

Property Inspection of Wheat by Extracting Morphological Features

Amit Bhande¹, Dr. S. V. Rode²

¹Sipna College of Engineering and Technology, Sant Gadge Baba Amravati University, India

²Professor, Department of Electronics and Telecommunication, Sipna College of Engineering and Technology, Sant Gadge Baba Amravati University, India

Abstract: *In the current scenario the farmers are taking more efforts in their farm and also spending more time and money, for getting more outcomes. But in front of their hard work they will not getting expected amount and profit of their products means grains. Image based wheat quality examination mechanism that can swap dreary visual investigations for virtue, shading, and size attributes of grains. It likewise has the potential for measuring the vitreousness of durum wheat. Model transferability between various review machines was likewise tried. Because of these merchants, agriculturists are for the most part not mindful about the first market rates, furthermore it is important to go before long, in the business sector for offering their item and to check the nature of their item, we can say that grains or particularly wheat. Thus, to defeat these nepotism which are finished by the dealers in the grain markets at the season of obtaining grains from the ranchers furthermore to maintain a strategic distance from this cerebral pain completely and tedious procedure, we are going to present a framework which is extremely useful to every one of the agriculturists and in addition in the standard markets to work all the more cleverly. The proposed technique is defined with the assistance of computerized image processing mechanism on MATLAB. In this paper three parameters; types of wheat, Foreign Particle and Admixture of Agmark Standards are changed over to computerized structure for advanced quality examination of wheat. The results of review of the specimens concentrated on, demonstrated that our model was a powerful path for computerized examination of Agmark Standards.*

Keywords: Wheat, MATLAB, Image Processing, Morphological feature extraction, Image Segmentation, Quality Identification

1. Introduction

In the field of agriculture every farmers have been taken so many efforts honestly and doing hard work for getting quality of grain or outcome. But according to area wise climate, type of soil, seed and fertilizers the quality of the crop will be categorized manually by traditional method. In the traditional method experts are identifying the quality of grain by handpicking. Likewise the inspection of the quality of different types of wheat manually is critical and time consuming. So to replace this very tedious and time consuming process of identifying the good qualities grain especially wheat manually we are going to introduced a smart computerized system which is, "Quality Identification of Wheat by Using Image Processing". Here, approach used is based on image processing technology, the detection, classification of wheat grain to identify quality are performed in this paper. Taking wheat grain as an example, the shape detection and description method of similar round object are studied firstly. Then a grain shape description method based on some feature points of wheat grain Boundary is proposed. Aiming at wheat seed detection, a simple image size calibration method based on black-white grid is put forward too. The quality classification of wheat, from the nature of their texture, shape, and color essence, it is tedious work using image processing but we are making use of MATLAB software to classify the wheat in their respective categories. In the present grain-handling situation, grain sort and quality are recognized physically by visual examination which is repetitive what's more, not precise. There is requirement for the development of quick, precise and target framework for quality determination of nourishment grains. In this paper we are going to categorized three major types of wheat (i.e. Lokwan, Narmada, Sarbati) according to its qualities and

morphological features. This paper proposes a model that utilizes shading and geometrical highlights as properties for characterization. A decent grouping exactness is accomplished by utilizing highlights as, HSB hues and geometrical components.

2. Literature Review

Here we are summarized some related work of different authors who are studying and analyzed the results of their research on the similar track by using computerized Image Processing technique.

K.Hatou 2011(1) presented a study aimed to diagnose the hanging of the stress to the plant by using images. The position where the influence of the stress appears first was a flower. Shape changes into the flower that receives the stress. Therefore, it was assumed that the stress condition of the plant can be diagnosed from the morphological characteristics such as a shape of the flower. The substantial change appears in the number of sheets of the petal, the number of stigma, and the size of the flower. An image diagnosis system for detecting the strength of the stress occurred in the plant was developed using an artificial neural networks.

Naiqian Zhang 2002(2) have presented the Grain Check 310 is a real-time, image-based wheat quality inspection machine that can replace tedious visual inspections for purity, color, and size characteristics of grains. It also has the potential for measuring the vitreous ness of durum wheat. Different neural network calibration models were developed to classify vitreous and non-vitreous kernels and evaluated using samples from GIPSA and from fields in North Dakota.

Volume 5 Issue 7, July 2016

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

Model transferability between different inspection machines was also tested.

Mandeep Saini 2012(3) have research in terms of total production tonnages used for food, India is currently second to wheat as the main human food crop and ahead of maize. Determining the quality of wheat is critical. Specifying the quality of wheat manually requires an expert judgment and is time consuming. Sometimes the variety of wheat looks so similar that differentiating them becomes a very tedious task when carried out manually. To overcome this problem, Image processing can be used to classify wheat according to its quality. This inspection approach based on image analysis and processing has found a variety of different applications in the food industry. Considerable research has highlighted its potential for the inspection and grading of wheat. Image processing has been successfully adopted for the quality analysis of rice, cereal grains, fruits and vegetables. Likewise wheat grain quality and characteristics have been examined by this technique. This paper presents the significant elements of the image processing technique coupled with a review on the research work carried out by various researchers in the field of quality information of wheat varieties.

S.V.More 2013(4) said that the Quality of grains is an important requirement to protect consumers from sub-standard products. Sensory pleasure, healthy eating, value and convenience the consumer trends are driving the food industry today. Rice delivers on all of these. Rice is the primary dietary staple for more than half the world's population. It is the most popular grain globally, supplying energy, carbohydrates, protein, fiber, essential vitamins and minerals and beneficial antioxidants. In the last 30 years, rice consumption all over the world has more than doubled. Proposed system helps to identify the type of rice grain being provided.

3. Proposed Work

According to our proposed method, first image of different wheat grains are acquired with a color Digital Camera, Here the wheat grains are dispersed on black background so that the image of grains can be separated from the background. Captured images are stored in JPG format. In MATLAB, captured image is read by the `imread()` function. The images acquired are color images, so it is converted into gray scale image. The color information is not necessary for further processing as it does not carry any useful information. MATLAB function converts the color image to gray scale image by eliminating the hue and saturation information while retaining the luminance. Images are normally corrupted by noise during image acquisition process. Noise may get add to original image due to different factors. The noise interference in images might affect the results for some processing that worsen the quality of original image. Therefore, the image noise removing process should be performed on the image before applying preprocessing methods. Block diagram of the proposed system as shown below.

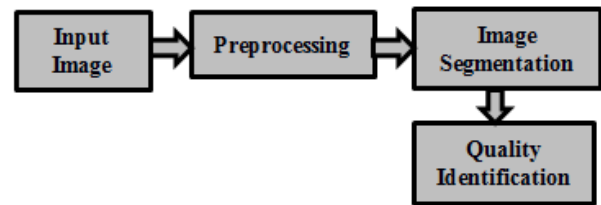


Figure 3.1: Block Diagram

The proposed system works on the basis of above block diagram. In the starting of the process first requirement is the input image of wheat. The required image will capture by the system and also stored in MATLAB. Under the second stage of preprocessing the noise will be removed from the input image and make it proper by adjusting necessary parameter. Sometimes in image there is a problem of brightness, contrast due to light effect. So under the preprocessing of image these types of problems will be minimizes by adjusting its grey level and threshold level of image. Then under the third stage of image segmentation, determining the exact quality of the input image by extracting the important features from the input image and finally on the basis of the important features of the input image, system will decide or identify the quality of the wheat. The result analysis will be generating by comparing its quality with available current data which stored already in database of the system. To implement "Quality Identification of Wheat by Using Image Processing", we have to study about different grains and their different qualities. Also Study and survey of the wheat and different market rates as per the qualities of the grains. Also we have to study about different techniques of acquisition and types of seeds, and also take regarding information from merchants about how they are identifying the quality of the wheat and also studied the different subtypes of the wheat.

4. Result and Discussion

By Using below algorithm we carried out Results and discussion

4.1 Algorithm : Gray scale image conversion

Input : Real time color input image
Output : Grayscale image
Step 1: Get the red, green, and blue values of a pixel.
Step 2: Used binary math to turn those numbers into a single gray value
Step 3: Replace the original red, green, and blue values with new gray value.
Step 4: Convert multichannel image into single channel image.
Step 5: Set $R=G=B$.

Algorithm 4.2: Morphological feature extraction

Input : Gray Scale image
Output: Calculate Geometrical parameter height and width.
Step 1: Get the grayscale image
Step 2: Locate the ROI to extract the features
Step 3: Extract features by threshold value and save as test feature.

Step 4: The four threshold possibilities of extracting features by its height and width and invert likewise as shown in below,



Figure 4.1: Test Features

Step 5: We consider x =width and y =height and vice versa in fuggy rules.

Step 6: Identify the class of test features according to threshold values of x and y .

4.3 Flow chart

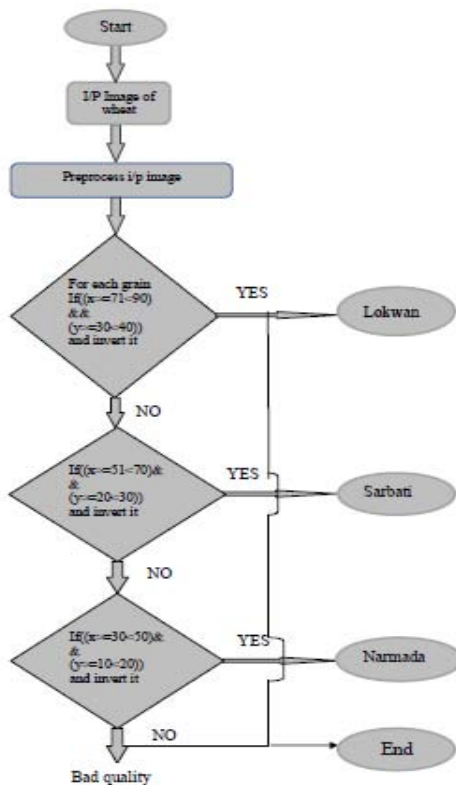


Figure 4.2: Flow Chart

4.4 Problem Statement

The point of the task is to plan a grain recognition and quality examination framework utilizing its color and morphological features, which groups the kind of grain and its quality and grade for wheat. For quality investigation we have considered three commonly used types of wheat in particular lokwan, sarbati and, narmada and each can be ordered into two evaluations, i.e. Good. Bad etc.

After receiving input image towards system then it will converted into gray scale for obtaining the ROI (region of interest) then proceed to next step there is a condition to classify the type of wheat and its grade according to its nature. The type and grade of wheat will classify according to fuzzy rules which are set as a threshold. By using condition we extract morphological features height and width of the wheat, in vertical manner for height we consider

x and width y and similarly in horizontal manner we invert it and consider x as width and y as height. Then simultaneously we set the conditions according to pixels are occupied by the particular type of the wheat and consider it as a threshold as value.

If the given input image satisfies the particular threshold condition from three then according to its nature it will provide results and grade. The same process will follow for all three types of wheat. According to the given three conditions if unable to extract features from the input image then system will decide its bad quality wheat. In front of this if the test features of the input image satisfy the threshold condition of lokwan then system will provide result Lokwan with its quality. Similarly if the extracts features of the input image will satisfy the threshold condition of the sarbati then system will provide the result sarbati and similarly for narmada. In such flow the system will perform the analysis.

4.5 Result Analysis

After completion of the process we can compare the result with respect to standard bitmap input image and real time bitmap input image. In result analysis we can check the output parameters comparatively by using RGB histogram plots. According to the parameters which are obtained in comparison result of two input image standard and real time we can also predict its accuracy. In this graphical representation there are four histograms are shown in which first is of mean of RGB, and remaining three graph of Red, Green and Blue separately. On x axis it is scaled up to 256 bits i.e from 0 to 255. If the pixels from the image will found dark then graphical point will be plotted Near to 0. Basically From 0 to 30 we consider it is dark in colour and from 230 to 255 pixels intensity can considers it is whitish in colors. Following fig 6.1 shows histogram plots for Narmada, fig 6.2 for Lokwan and fig 6.3 for sarbati comparing with particular standard bitmap image.

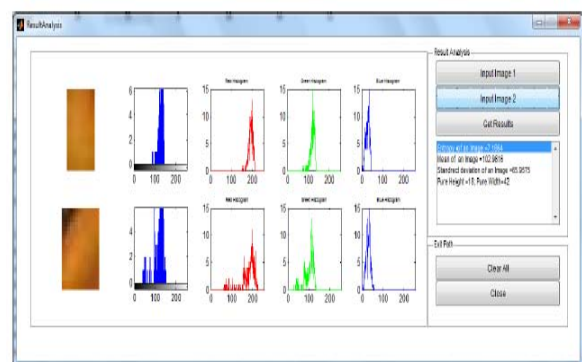


Figure 4.3: RGB Histogram of Narmada

From the above RGB histogram of narmada we can comparatively observe its output parameter which are obtained from the histograms plots, we can observed in red channel plot the graph is plotted in midrange of red channel intensity according to the image colour parameters, in green it is continuously plotted from 0 to 200 and at the last in blue it turns more towards dark i.e 0 position and finally it will combined three histograms plot of RGB and plotted in first graph called as a mean.

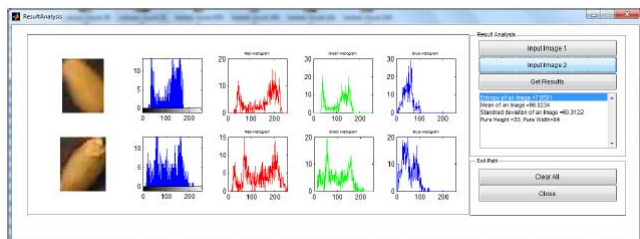


Figure 4.4: RGB Histogram of Lokwan

Similarly, From the above RGB histogram of Lokwan we can comparatively observe its output parameter which are obtained from the histograms plots like its entropy, mean, Standard deviation etc. We can observed in red channel plot the graph is plotted in continuously from 0 to 255 and in red graph of second input image we can observed pick point at near to 100 due to color variation. Similarly in green there is also pick between 0 to 100 in second graph and at the last in blue it turns more towards dark i.e 0th position and finally it will combined three histograms plots of RGB and plotted in first graph called as a mean.

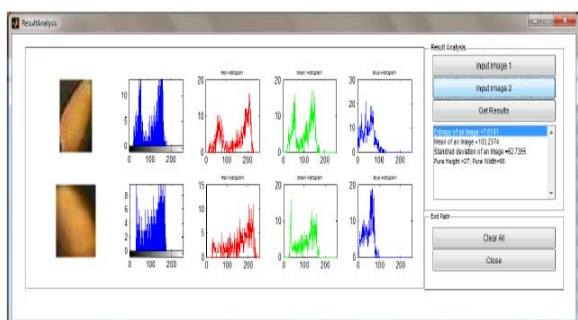


Figure 4.5: RGB Histogram of Sarbati

Similarly, From the above RGB histogram of Sarbati again we can comparatively observe its output parameter which are obtained from the histograms plots like its entropy, mean, Standard deviation etc. We can observed in red channel plot the graph is plotted in continuously from 0 to 255 and in red graph of second input image we can observed pick point at near to 200 due to color variation. Similarly in green it is plotted from 0 to 200 and at the last in blue it plotted from 0 to 100 and finally it will combined three histograms plots of RGB and plotted in first graph called as a mean. According to comparison parameters which are obtained from the histogram plots of the three different qualities of the wheat the following table is obtained.

Table 4.1: Parameter values of different qualities of wheat

O/p Parameter	Input Image 1			Input Image2		
	Lokwan	Sarbati	Narmada	Lokwan	Sarbati	Narmada
Quality	Lokwan	Sarbati	Narmada	Lokwan	Sarbati	Narmada
Entropy	7.48	7.43	7.18	7.71	7.72	7.17
Mean	103.30	121.93	102.96	101.52	116.81	101.51
Std. Deviation	60.10	58.12	65.95	64.28	62.92	66.09
Height	32	29	18	30	33	18
Width	75	51	42	72	54	42

From the above table we can compare its accuracy from the values of the output parameters with respect to standard input image of particular type, for example we consider lokwan the entropy of an input image 1 is 7.48 and the entropy value of an input image 2 is 7.71 likewise we compare it in different way i.e mean, standard deviation, height, and width as mentioned in above table.

5. Conclusion

Now a-days nature of grains is a vital prerequisite to shield shoppers from sub-standard items. Yield is the most detectable trademark to ranchers while the product is in the ground; however when the result of the product, the processed wheat, achieves the business sector, quality turns into the key determinant of its deal capacity. Nature of a grain is an essential prerequisite throughout today's business sector, to shield customers from substandard items. There are such a large number of second rate quality grains landing to the market step by step. Today in wheat exchange; wheat of low quality is sold without being taken note. Be that as it may, there is no helpful strategy to distinguish these sub-part quality grains in the business sector. Consequently, this has turned into a significant issue for both the customer and the legislatures. This anticipates will help in recognizable proof and arrangement of assortments of wheat using image processing.

This thesis is centered on giving a superior way to deal with distinguishing proof of various sorts of grains and wheat quality in light of color and geometrical components utilizing Probabilistic neural system and image processing ideas. Firstly the picture is preprocessed and fragmented, then color and geometrical elements that have been extricated from grain pictures. The extricated properties are info to PNN classifier for further coordinating procedure. 3 sorts of wheat grains are considered for identification.. Three nature of wheat is considered and each has been reviewed into three evaluations. Tests on the framework for the test sets show exactness of 98% and aggregate achievement rate of quality investigation and reviewing of wheat is 90% and 92% individually. Despite the fact that the issue being worked upon is not totally new, the prior methodologies utilized extensive. Number of color, textural and morphological highlights which made the calculation amazingly moderate in color of the concentrated calculation. The trial results demonstrate that the proposed technique created in this study gives better exactness with just 6 properties for grouping. The quantity of preparing tests utilized here is nearly little i.e. 5 tests of every sort, thus it requires less preparing investment. This is conceivable in color of the fact that we have considered non touching grain tests in the approach. Here we consolidate both the quality examination and reviewing of wheat.

6. Future Scope

The work presented in this project recognizes only three quality of wheat. It can be extended to be able to detect other quality of wheat. We can use a closed system for image acquisition, with a high definition camera i.e. CCD, this

might help to avoid the grain shadow observed in the database acquired and will also give uniformity in the intensity of background color. The present work could be extended for remaining food grains also and few other features can also be extracted to increase accuracy. Also various infections on food grains like fissures can also be identified further.

[15] Varghese Z, Morrow CT, Heinemann PH, Sommer HJ Tao Y, et al. Automated inspection of Golden Delicious apples using colour computer vision.

References

- [1] Ilkka Seilonen (2009) Software architecture for farm management information systems in precision agriculture in computer and electronics in agriculture at science direct.
- [2] Nadeem Iftikhar, Torben Bach Pedersen (2010) Flexible exchange of farming device data in computer and electronics in agriculture at science direct.
- [3] Abutaleb AS (1989) "Automatic thresholding of grey-level pictures using two-dimensional entropies." Pattern Recognition, 47 (1), 22-32.
- [4] Edmund W. Schuster a, Hyoung-Gon Lee b, Reza Ehsanic, Stuart J. Allen d, J. Steven Rogers (2011) Machine-to-machine communication for agricultural systems: An XML-based auxiliary language to enhance semantic interoperability in computer and electronics in agriculture at science direct.
- [5] Jahne B. Practical Handbook on Image Processing for Scientific and Technical Applications // Second edition. CRC, 2004.
- [6] Abdelkader Mendasa, Amina Delalib (2012) Integration of Multi Criteria Decision Analysis in GIS to develop land suitability for agriculture: Application to durum wheat cultivation in the region of Mleta in Algeria in science direct.
- [7] Richard J. Lehmann a,b, Robert Reichea, Gerhard Schiefer (2012) Future internet and the agri-food sector State of the art in literature and research at science direct.
- [8] Liu Guang-rong, "Rice color inspection based on Image Processing Technique", in International Conference on Advances in Energy Engineering (IEEE), ISBN No. 978-1-4244-7830-9, pp. 134-137, 2010.
- [9] Otsu, N., IEEE Trans. Syst. Man Cyb.
- [10] D. Anoraganingrum. Cell segmentation with median filter and mathematical morphology operation. Image Analysis and Processing, International Conference on, 0:1043, 1999.
- [11] Granitto, P. M., Verdes, P. F. and Ceccatto, H. A. (2005). Large-scale investigation of weed seed identification by machine vision; Computers and Electronics in Agriculture.
- [12] Narendra VG, Hareesh KS (2010). Prospects of computer vision automated grading and sorting systems in agricultural and food products for quality evaluation; International Journal of Computer Applications.
- [13] Sun DW, Brosnan T (2003). Improving quality inspection of food products by computer vision: a review; Journal of Food Engineering.
- [14] Uthu, H. (2000). Application of the feature selection method to discriminate digitised wheat varieties; Journal of Food Engineering.