Quality Assessment of Wheat grains using Image Processing and Neural Network Algorithm

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Abstract : Wheat is the most favourable cereal of our country. Market for wheat depends on the quality the grains. Currently the type and quality of wheat are assessed by visual inspection method through naked eye. This process is however tedious, time consuming, needs human expertise. To overcome these drawbacks, in this paper, an automated system is introduced which identifies and classifies the wheat grains based on digital image processing techniques. Image processing method is most suitable as it is a non-contact technique where in the image of the wheat grains are captured. The captured images are pre-processed, segmented and features are extracted through MATLAB. From the extracted features the quality of wheat is assessed based on Neural Networks (NN) classifier algorithm.

Keywords: Wheat, Neural Network, Digital Image processing, Geometric Features.

INTRODUCTION

Indian economy is based on agriculture to a larger extent. Due to increase in rapid growth of cultivation technology, the total cultivation area and yield for agricultural products has increased rapidly [8]. India is a leading producer and consumer of pulses in the entire world. Moreover pulses are important part of our diet. The quality of such food grains has been accessed traditionally by human inspectors to detect defects, color, size or strange features and classify the products in its appropriate category [9]. But quality assessment through visual inspection by human inspectors is not up to mark as it is affected by external factors like fatigue, bias etc. To overcome this problem, machine vision and image processing techniques are successfully used for recognition and classification of grain samples [10].

What is Image Processing?

Image processing represents complex field in which the input to the system is an image in any form and the output of the processing obtained after using different filters and tools is the processed image in the form of any parameter related to the image. Image processing is the study of any algorithm that takes an image as input and returns an image as output.

It Includes:

Image compression

Image display and printing

Image enhancement

Feature detection

Image editing and manipulation

Neural Network : It is a series of algorithms which recognize the relationships in a set of data through a process, similar to the way the human brain works.

LITERATURE SURVEY

Zayas et al. [1] image analysis has been used to discriminate between wheat and non-wheat components in a grain sample. Two methods have been presented, multivariate discriminate and a structural prototype method for pattern recognition.

Jaspreet Kaur [2] Image processing techniques provide a way to grade the food grains. In this paper a technique for quality assessment of pulses grains is presented by measuring the pixel area which improves the accuracy of quality assessment of food grains

Yong Wu [3] has been proposed cereal grain size measurement method based on image processing technology. Their method measures the grain size parameters including grain number, area, size, roundness and size distribution. Their method is used to reduce the error in measurement of grain image and also increasing the degree of automation of grain size measurement technique

Megha R. Siddagangappa, [4] has been introduced automated system which is used for grain type identification and analysis of grain quality. This system has been uses the Probabilistic Neural Network classifier. The color and geometrical features are used as attributes for classification

Rubi Kambo [5] has been worked on basmati rice. The system has been given the principle component

analysis approach for classification of different varieties of basmati rice. They have used morphological features like area, major axis length, minor axis length, eccentricity and perimeter for analysis of grain samples

METHODOLOGY

1. **Image Acquisition** (input test image): Image of grain sample is taken by camera. The camera is fitted at fixed distance above from grain sample on conveyer belt. So, here we get our input image.
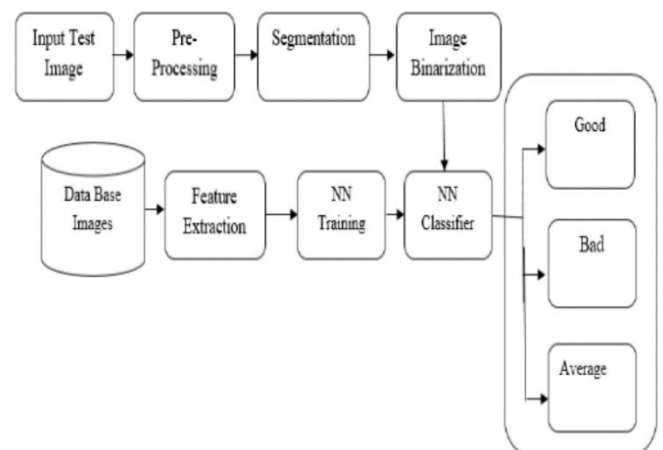

Fig 1. Block diagram of the system

2. **Pre-processing**: In pre-processing first we convert RGB to grey image. And then we place Low pass filter so that the pixel noise can be removed. Applied Gaussian filter for smoothing and Thresholding method to eliminate background.

3. **Segmentation**: In this step, the captured image is resized. The background is eliminated and foreground is extracted which is the region of interest. And then the thresholding is done. Thresholding is used to separate the region in an image with respect to the object, which is to be analysed and this is based on the variation of

intensity between the object pixel and background pixel.

4. **Feature extraction**: In this step, qualitative information about the object is extracted from image. The geometrical features of grain are extracted from sample image. These features are:

    a. Area

    b. Major axis length

    c. Minor axis length

    d. Perimeter.

5. **NN Training/Classification**: NN classifier is first used to train the collective data. And then it classifies the images according to features. In this case we have taken three grades namely Good, Average and Bad.

CONCLUSION

The proposed system has been worked on wheat and rice samples to determine the quality. The analysis is based on shape and size of the grain. The database of hundred images are trained for classification. The classification has been done with the help of NN classifier. It results good, bad and medium quality. This system is fully automated in food industry and gives cost effective solution. Also it is relaxed, reliable and less time consuming.

FUTURE SCOPE

Many research has been going on in this area but converting the prototype into the real time system is utmost necessary. Simple operations and least human intervention leads to the faster grading.

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