Grain Detection Using Image Processing

Minakshi Patil, Sneha Pawar, Sushant Sakate &Shardul Joshi.
Dr. Vidya Sarode.
Department of Electronics And Telecommunication Engineering
Xavier College of Engineering Mahim, Mumbai, India

Abstract— In the present grain-identification and detection system type of grain and grain quality are identified manually by visual inspection which is difficult and not accurate. In this paper we are focusing about the methods used for detection of grain. An machine vision system is introduced which is used for grain type identification and differentiate different type of grains based on special features (color,geometrical) as attributes for classification. The grading of rice sample is done according to the size ,shape and texture of the grain .A good classification accuracy is achieved using only 6 features, i.e. mean of RGB colors and 3 geometrical features. Also image Pre-processing, Feature extraction, Image Acquisition, Filtering, Binarization, Morphological operation and segmentation are going to be perform to differentiate the grain.

Keywords: Grain Type Identification, Detection, Image Processing, Mat lab.

---

1 INTRODUCTION

Agriculture is the largest economic sector and it plays the major role in economic development of India. In the manual grain differentiation and grading techniques which are being used to distinguish between different types of grains are completely relying on human efforts, they are subject to some kind of errors.So as to reduce the human efforts and errors we can take help of automated system which also helps to reduce the time consumed by manual techniques.

The new agricultural technologies are being developed by university researchers that creates a questions about the time efficiency and quality effectiveness.Which we are going to solve in this project.

2 OBJECTIVE

The aim of the project is to identify and detect the type of grain. This can be figure out using its characteristics such as geometrical features, color. Here we consider five type of grains: Rice, Wheat, Cowpeas, Rajma, Corn. While identifying and detecting the type of grain difficulties faced in image processing are as follows:-

Large varieties of type of grain:- In this grain such as rice have large varieties so it is difficult to fix the characteristics in particular frame .

Image clarity:- While taking the image as input blur image causes error in output

Impurities :- Impurities such as stone , worms present in the grain causes error, it is difficult for detection .

3. LITERATURE SURVEY

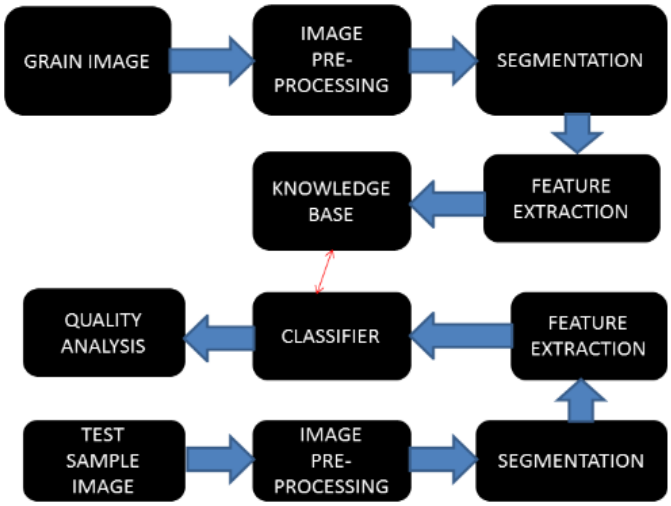
Here we summarized some related work of different authors who are studying and analyzed the results of their research by using Image Processing Technique.

Naiqian Zhang 2002(1) 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. Model transferability between different inspection machines was also tested.

Mandeep Saini 2012(2)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 conuming.Sometimes it becomes very hard to differentiate between the same color and shape of grain. To overcome this problem, Image processing can be used to classify wheat according to its quality.

S.V.More 2013(3) said that the Quality of grains is an important requirement to protect consumers from substandard 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.

4. DESIGN AND IMPLEMENTATION



The upper part compromises of training section and below one consist of testing section. We are going to take sample of an grain on which some operations will be performed. And the operation processes as follows:

IMAGE ACQUISITION:

The first stage in any machine vision system is to acquire digital image. Image acquisition does this job. This can be done by sensor, digitizer or digital camera. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks .

IMAGE PRE-PROCESSING:

Pre-processing is one of the important steps for the enhancement of quality of the captured image. It uses small neighborhood of pixel of an image to get new brightness value in the output image.

IMAGE FILTERING:

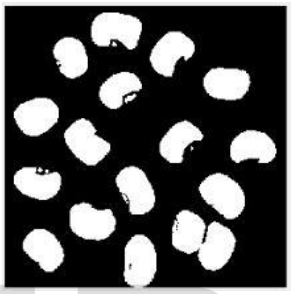
It helps to transform pixel intensity value to reveal certain image characteristics.

- **Enhancement**: Improves contrast.
- **Smoothing**: Remove noises.
- **Gaussian Filter**: Gaussian smoothing is very effective for removing Gaussian noise.

$$g(x,y) = \frac{1}{2\pi\sigma^2} \cdot e^{-\frac{x^2+y^2}{2\sigma^2}}$$

BACKGROUND ELIMINATION:

Background subtraction is widely used approach for detecting moving object in videos or images.



BINARIZATION:

Binarization of an image is a process represents an image using only two different pixel values. It is generally performed by classifies a gray scale image into two groups of pixels.
If the pixel values greater than the threshold is set to a particular grey value and those below the threshold to new grey value i.e,
If f (x, y) > T then f (x, y) = 0 else f (x, y) = 255 where T is a threshold value.

MORPHOLOGICAL OPERATIONS:

The Morphological operation is a group of non-linear components related to the shape or morphology of features in an image. It uses a structuring element which is positioned in all the possible location which is compare to neighborhood pixel of an image.
The two main operations that will be performed under morphology are as follows:

Erosion: It will Eliminate shadow of the grain.

Dilation: It will enhance the image after erosion .Also improves the boundary sharpness.

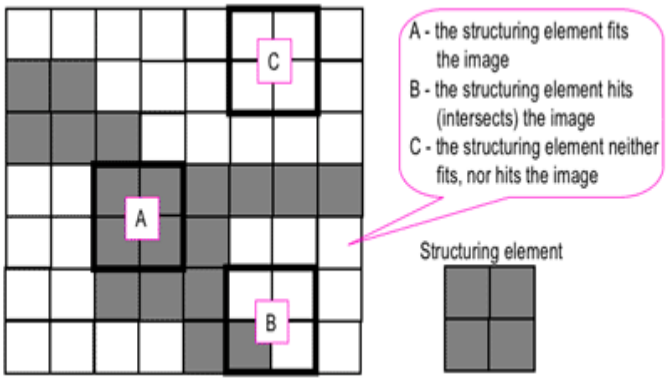


IMAGE SEGMENTATION:

It is used to perform segmentation using component labeling i.e. once the image is binarized it will perform labeling of connected components. Assigning label to every pixel in image i.e. pixel with same label shares the certain characteristics.

FEATURE EXTRACTION:

In this process some qualitative information is being extracted from the objects to be analyzed in the image. The various features that could be extracted are color features, geometrical features and texture features. In this method we have extracted 3 color features and 3 geometrical features.

COLOR FEATURES:

Color features is very important in the classification process. We are going to use the extracted features of color which are red, green and blue i.e.RGB.

GEOMETRICAL FEATURES:

The geometric parameters gives us the basic information regarding the size and shape of the grains.
Area: This refers to the amount of pixels in the region, i.e. the pixels with level "1".
Major Axis Length: Major axis length of the ellipse is same as that of second order normalized central moment of the object.
Minor Axis Length: Minor axis length of the ellipse is same as that of second order normalized central moment of the object.
Convex Area: It is the area enclosing the object with smallest convex shape
Eccentricity: It is defined as the relation between the distance of the focus of the ellipse and the length of the principal axis.

5. CONCLUSION

The main purpose of this project is to provide better approach for identification & detection of grains. Here all measurement are stored in variable 'Grain size' and each measurement direction separately in its own corresponding variable. Variable 'Grain size' probability levels includes the grain size at different probability level and the average grain size is output into variable average grain size. The relative grain size dispersion is sorted in variable. with this we can calculate the grain size.

6.RESULTS

In our project the planned schedule went smoothly and as per the guideline. We are finally able to implement extra features i.e. grain detection.The result achieved thorugh is 98% correct.

7. ACKNOWLEDGE

We would like to thank our project guide Professor. Shaileja Udtewar who has been a source of inspiration. We are also greatful the authorities, faculties of Xavier Institute of Engineering who have helped us to be better aquainted with recent trends in the technology.

8. REFERENCES

[1]Neelamma K. Patil, Ravi M. Yadahalli (2011),"Classification of Food Grains using RGB color model by Combining Color and Texture", Third International Journal on Computer Vision ,Pattern recognition, and graphics,2011.

[2]Huang, X,Y., Li, J, Jiang, S., Study on identification of rice varieties using computer vision,2004.

[3]Majumdar, S. and D.S.Jayas. 2000d. Classification of cereal grains using Machine vision. III.Texture models. Transactions of the ASAE.

[4]L.A.I. Pabamalie, H.L. Premaratne," A Grain Quality Classification System", Institute of Electrical and Electronics Engineers,2010.