International Journal of Electrical and Electronics Engineers
Vol. No. 8, Issue No. 02, July-December 2016
ISSN (O) 2321-2055
ISSN (P) 2321-2045

QUALITY TESTING AND GRADING OF FOOD GRAINS USING DIGITAL IMAGE PROCESSING

Ms.Sushma[1], Mr. Krishan Kumar[2] , Mr. Rajender Kumar[3],

[1.2.3].Department of Electronics And Communication Engineering , BPS Mahilavishwavidyalay Khanpur Kalan , Sonipat , Haryana(India)

ABSTRACT

Food grains are the farming product which require 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 a wrong sampled based observation can completely fails this analysis process. These situations occurs because of lack of availability of such quality measure labs in near region. In this paper, different digital image processing steps such as gray scale conversion ,segmentation, morphological feature extraction and training and testing through feed forward propagation algorithm and k-mean clustering are used and find out the best algorithm for quality analysis of food grains.

KEYWORDS:-Farming and Food Products, Grading and Sorting, Image Processing, Neural Network,Qualitytesting

I. INTRODUCTION

India is the second largest country in producing the food grains in the world. It is mandatory for each government to provide standard food grains product[2]. To resolve this issue there is the quality testing of food grains play an important role. But this is very tedious task to test the quality of food grains manually. To solve these problems we use different digital image processing algorithm for testing and grading of food grains[3].

1.1. Problem Definition

To sort out the best quality food grains product,some times there are some problems may be occur, such as sometimes the variety of food grains looks so similar that to differentiate them became a very tedious task when sort out physically[3]. To overcome these problem, move towards the digital image processing techniques for finding out the best quality food grains[5]. However there are many solution provided by the researcher for find out the best quality food grains products[4]. But in these solutions we can't say that which best solution.In this paper,feed forward propagation algorithm and k-mean clustering methods are used to find out the best solution.

International Journal of Electrical and Electronics Engineers
Vol. No. 8, Issue No. 02, July-December 2016
ISSN (O) 2321-2055
ISSN (P) 2321-2045

II. DIFFERENT STEPS DESIGN AND IMPLEMENTATION DETAILS

2.1. System Design & Flowchart

The basic steps for testing the quality of grains and for the grading of grains are give below :

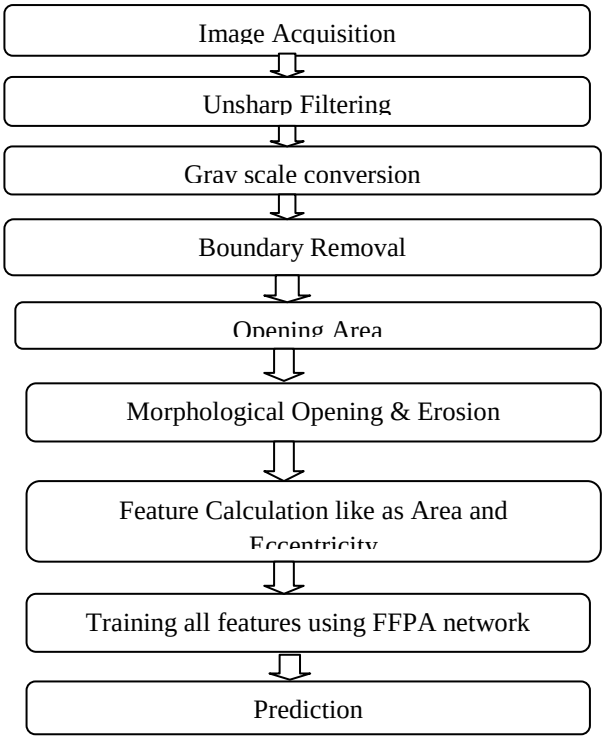

Fig1. Different Steps Performed In The Whole Work[1,2,7,12,15]

2.1.1 Image Acquisation

Mostly the digital image acquisition is done using digital camera and then it is saved. It supports some file formats such as TIF (TIFF), JPG (JPEG), BMP (bitmap), as well as raw format[1].

2.1.2 Image Pre –Processing

Basically the images which are find during image acquisition may not be directly suitable for detection and sorting purposes, such as noise, weather conditions, and poor resolution[1]. Because of some factors images and unwanted background etc. we always try to approve the well-known techniques and study their performances [3]. The steps involved in pre-processing are :

- Input image
- Removing the background
- RGB to Gray conversion
- Gray to Binary conversion
- Unsharp filtering
- Boundary removal

International Journal of Electrical and Electronics Engineers
Vol. No. 8, Issue No. 02, July-December 2016
ISSN (O) 2321-2055
ISSN (P) 2321-2045

2.1.3 Morphological Operation

The Morphological Operators are defined as the set of numerical operators that take the input in matrix shape and execute the geometrical configuration based operation under set theory[1]. This algorithmic approach is the combination of set theory, lattices and the topological operations. Digital image processing is the major function of morphological operator where the image or the image regions are considered as the input object[15].

(a)Dilation: Due to dilation operation images have becomes thickens. And it is based on the structuring element that how much it should be thicken. The dilation (+) process combines two sets with the help of vector addition[15].

(b) Erosion: The erosion operation performs thinning process of the object. This operation is decided by structuring element. Erosion (-) combines two sets with the help of vector subtraction of sets elements[15].

(c)Opening: Opening is basically the process of erosion which is done by dilation is called opening.

(d)Closing: Closing is basically the procedure of dilation which is done by erosion is called closing.

2.1.4 Ffpa (Feed – Forward Propagation Algorithm)

One of the most trendy neural network algorithm is feed forward propagation algorithm .In this algorithm after findig the weights of the network arbitrary, essential corrections are done using feed forward propagation algorithm[12].

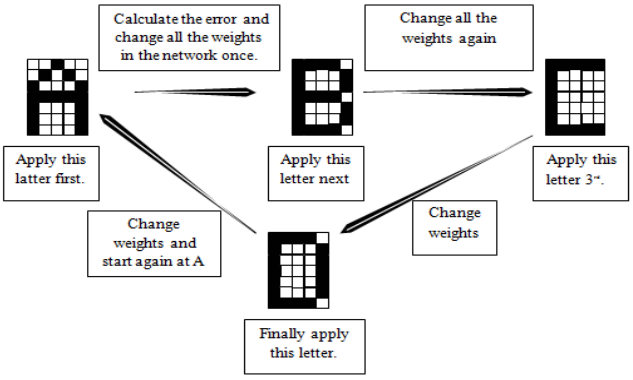

Fig2. Flow Diagram of FFP Algorithm for Testing the Weight[12]

III. RESULTS AND DISCUSSION

The snapshot shown here gives the step by step procedure to run the algorithm and how we will get results.And how image is represented in MATLAB platform and how it works.

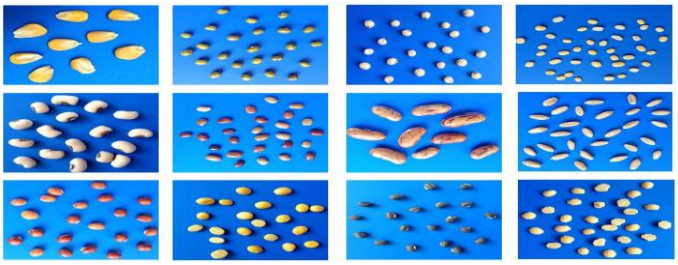

Fig.3.Input Image of Different food Grains [4]

International Journal of Electrical and Electronics Engineers
Vol. No. 8, Issue No. 02, July-December 2016
ISSN (O) 2321-2055
ISSN (P) 2321-2045

Step 2: After loading image in programme, our next step is to make it compatible with MATLAB platform. MATLAB works only in the matrix form.

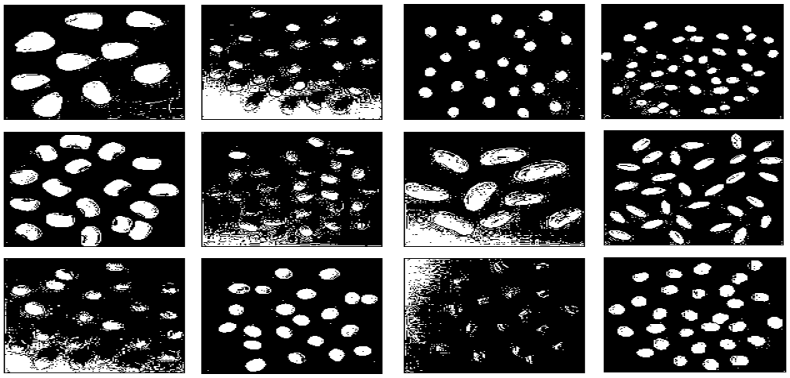

Fig.4.Different Food Grains Images Which are Compatible with MATLAB Platform.

Step 3: Now to make small segments of the complete image, a mixture of small segments makes a group of similar type. So to perform the next step we need to go through segmentation process.

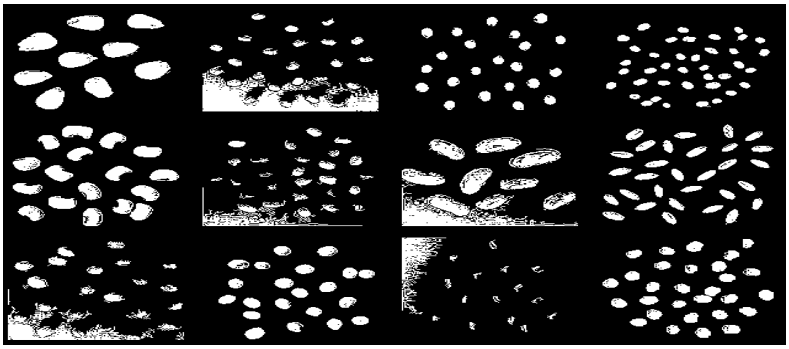

Fig.5. Segmentation Process of Different food Grains Image

Step 4: All these segments have some properties and out of which some are similar to other segments and some are different from others. So now we there is a requirement to take out the features from all segments.

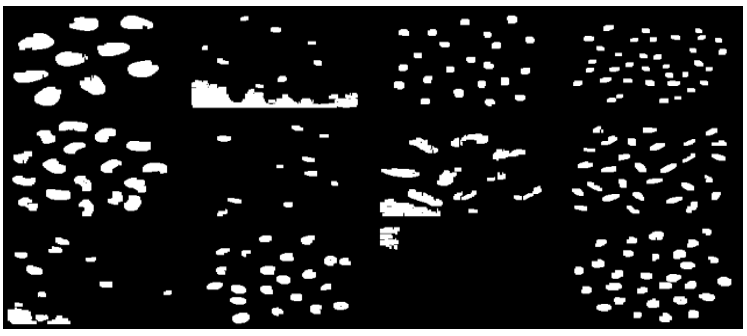

Fig.6.Feature Extraction for all Segmented Image of food Grains.

International Journal of Electrical and Electronics Engineers
Vol. No. 8, Issue No. 02, July-December 2016
ISSN (O) 2321-2055
ISSN (P) 2321-2045

Step 5: This step is performed on the basis of testimony collected from the last step. This is a clustering performing step.Here a a technique for making cluster that is k-mean clustering technique is used. A cluster is collection of similar type segments. The features which are similar is collected on a common place.

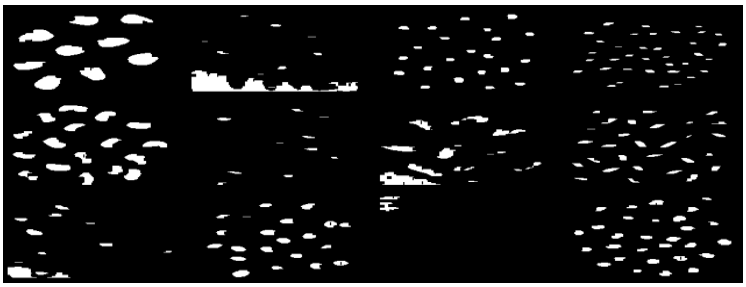

Fig.7.Apply K-mean Clustering Technique for the same Featured Grains Image.

Step 6: The performance find out from the last step is recorded. Now to improve the performance ,a new technique that is feed forward propagation technique is needed. This technique will improve the accuracy for grading the food grains quality.

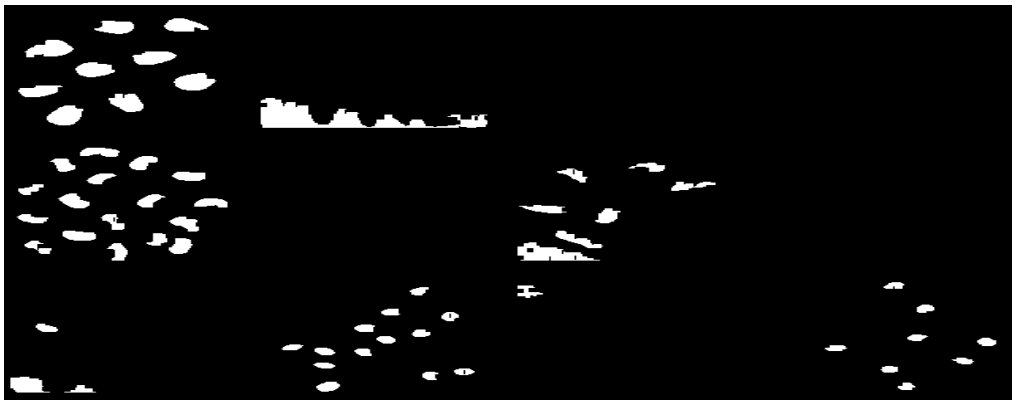

Fig.8. Apply Neural Network for Grading and Testing food Grain

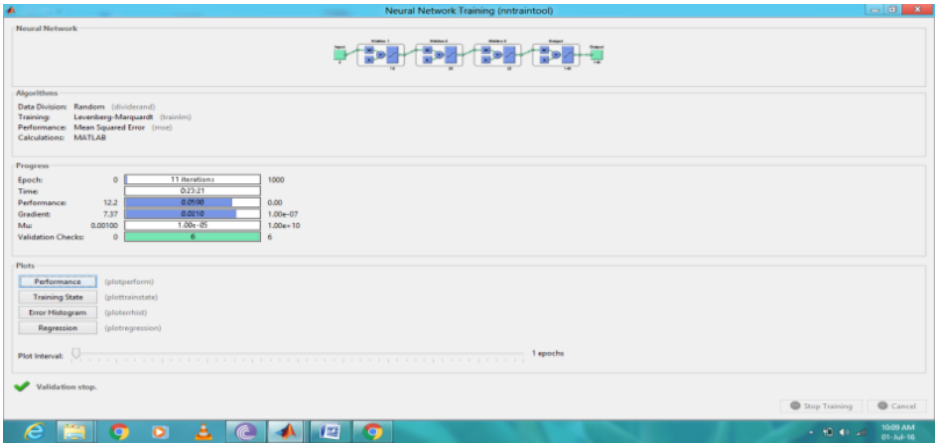

Fig.9. Platform of Neural Working which Represent Some Parameter of Neural Network

International Journal of Electrical and Electronics Engineers
Vol. No. 8, Issue No. 02, July-December 2016
ISSN (O) 2321-2055
ISSN (P) 2321-2045

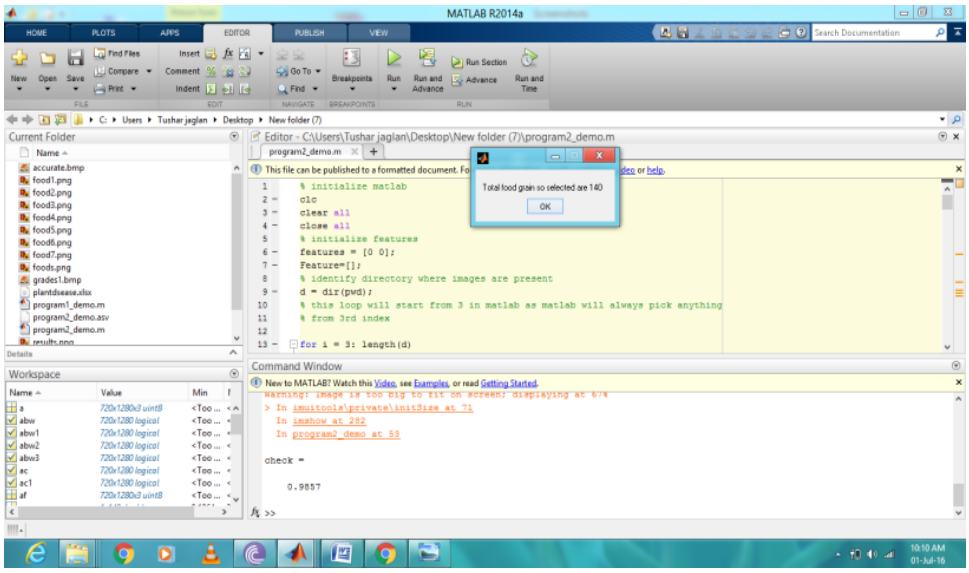

Fig.10.The Window Showing That How Many Food Grains Are Selected

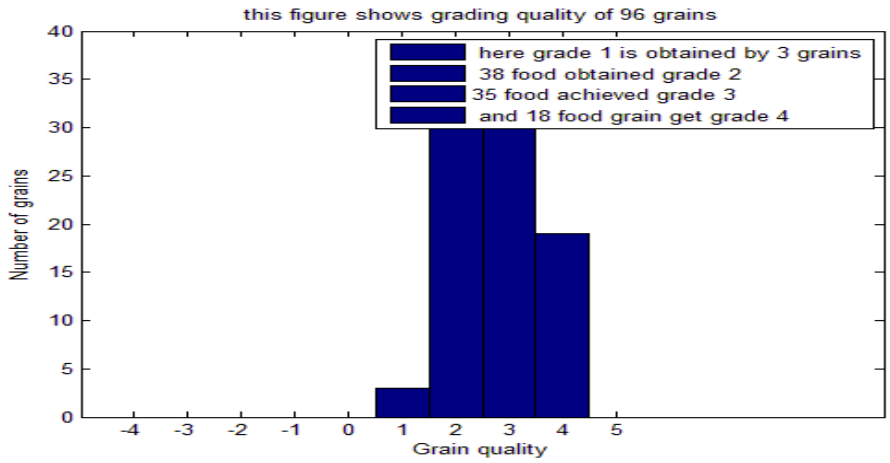

Fig.11.The Analysis Represent Grading of 96 food Grains of Different Type

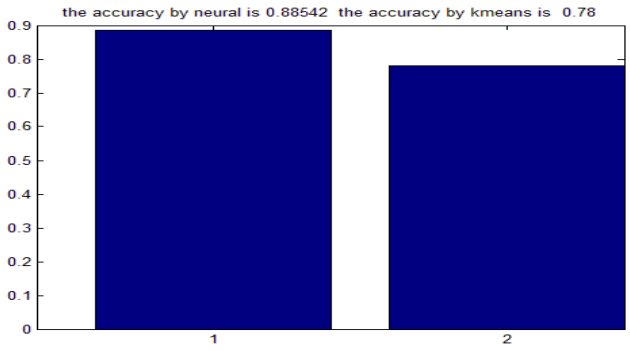

Fig.12.A Comparative Analysis of Neural Network Network and K-Mean Clustering Technique on Basis of Accuracy

International Journal of Electrical and Electronics Engineers
Vol. No. 8, Issue No. 02, July-December 2016
ISSN (O) 2321-2055
ISSN (P) 2321-2045

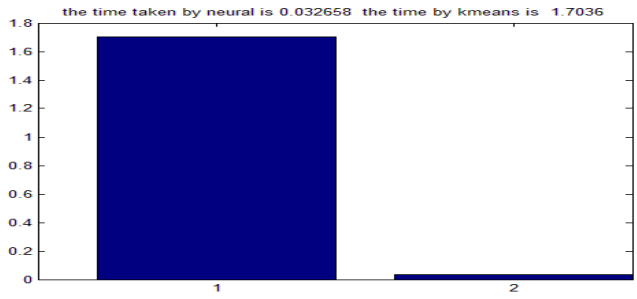

Fig.13. A Comparative Analysis of Neural Network and K-Mean Clustering Technique on Basis of Time

Sr. No.	Technique Name	Accuracy %	Time (in seconds)
1.	K-mean	0.78	1.7036
2.	Feed forward Neural Network	0.88542	0.032658

Table 1. Comparison Table for Accuracy and Time Through Neural Network and K-Mean Clusterin

IV. CONCLUSION

Feed forward propagation algorithm is profitably applied for grading granules. 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.Here up to 96 images were used to test the system Quality. Testing of accuracy of grains is 0.78% for K–mean clustering and 0.88542% for neural network .Here a simple process is proposed for testing and grading of food grains which require only limited features and thus overcoming the disadvantages like tiredness and time expenditure. The experimental results show that the proposed method developed in this study gives better accuracy.

REFERENCES

[1] "Digital image processing using MATLAB " Third edition" by Rafael C. Gonzalez.

[2] N. M. Z. Hashim, N. H. Mohamad, Z. Zakaria, H. Bakri, F. Sakaguchi, "Development of Tomato Inspection and Grading System using Image Processing". Published in International Journal Of Engineering And Computer Science, Volume 2 Issue 8, pp. 2319-2326, August, 2013.

[3] Kantip Kiratiratanapruk, Wasin Sinthupinyo, "Segmentation Algoritm for Touching Round Grain Image". Published in International Conference on Electronics and Information Engineering, Volume 1, pp. 263-266, 2010.

[4] R.Kiruthika, S.Muruganand, Azha Periasamy, "Matching Of Different Rice Grains Using Digital Image Processing". Published in International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, Issue 7, pp. 2937-2941, July 2013.

[5] Jagdeep Singh Aulakh, V.K. Banga, "Percentage Purity of Rice Sample by Image Processing". Published in International Conference on Trends in Electrical, Electronics and Power Engineering, pp. 102-104,2012.

[6] Mayur P. Raj, Dr. Priya R. Swaminarayan, "Applications of Image Processing for Grading Agriculture products". Published in International Journal on Recent and Innovation Trends in Computing and Communication, Volume: 3 Issue: 3, pp. 1194 – 1201, March 2015.

[7] Megha R. Siddagangappa, Asso.Prof. A. H. Kulkarni, "Classification and Quality Analysis of Food Grains". Published in IOSR Journal of Computer Engineering, Volume 16, Issue 4, Ver. III, pp. 01-10, Jul – Aug. 2014.

[8] Tadhg Brosnan, Da-Wen Sun, "Improving quality inspection of food products by computer vision—a review". Published in Journal of Food Engineering, pp. 3-16, 2004.

[9] Aasima Rafiqa, Hilal A Makroob, Poonam Sachdevaa and Savita Sharma, "Application of Computer Vision System in Food Processing- A Review". Published in Aasima Rafiq et al Int. Journal of Engineering Research and Applications, Vol. 3, Issue 6, pp.1197-1205, Nov-Dec 2013.

[10] Jaspreet Kaur, 2Vijay Kumar Banga, "Image Processing in Quality Assessment of Pulses". Publioshed in IJCEM International Journal of Computational Engineering & Management, Vol. 17 Issue 2, pp. 26-28, March 2014.

[11] Sheetal Mahajan, Sukhvir Kaur, "Quality Analysis of Indian Basmati Rice Grains Using Digital Image Processing- A Review". Published in International Journal of Comupter Science and Information Technologies, Vol. 5, Issue 2, pp. 2358-2360, 2014.

[12] Nandini Sidnal, Uttam V. Patil, Pankaja Patil, "Grading And Quality Testing Of Food Grains Using Neural Network". Published in International Journal of Research in Engineering and Technology, Volume 02, Issue 11, pp. 545-549, Nov-2013.

[13] Abirami. S, Neelamegam. P, Kala. H, "Analysis of Rice Granules using Image Processing and Neural Network Pattern Recognition Tool". Published in International, Volume 96– No.7, pp. 20-24, June 2014.

[14] Neelam, Jyoti Gupta, "Identification and Classification of Rice Varieties using Neural Network by Computer Vision". Published in International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 4, pp. 992-997, 2015.

[15] AmanChadha, SushmitMallik, RavdeepJohar, "Comparative Study and Optimization of Morphological Feature-Extraction Techniques for grains Image Retrieval" International Journal of Computer Applications (0975 –) Volume 52– No.20,pp.0975-0979, August 2012.

[16] H. Sardar, "A role of computer system for comparative analysis using image processing to promote agriculture business," International Journal of Engineering Research & Technology, vol. 1, no. 9, 2012.