

Survey on Classification of Rice Grains Using Neural Network

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Abstract: The Rice is a very useful food for human. Basically, it is cropped by all humans consumed in the overall world, mostly in Asian countries. Basically, it is classified based on the grain shapes; color, etc. This paper presents the use of machine vision system for the grain classification. Different features of the rice grain are depending on different rice grains. An automated system is introduced which can be used for rice grain type identification and classification where the digital image is classified. Images are acquired for the rice using camera. In that, image processing techniques, segmentations, feature extractions are performed on the acquired images. That can be extracted features from the rice grain in non-contact manner. In this we also discuss and suggest methods to classify seven varieties of rice and it also finds the percentage of purity of rice using the grain. The techniques of image processing based on the several features such as major axis length, minor axis length, Area etc.

Keywords: Grain classification, Image processing, MATLAB techniques, Segmentation, Neural network.

I. INTRODUCTION

Rice is a single most important food in the Asian countries, especially in Sri Lanka. Averagely 37% cultivation of in Sri Lanka [1]. Rice is a seed belongs to the Poaceae family. It is seed belongs to the grass type Basmati, Chhapi, Gujarat-17, Jirasar, Masoori, Parimal, Ponia. Rice is produced in several areas throughout the world. The India is the second country for the production of rice in the entire world [2]. Commercial value, genetic characteristics, depends on the type of rice variety type. The grade and price of rice grain are decided by this factor, for the future rice industry development and dissemination are new factors.

An accurate identification of rice seeds is very important when classifying rice varieties. Manual classification methods are being used largely by local industry to differentiate rice grain by local geometric parameters. These works propose a method that processes the captured still digital image of rice grains and extract the relevant features. Morphological features of rice grains are used to check the types of rice. Image processing techniques are applied to extract various types of rice grains and classified the rice grain based on the several features. The collected features are help full to Neural Network Pattern Recognition patterns for categorizing of granules of rice [8].

In this paper Section 1 contains the introduction of the rice and systems. Section 2 contains the related work of the previous papers authors' information. Section 3 contains the methodology of the system; it also includes the flow chart of

the system. Section 4 is contained the experimental result of the system. Section 5 is Contains the conclusion and future work of the system.

II. RELATED WORK

Some work for classifying for grading of rice grains are reported. Kasun Hearth [1] it has given the methods are gradation and classification for various rice grains. For the identification and classification neural network is used. Ozan aki [2] presented a work on geometric feature extraction of rice grains for the techniques image processing. Rexce J[3] is implemented Neural Network Pattern Recognition Tool and Image processing for Analysis of Rice Granules. Anusha Anchan [4] presented the paper proposed digital method which can evaluate the quality of rice for the present Agmark Standards formulated to help of Image processing techniques on Matlab. Dr. Kumar kumbhakar [5] presented an Automatic evolution method for the determination of the quality of milled rice. Nikhade Pratibha [6] presented an automatic evolution for determination of the quality of milled rice. An automated system is introduced which is used for grain type identification and analysis of rice quality and grade using probabilistic Neural Network by Dr V.K .Banga [7]. The wan putrid N.W.M tapir [8] it gives the new principal component analysis for classification of various varieties of Basmati Rice. Dr, Muhammad anjar alam [9] proposed a work where image processing technique was use an attempt to automate the process which overcomes the drawback of manual processes. This paper provides the

quality assessment of rice based on its size. Prof P.M Soni [10] made a study, they showed a use of support vector machine and classifying and grading of rice grains.

III. METHODOLOGY

Architecture of rice grain proposed identification system is shown in Fig 1. An objective of the project is to design of the rice grain classification and identification system using its morphological features, which classify the types of rice grains using neural network.[4]

There are four rice of variety were selected as experimental grain materials shown in Fig 2. These varieties were grown in different zones in india. Rice grain samples are considered are : Basmati, chhapi, Gujarat-17, Jirasar, masoori, parimal, ponia.

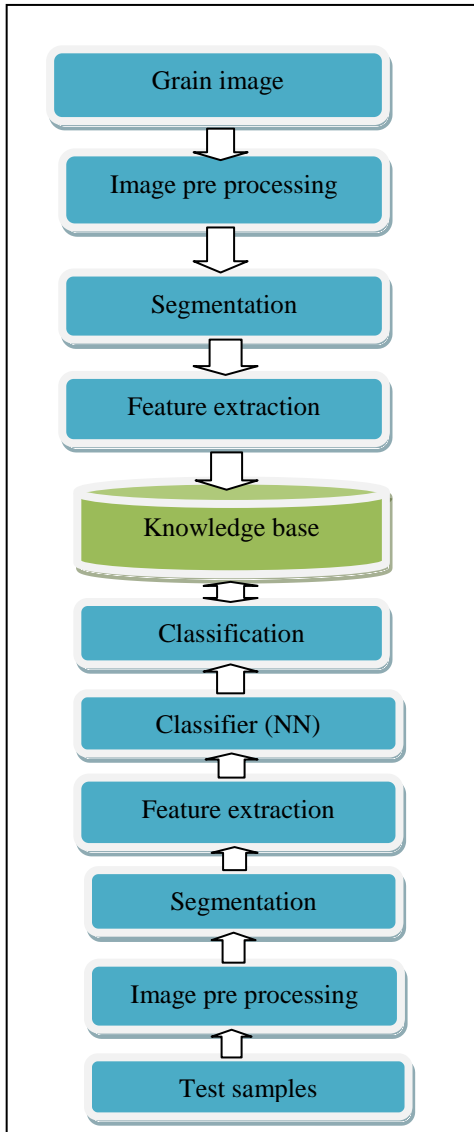


Fig 1. An Architecture of system.

Using digital camera acquisition is carried out. On a fix stand camera was mounted. Were Grains are arranged in non-touching pattern and that images are acquired and stored in JPEG format for later analysis. The Size of the image was reduced into 448 x 336 pixels [7].

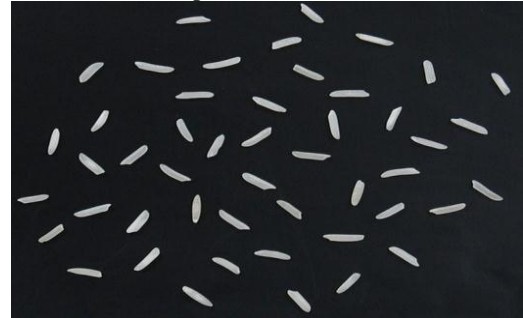


Fig 2 Basmati Rice

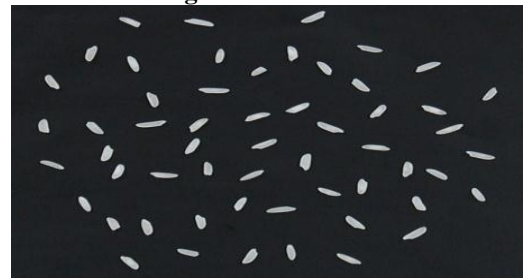


Fig 3 Jirasar Rice.



Fig 4 Ponia Rice.



Fig 5 Parimal Rice.

Image preprocessing:

The main goal of the Image preprocessing is to increment of data, image so that can be purpose of foe further processing Distortion or enhances some image features. For human viewing, Image enhancements improve the quality and clarity of images. Removing noise and blur, rising contrast and enlightening details from examples of the enhancement

operation[2].Pre-processing step scard out in the works are using Matlab tools:

- A. Gray scale conversation
- B. Smoothing using median filtering.
- C. Image Segmentation.
- D. Area opening.
- E. Labeling of regions.

Gray scale image

In the Gray scale image the value of a pixel is a single sample that is obtained only intensity information. Images of this sort, also known as The black and white images are known as Images of the sort. That are composed shade of gray, differs native of black at the weakest intensity to white at the strongest = `rgb2gray` (RGB) converts true color image RGB to the gray scale intensity image I. `rgb2gray` converts RGB images to grayscale images by reducing hue and saturation details while retaining the luminance[1].

Median filtering

Median filtering is a nonlinear process helpful to reduce impulsive, or salt and paper noise. While eliminating random noise it can be help to preserve edges in the image. In a median filter,[8] a window slide along the image ,and the median intensity value of the pixels within the glass become the output of the strength pixels organism process. Median filtering smooth image and it's helpful to noise reducing. Without affecting the other pixels the low pass filtering , median filtering are preserved to discontinuities for function[5] .

Image segmentation

The purpose of Image segmentation is to modify and present the image into something that is easy to important and easier to evaluate. The use of Image segmentation is located objects and boundaries in images. These works are carried out segmentation of an image into foreground and background using global thresholding.segmentation is use global threshold where binary image is computed by y threshold. Fig 3 shows the segmentation of an input image using a global threshold at threshold value 55.

In this case $y(i,j) = 1, \text{if } I(i,j) > \text{th}, \text{else } y(i,j) = 0$. Ideally, $y(i,j) = 1$ if the pixel (i,j) belongs to the rice region ,and if it is 0 belongs to the background[6].

Segmentation using threshold and zero background



Fig 3 Segmentation of Rice image at threshold = 55

Area opening

It is also known as eliminating of small regions or isolated pixels. The new segmentation, image might have isolated pixels they correspond to noise in the background. In that using the function `bwareaopen` (BW,P) the pixels are eliminated .This function removes from binary image all connected components which have fewer than P pixels[9] .

Labeling of regions and connected components

In that order to perform pattern recognition approach each isolated region is labeled using the command ' `bwlabel`' . `L = bwlabel` (BW, n) returns a matrix L, of the size as BW, containing the labels for the connected objects in BW. The connected components CCfound in BW returns using `bwconncomp`. Binary image BW has multiple dimensions. There are four fields,CC structure.`bwconncomp` use to 8 connected components two dimensions[10].

Feature extraction

Using the Function of region props () the Rice grains Feature is extracted. The features extracted are: Area, Major axis length, Minor axis Length, Eccentricity, centroid, etc [8].

Training of neural network

The nprtools leads through solving a pattern recognizing classification difficulty using a two layer feed forward pattern net network of sigmoid output neurons [2]. A three layer feed forward network is classified vectors arbitrarily through the sigmoid hidden and softmax output neurons.

Neural network architecture

The default network for pattern recognition is, pattern net is a feed forward network ,which is created using a function `pattern net` () with a number of hidden layer size as an argument.

- The pattern recognition neural network is built with
- input layers have Eight neurons.
- 'n' neurons in the hidden layers have 'n' neurons.
- output layers have seven neurons[7].

The number of neurons in input layers is depends on the numbers of input elements(features) and the number of neurons in the output layers is same to the number of the element in target vector. A neural network training,performance mainly depends on the number of hidden layer neuron. Usually as the number of hidden layer neurons increased performance of the neural network is also elevated. But the consequences of increases the number of neurons will complicate the network. This work has provision for sitting any number of hidden layer sizes during neural network training. Eight featuresareconsideredareArea, majoraxislength, Minoraxislength, centroid, eccientricity, convex area ,orientation .This works are carried out by considering 56 sample images of seven types of rice grain.I.e,basmati, Gujarat 17, jirasar, parimal, ponias, masoori, chhapi ,each image contains approximately 48

grains .This system is also designed to take any number of sample images for input feature data set creation[7].

Training network

A supervise learning backpropagation algorithm is used to find the function that best maps to set of inputs to its correct output and these are used to train feed forward network .The mat lab neural network tools to provide various backpropagation algorithms to train back pattern recognition neural network. These algorithms are implemented as a function in mat lab. These functions take network, feature dataset and target data set is input arguments. Yield these functions are newly trained network and training record.

Input vector = Input vector is a 9 x 2688 matrix, representing static data: 8 features of 2688 rice grains.

Target vector = Target vector is a 9 x 2688 matrix, representing static data: 7 classes to which input data set are mapped[10].

IV. EXPERIMENTAL RESULT

Experiments are carried out with 56 sample rice images. In that each image containing 48 rice grains these image samples are used to create the input feature dataset. Once a training feature dataset and target data set is created the feed forward pattern recognition neural network is created and trained.

In these works there is a provision for selecting neural network training algorithm and also the number of hidden layer size. An experiment is carried out with approximately 2688 rice grain basmati, Gujarat-17, chhapi, masoori, parimal, ponia, jirasar rice with 48 grains of each type respectively. The Input feature data set is created using these images to train a neural network. The result of a train neural network using different algorithm and hidden layer sizes. The result of the classification is obtained by confusion matrix in the form of percentage of classification of accuracy. Once the network is trained it is used to identify the type of rice. Based on the training performances, the best trained network is used for identification of rice types[1].

V. CONCLUSION AND FUTURE WORK.

This work presents a classification of accuracies for rice grain presents through image processing with neural network architecture. The processing of imagery and the attentive collection of the variety considered in this effort for extracting features from rice granules considerably abraded the difficulty of the classification problem. For grading rice granules the neural network Pattern recognition tool is applied. The developed neural network is adapted for classifying and identifying the grains with the accuracy of 75%.The preliminary work presented in the paper could be further enhanced by focusing on different sampling methods, sample preprocessing techniques, different features, and

different neural network model to match the requirements of the rice industry[5].

REFERENCES

- [1]. Kasun Herath, "Rice grains classification using image processing techniques", Research gate, December 2016.
- [2]. 2.Ozan aki,Aydin Gullu,Erdim Ucar, "Classification of Rice Grains using Image processing and machine larning techniques." , International scientific conference,20-21 November.
- [3]. Rexte J, Usha kigsly Devi K, " clasificaion of Miled Rice Using Image Processing", International journal of Scientific and engineering research, Vol 8, Issue 2, February 2017.
- [4]. Anusha Anchan,Shabari Shedthi B, "Classification and Identification using Neural Network", International Journal of Innovative research in Computer and Communication Engineering, Vol 4 ,Issue4, April2016
- [5]. Dr, prashant kumbharkar, Priyanka Upale, "Application for Rice quality Assement and classification using Image processing Technique." ,International journal of Innovative research in Computer and Communication engineering, Vol 4, Issue 10, October 2016.
- [6]. Nikhade Pratibha, More Hemlata, "Analysis and Identification of Rice Granules Using Image processing and Neural Network", International Journal of Electronics and Communication engineering, Vol 10, Issue 1, 2017.
- [7]. Jagdip singh Aulakh ,Dr ,V.K.Banga , " Grading of Rice Grain by Image Proceasing", International Journal of Research and Technology, Vol 1 ,Issue 4, June 2012.
- [8]. Wan putrid N.W.M tahir ,Nor haida Hussian , " Rice Grading Using Image Processing", ARPN journal of Engineering and Applied Sciences, Vol 10 ,Issue 21, November 2015.
- [9]. Prof, P.M Soni, "A Review on Identification of Rice Grain Quality Using Matlab and Neural Network." International Journal of Innovations in Engineering Research and Technology, Vol 4, Issue 1, January 2017.
- [10]. Dr muhammd anzar Alam,Engr Zahida parveen, "Assement and Quality of Rice Grain Using Optical and Image processing Technique." ,International conference on computing communication and digital system 2017.