ABSTRACT

Rice is the most favorable and most consuming food for all the human being in all over the world. Market for rice depends on the quality of it. Currently the type and quality of rice are assessed by visual inspection method through naked eye. This process is however tedious, time consuming, needs human expertise and depends on physical fitness of the inspector. To overcome these drawbacks, in this paper, an automated system is introduced which identifies and classifies the rice 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 rice grains are captured. The captured images are pre-processed, segmented and features are extracted through MATLAB. From the extracted features the quality of rice is assessed based on Neural Networks (NN) and Support Vector Machine (SVM) classifier algorithms. A comparative study is made between these two methods and the results infer that SVM based classification outskirts its counterpart.

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Chapter 1
INTRODUCTION

1.1 Introduction:

Grains are the prime crop for our country to increase the agricultural income. Also, yield is the most noticeable characteristic to farmers while the crop is in the ground, but when the milled rice reaches the market, quality becomes the key determinant of its sale-ability. These grains consist of several impurities like stones, weed seeds, chaff, and damaged seeds etc. The automation level of testing quality of grain is low and most work is done by manpower. The workload is so mass that it will lead to workers fatigue and need them to have sample testing experience. And it also makes the testing more costly and long to be made. With the development of import and export trade this contradiction is more and more outstanding. During grain handling operations, types of grain and their quality is required at several stages before the next operation can be determined and performed. In the present grain handling system, grain type and quality are rapidly assessed by visual inspection. This analysis process is, however, tedious and time consuming. There is no convenient method to identify these inferior quality grains in the market. Therefore, this has become a serious issue for the consumer. The farmers are affected by this manual activity. Therefore, it is required to explore the possibility of using technology for a suitable solution. The accuracy of quality checking by using manual method is varied from person to person and it also depends on working stress, persuasion and loyalty for traders and also the knowledge and experience of inspectors are required to accurately perform this evaluation process.

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1.2 Literature survey:

1.2.1 Title 1: Rice Grain Identification and Quality Analysis using Image Processing based on Principal Component Analysis

Author: Muhammad Junaid Asif

Department of Mechatronics & Control Engineering, University of Engineering & Technology, Lahore; Tayyab Shahbaz; Syed Tahir Hussain Rizvi; Sajid Iqbal '06 May 2019'

Content: Different types of foods are available in grain form, but rice is one of the important and most used cereal grains of Pakistan and all over the world. Quality inspection of rice grain is also important for both local as well as export purpose. It is necessary to propose an automatic solution to perform the quality analysis as well as to distinguish between different classes of rice. Main purpose of this paper is to present an image processing-based solution to classify the different varieties of rice and its quality analysis.

1.2.2 Title 2: Rice Quality Analysis and Classification Using Image Processing Techniques

Author: Vijay Sonawane1 ; Nikhil Gaikwad2 ; Hrushikesh Mandekar3 ; Kishore Baradkar4 ; Chetan Gunjal5 2021, IJCSMC

Content: More than half the world's people consume rice every day and fulfills over 21% calorific requirement of world population. It is considered the whole grain which is rich in fiber and it contains 80 percent with protein, phosphorus, and potassium. There are hundreds of different varieties of rice and each rice grain has a unique shape, texture, and flavor that make it just right for certain dishes. The quality of rice between various types has different standards. Therefore, you must select the best quality rice because rice with best quality is not only good for consumption but also good for health.

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1.2.3 Title 3: Computer Vision and Machine Learning Analysis of Commercial Rice Grains

Author: Aimi Aznan,[1,2] Claudia Gonzalez Viejo,[1] Alexis Pang,[1] and Sigfredo Fuentes 2021 Sep 23.

Content: Rice quality assessment is essential for meeting high-quality standards and consumer demands. However, challenges remain in developing cost-effective and rapid techniques to assess commercial rice grain quality traits. This paper presents the application of computer vision (CV) and machine learning (ML) to classify commercial rice samples based on dimensionless morphometric parameters and color parameters extracted using CV algorithms from digital images obtained from a smartphone camera. The artificial neural network (ANN) model was developed using nine morpho-colorimetric parameters to classify rice samples into 15 commercial rice types.

1.2.4 Title 4: Machine vision based quality analysis of rice grains

Author: T. G. Devi, Periasamy Neelamegam, S. Sudha 2017 IEEE

Content:

In machine vision based testing, we take both physical (grain shape and size) and chemical characteristics (amylose content, gel consistency) for evaluation and grading of rice grains. Quality assessment is done by finding 1) the region of boundary and 2) the end points of each grain by measuring the length, breadth and diagonal size of grain. In this proposed image processing algorithm, quality and grading of rice grains were analysed using the average values of the features extracted and it was implemented in Mat Lab.

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Chapter 2

SYSTEM ANALYSIS

2.1 Existing system:

- In existing system normally they can identified by manual only. Those are easily identified village people and old persons.
- Now a days it is so difficult to identified the rice quality checking.

2.2 Proposed system:

- Consumers of today are very conscious about the quality of food grains. In order to ensure the quality of rice grains, an automated rice grain quality assessment system based on ANN and SVM classifiers has been addresses in this research work. Two types of rice grains viz. Ponni and Matta are taken up for study.
- The proposed system identified and classified the rice grains based on their morphological and geometrical features. The experimental analysis showed that the proposed ANN classifier has an overall accuracy of 83%, whereas SVM resulted in 91%.
- On the other hand, when the other parameters are considered, such that the computational time and parallel processing (classifying more than one samples at a time), the performance of SVM is far better than its counterpart.
- The reasons may be due to imbalance training ratio. It is concluded that the proposed system can effectively classify the type of rice grains.

2.3 Block diagram:

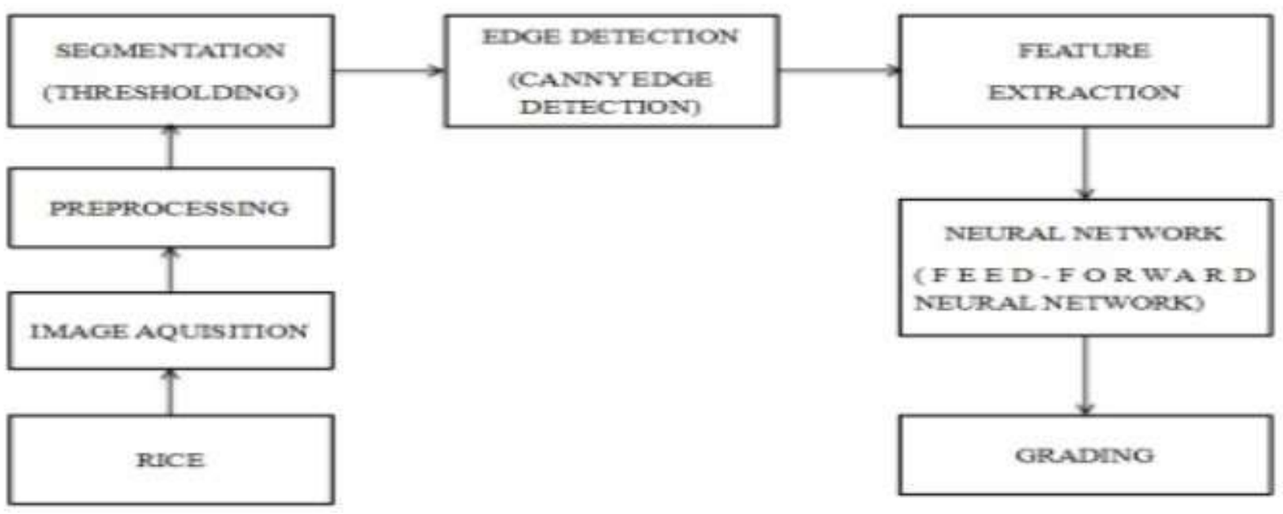

Fig:2.1

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2.4 Modules:

- In first module we collect the images of data set and going to pre-processing it.

In pre-processing the images can be covert into frames and it will convert into gray scale.

- In second module adding filtering techniques

In this module we can get what we want in the image, by using filters and morphological techniques.

- In third module we can detect the rice grains.

In this module for detecting the rice grains, we are using edge detection and segmentation.

- In the final module we can Quality analysis of rice grains.

In this module rice can be analysed using neural networks.

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Chapter 3

SYSTEM DESIGN

3.1.1 Image processing

Image processing is the technique to convert an image into digital format and perform operations on it to get an enhanced image or extract some useful information from it. Changes that take place in images are usually performed automatically and rely on carefully designed algorithms.

Image processing is a multidisciplinary field, with contributions from different branches of science including mathematics, physics, optical and electrical engineering. Moreover, it overlaps with other areas such as pattern recognition, machine learning, artificial intelligence and human vision research. Different steps involved in image processing include importing the image with an optical scanner or from a digital camera, analysing and manipulating the image (data compression, image enhancement and filtering), and generating the desired output image.

The need to extract information from images and interpret their content has been the driving factor in the development of image processing. Image processing finds use in numerous sectors, including medicine, industry, military, consumer electronics and so on.

In medicine, it is used for diagnostic imaging modalities such as digital radiography, positron emission tomography (PET), computerised axial tomography (CAT), magnetic resonance imaging (MRI) and functional magnetic resonance imaging (fMRI). Industrial applications include manufacturing systems such as safety systems, quality control and automated guided vehicle control.

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