_j)}{\sum_{n=1}^{k} p(x = x_i \mid \mu = \mu_n)}$$

$$= \frac{e^{-\frac{1}{2\sigma^2}(x_i - \mu_j)^2}}{\sum_{n=1}^{k} e^{-\frac{1}{2\sigma^2}(x_i - \mu_n)^2}}$$

The weight for border edge pixel or the expectation of the z with respect to partition j is the value of the probability that x is the pixel x_i and which has been given that μ is the partition μ_i which is divided by the total pixel sum against all the pixel based partitions which will give lower weight of the pixels. The sigma squared observed in the second expression which is the covariance based pixel valued data. after E step has been performed , every pixel will be having the expectation in every partition, the later maximization 'u' used for the border extraction step begins as follows.

$$\mu_j \leftarrow \frac{1}{m} \sum_{i=1}^{m} E[z_{ij}]\, x_i$$

Partition value of the pixel j is, also weighted average of the individual pixel value has been used in the weights which are the weights passed by the E step. This cycle has been repeated for other alternative pixel in two levels. The user is allowed to choose the best possible result for the feature extraction based on the clustering of the pixel.

3.5 Count and Analyze By Feature in Pattern

The image features are extracted from the image part of segmented. The functions used are **regionprops (), bwconncomp ()** methods.The connected components form the input image is extracted based on the 8 cc values. These connected co-ordinate values are passed for the **regionprops ()** for the feature extraction. With the help of GLCM, pixels of pairs information is is collected, occurrence of the pixel brightness in an image exhibits by the GLCM. The valued matrix is created at distance d=1 and angles which are represented in the degree ranges of (0, 45, 90,135). It provides the stats like the entropy, energy, contrast and correlation. For texture character profile such as smooth, silky, and rough GLCM is used. GLCM is prepared from the gray scale values and picks up the relationship between two neighboring pixel at a time. GLCM implementation for input image with 8 tones is shown below

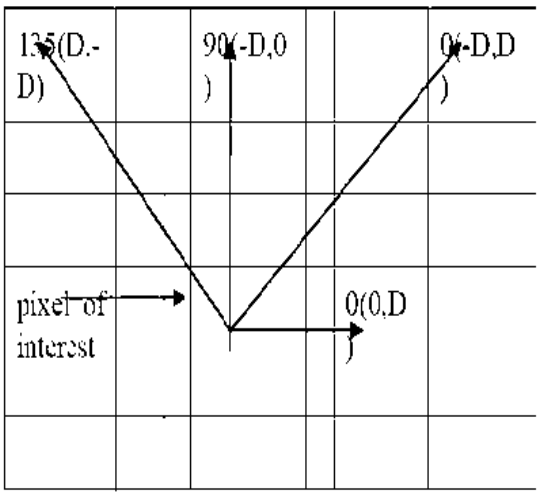

Figure.3.1.1: GLCM implementation for 8 tone image

The properties of GLCM are:

- Quantization level of the image is equal to number of rows and columns.
- The test image consists of four grey levels (0, 1, 2 and 3) with eight bit data 256(2^8). 256x256 matric with 65536 cells are obtained.
- GLCM matrix is a square matrix.

3.6 Morphology features for Analysis

- **Contrast**: It is the square variance. It is the calculation of intensity contrast linking with the neighbor pixel.
- **Correlation**: perfectly +ve image correlation value = 1. Perfectly negative image correlation value = -1. This calculation of the pixel will be passes over the whole image to get the linear dependency of the gray levels.
- **Energy**: the energy make use of texture which will result in the sum of square elements in GLCM. Square root of angular 2nd moment based on the texture termed as the energy.
- **Homogeneity:** It estimates the tightness distribution of the GLCM and passes to GLCM diagonal.
- **Kurtosis**: It's the measure of shape of the probability in the distribution of random valued variable.

4. Block Diagram of Proposed System

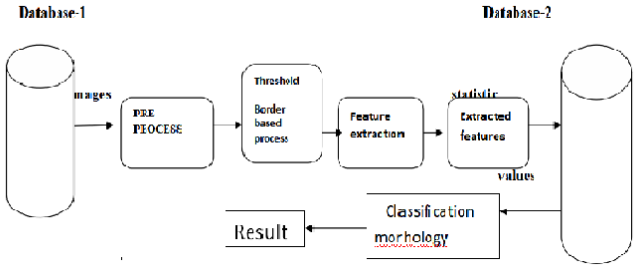

Figure 4.1.block diagram of proposed system

5. RESULTS

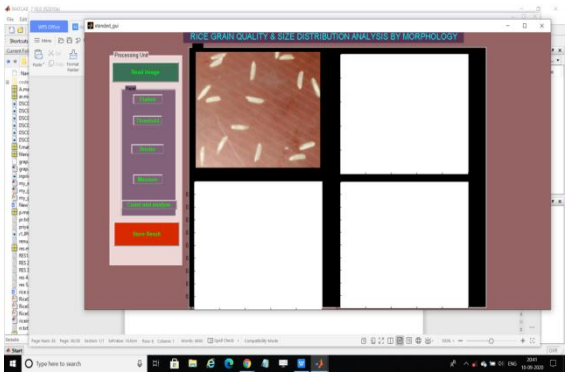

Figure 5.1: Input sample image from database-1

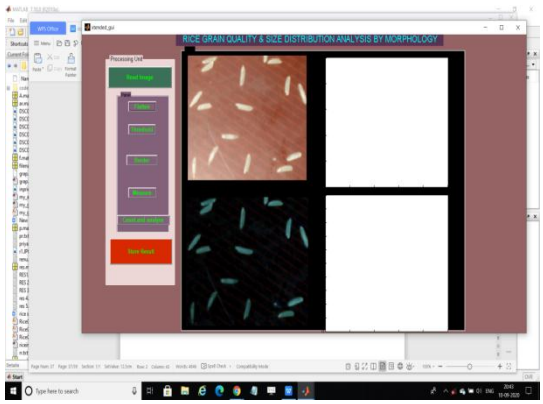

Figure 5.2: Image flattening

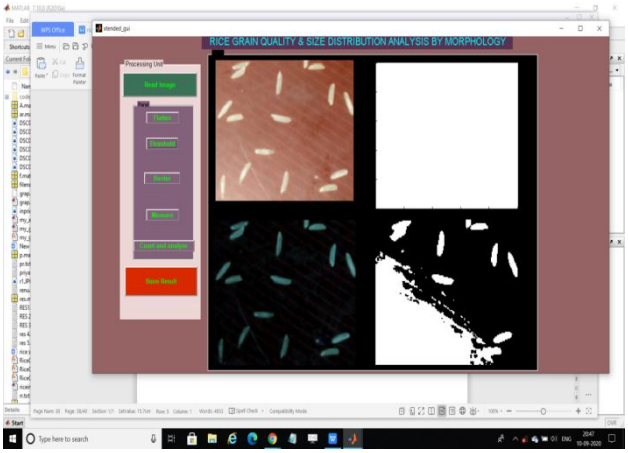

Figure 5.3: Image thresholding

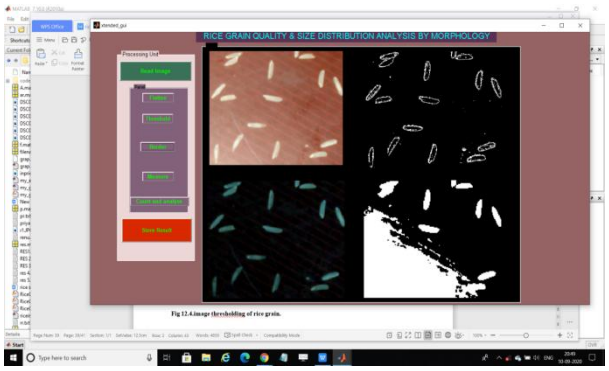

Figure 5.4: Border analysis of image.

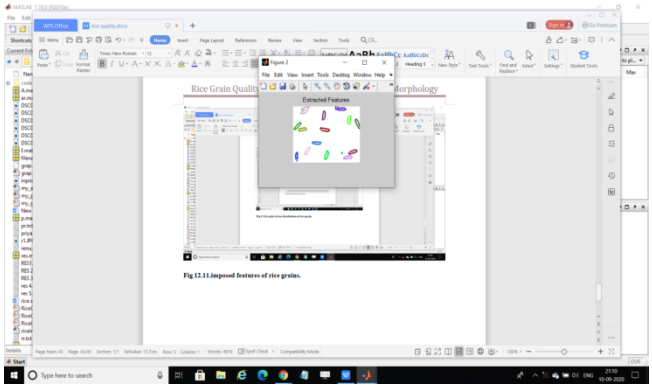

Figure 5.5: Extracted features of rice grain image.

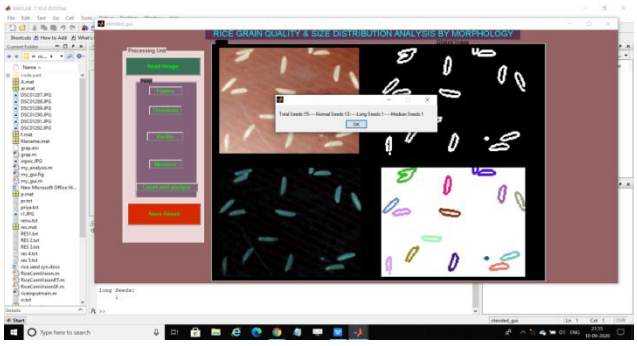

Figure 5.6: Counting and distribution analysis of rice grains by using morphology.

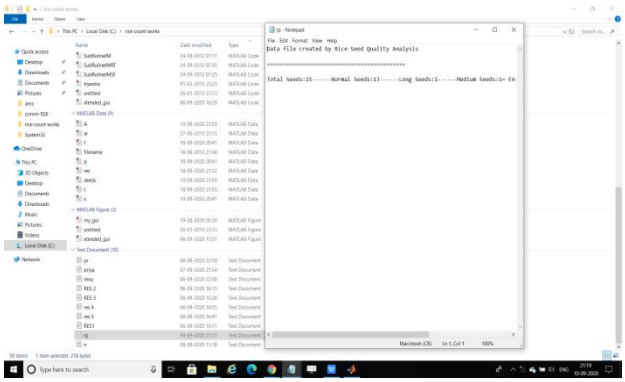

Figure 5.7: Result stored in database-2.

6. Conclusion and future scope

By this proposed work the user will able to detect the rice quality as long, medium and normal. The rice items type is decided by using the input image. It will use the edge, border, image flattening methods and the digital image processing technologies like image enhancement, feature extraction based on the size and shape of the object. The image segmentation based on the threshold and the clustering for the feature extraction will help the system to create dataset. The Morphology phases will help in the efficient and accurate classification of the result.

Future scope, will be designing the system with the diet plan instruction and suggestion of the food items based on the human health history.

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