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EDGE DETECTION FOR FOOD GRAINS USING NEURAL NETWORK

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ABSTRACT: - Grains are the agriculture product which requires the supervision to identify the quality. This quality estimation will help in audit system as well as to protect it from insect infection. But a false report or the wrong sample based observation can completely fails this analysis process. These situations occur because of lack of availability of such quality measure labs in near region. But this grain image processing methods provided the clear solution to identify the quality of the grain. In this thesis, a wheat grain analysis method is defined to identify the quality of grain. The proposed work model is divided in three main stages. In first stage, the segmentation is applied to identify the grain region. In this stage, mathematical morphological operators with color model analysis are applied. The stage also subtracted the background region and generated the ROI. In second stage, the complete grain image is divided in smaller segments to generate the features. In this stage, the entropy, and edge detection method are applied to identify the structured observation. In final stage, the decision rules will be formed to identify the quality of grain. In this stage, we apply neural network for classification of image quality. This probabilistic measure will use the associated rules to identify the quality of grain. The work will be applied on real time images in MATLAB environment.

KEYWORD*:* Food grain, Segmentation, Feature extraction, K-mean clustering, Neural Network

I. INTRODUCTION TOIMAGE PROCESSING

Quality of grains is a vital prerequisite for today's souk, to shelter the patrons from second-rated foodstuffs. Some traders dishonorably discharge poor quality products to the shopper market. Because of such practices there are numerous low-grade quality grains arriving to the marketplace day by day. These grains consists of several impurities like stones, weed seeds, chaff, damaged seeds, more broken granules etc. This is frequently seen today in rice deal where rice in stumpy quality is sold without being noticed. Conversely, there is no opportune scheme to recognize these second-rated quality grains in the market. Therefore, this has become a stern crisis for mutually the purchaser and the regime. It is trouble-free for the purchaser fortification influence to abstain from executing the duties as the categorization of manufactured goods such as rice with reverence to the foreign substances, broken granules etc. is indistinct. Therefore, it is requisite to survey the likelihood of using technology for an appropriate elucidation. The exactness of quality scrutiny via human assessment scheme is different from person to person according to the inspectors' physical status such as working hassle, point of view and fidelity for traders. Also, the understanding and skill of inspectors are obligatory to precisely execute this appraisal progression.

Substantial work for classifying and identifying varieties of grains has been reported. B.S. Anami et al., [1] described a method for gradation and classification of different grains such as wheat, Bengal gram,

groundnut, etc. An artificial neural network approach is used in the Identification and classification of the bulk grain samples by N.S. Visen et.al, [2]. Harlick, et.al. [3] Has presented a paper on classification of image using textural features. This work is done based on gray-tone spatial dependencies for easily computable textural features. LIU zhao-yan et al., [4] projected his ideas on Identification of different varieties of rice grains using neural network and image processing. They used an algorithm of digital imaging based on morphological and color features of different rice varieties. By using image analysis techniques M.A. Shahin and S.J. Symons [5] automated the manual sieving procedure. Using flatbed scanner, J.Paliwal et al., [6] performed a research for both bulk and single seed images. N.S. Visen et al., [2] developed and optimized a technique by extracting the morphological, texture, and color features using images of single grains for discriminating various types of grains. Identifying the food grains and evaluating its quality using pattern classification is done by Sanjivani Shantaiyai, et al., [7]. H.Rautio and O.Silvn [8] carried out research to verify the normal grain size and classified using morphology and texture features. This paper presents classification of grades of Basmati rice granules using the novel system Image Processing and Neural Network Pattern Recognition Tool.

II. IMAGE SEGMENTATION

Image segmentation is the process that subdivides an image into its constituent parts or objects. The segmentation should stop when the objects of interest in an application have been isolated. Image thresholding techniques are used for image segmentation. In autonomous air-to-ground target acquisition, suppose our interest lies in identifying vehicles on a road, the first step is to segment the road from the image and then to segment the contents of the road down to potential vehicles. The level to which this subdivision is carried out depends on the problem being solved.

III. K-MEAN CLUSTERING

Clustering is the process of partitioning or grouping a given set of patterns into disjoint clusters. This is done such that patterns in the same cluster are alike and patterns belonging to two different clusters are different. Clustering has been a widely studied problem in a variety of application domains including neural networks, AI, and statistics. The k-means method has been shown to be effective in producing good clustering results for many practical applications. However, a direct algorithm of k-means method requires time proportional to the product of number of patterns and number of clusters per iteration. This is computationally very expensive especially for large datasets. We propose a modifying algorithm for implementing the k means method. Our algorithm produces the same or com.

The simplest and most popular among iterative and hill climbing clustering algorithms is the K-means algorithm (KMA). As mentioned above, this algorithm may converge to a suboptimal partition. Since stochastic optimization approaches are good at avoiding convergence to a locally optimal solution, these approaches could be used to find a globally optimal solution. The stochastic approaches used in clustering include those based on simulated annealing, genetic algorithms, evolution strategies and evolutionary programming.

IV. BPA (BACK PROPAGATION ALGORITHM)

One of the most popular NN algorithms is back propagation algorithm. Rojas [9] claimed that there are four categories for broking BP algorithm. After choosing the weights of the network randomly, necessary corrections are computed using back propagation algorithm. There are four steps for decompose of this algorithm as following:

1. Feed-forward computation
2. Back propagation applied on output layer

3. Back propagation applied on hidden layer
4. Updating of weight performed

The algorithm is stopped when the value of the error function has become sufficiently small. There are some variations proposed by many other researcher but Rojas define it in easy way that is accurate. The last step, weight updates is happening throughout the algorithm.

Wegive the algorithm example, as training is completed when we weighted the network, it will give us the required output for a particular input. For simple Pattern Recognition use of Back propagation networks ideal and Mapping Tasks4. We need to give it examples of what we want – the output we want (called the Target) for a particular input as shown in Figure 1.

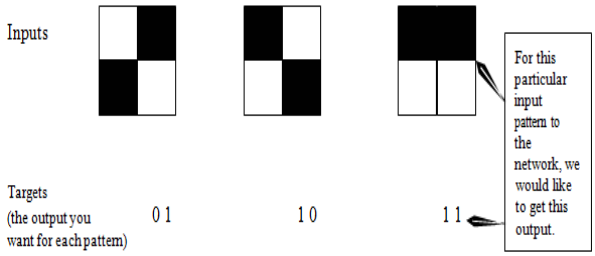

Figure 1a set of BP training.

V. PROBLEM STATEMENT

Food grains are the farming product which requires the supervision to classify the quality. This quality estimation will help in audit system as well as to protect it from insect infection. But a false report or the wrong sample based observation can completely fails this analysis process. These situations occur because of lack of availability of such quality measure labs in near region. But this grain image processing methods provided the clear solution to identify the quality of the grain. In this paper, a wheat grain analysis method is defined to identify the quality of grain. The proposed work model is divided in three main stages. In first stage, the segmentation is applied to identify the grain region. In this stage, mathematical morphological operators with color model analysis are applied. The stage also subtracted the background region and generated the ROI[26]. In second stage, the complete grain image is divided in smaller segments to generate the features. In this stage, the entropy, and edge detection method are applied to identify the structured observation. In final stage, the decision rules will be formed to identify the quality of grain. In this stage, an interactive kalman filter method will be applied on these parameters. This probabilistic measure will use the associated rules to identify the quality of grain. The work will be applied on real time images in matlab environment.

VI. PROPOSED METHODOLOGY

1. The objectives of this work are given here under
2. The main objective of work is to define a three stage model for wheat grain quality estimation.
3. To apply mathematical morphology to extract the grain region under segmentation process.
4. To apply the segmented featured analysis for structural evaluation of grain.
5. To apply probabilistic neural network to identify the grain quality.
6. To implement the work on real time images and estimates the accuracy.

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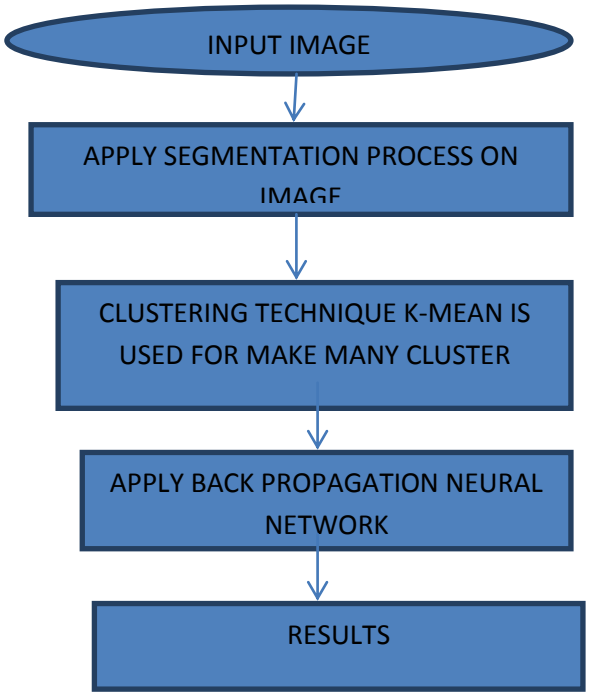
VII. FLOW OF PROPOSED WORK



VIII. IMPLEMENTATION

Step 1: Load Image

```
a  =imread('food1.png');
figure(1)
imshow(a)
```

Step 2: Apply filteration

```
f = fspecial('unsharp');

af = imfilter(a,f);
figure(2)
imshow(af);
```

Step 3: Convert Colour in Black And White

```
abw = im2bw(af,g);
figure(3),imshow(abw)
```

Step 4: Clearance of border

```
ac = imclearborder(abw);
figure(4),imshow(ac)
```

Step 4: Apply Clustering Technique

```
clusters = kmeans(Feature,2);
```

Step 5: Apply Neural Network

```
network = feedforwardnet([10 20 22]);
target = zeros( length(clusters));
for i = 1: length(target)
target(i,i) = clusters(i);
end

network = train(network,Feature',target);
```

Step 6: Testing using trained program

```
for i = 1: length(clusters)
   [axx(i),b(i)] = (max(sim ( network, Feature(i,:)')));
end
check = sum(round(axx)'~=clusters)/length(clusters);
display(check)
```

IX. RESULTS

Step 1:- Database of images work as input in our proposed work. So in following window with name 'select file to open' is used to provide path of images for implementation.

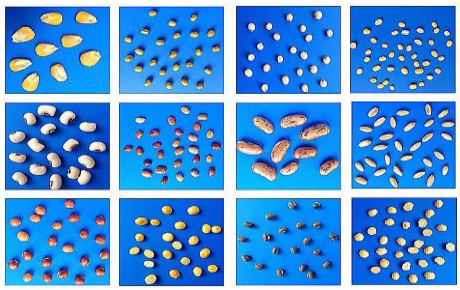


Figure 1: Input image for testing

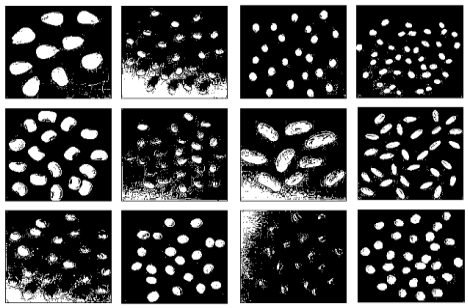


Figure 2: Transformation in black and white colours

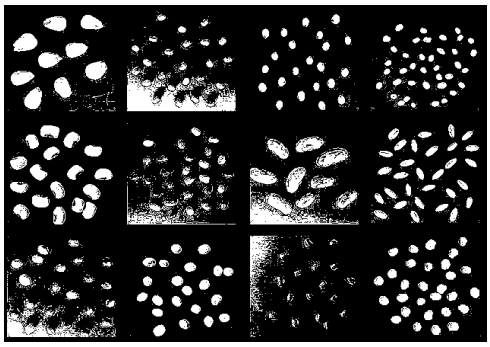


Figure 3: Segmentation of image

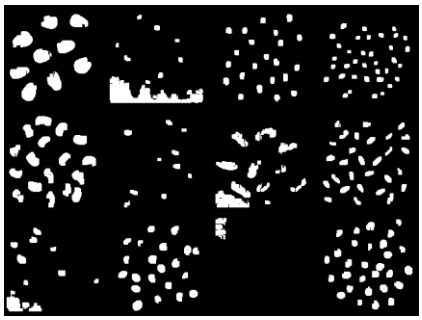


Figure 4: Feature extraction from all segments

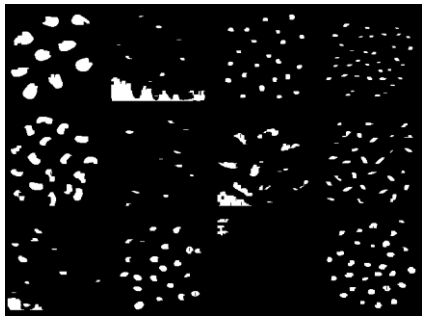


Figure 5: Clustering of all segments

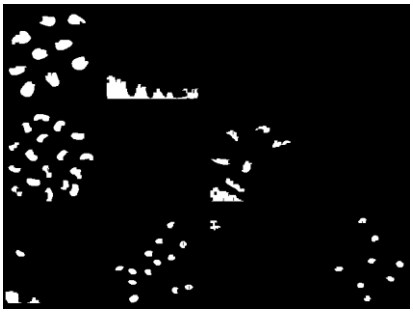


Figure 6: Final testing of food grain

X. CONCLUSION

The processing of imagery and the vigilant assortment of the variety measured in this effort for extracting features from granules significantly abridged the intricacy of the grading problem. Neural Network Pattern Recognition Tool is lucratively applied in grading granules. The developed Neural Network can be adapted for grading added grains and foodstuffs as well. Even though the problem being worked upon is not completely new, the earlier approaches employed very large number of color, textural and morphological features which made the algorithm extremely slow because of the intensive computation. The experimental results show that the proposed method developed in this study gives better accuracy with only 6 attributes for classification. The number of training samples used here is comparatively small i.e. 5 samples of each type, hence it takes less training time. Scaled Conjugate Gradient Training based Neural Network is able to classify well when there is no overlapping of granules.

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