WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Quality Testing of Rice Grains Using Image Processing.

[1]Narmada B Assistant Professor, [2]Praveen kumar S, [3]Sangeethkumar P, [4]Sekar K A, [5]Tamilselvan G.

[1,2,3,4,5]Department of Computer Science and Engineering, Dhirajlal Gandhi College Of Technology, Salem.

A B S T R A C T

The main crop for our nation to boost agricultural income is grains. Several contaminants, including stones, weed seeds, chaff, damaged seeds, etc., are present in these grains. Low automation levels and a large human workforce are required for assessing grain quality. Additionally, it increases the cost and length of the testing process. This contradiction is becoming more and more obvious as import and export trade expands. Prior to performing the next process during grain handling procedures, several types of grain and their quality are necessary. In contrast to the chemical approach, machine vision or digital image processing is a non-destructive method that is also a highly convenient and inexpensive process. In order to identify different types of grains and determine the purity of grains using image processing techniques based on various parameters including grain size and shape, we proposed a grain classification system based on machine learning and image processing algorithms. The Python programming language and Python software are used for all operations. Images are collected from a dataset that includes images of food grains. On the captured images, feature extractions, segmentation, and image processing techniques are applied. That can be extracted in a non-contact method from the grains. This paper will also discuss and offers suggestions for how to categorize different types of food grains. It also determines the purity of the grain using image processing techniques based on characteristics like major axis length, minor axis length, area, and others.

Keywords: Image Processing, Python.

1. Introduction

Rice is a favourable and high consumed food grain in Asian countries. It can be easily found all over the world. In the rice market, the key determinant of milled rice is quality. The quality measurement becomes more important with import and export trade. Rice Quality varies according to impurity content and each type of rice have different quality based on the physical features. The main purpose of the proposed method is to offer alternative ways for quality control and analysis which reduce the required effort, cost and time. Image processing and Machine Learning are significant and advanced technological area where important developments have been made. Quality control and analysis plays a vital role in agricultural and farming. Quality is analysed visually by a veteran person and technician. But the effect of each measurement is changing in results and prolonged, so to overcome the traditional methods advanced techniques i.e. Image processing is projected. Image Processing manipulates images for performing some operations on targeted images to get an improved and desirable image. And extort some valuable information from the input image. All types of data have to go through three general phases: pre-processing, enhancement and display, and information extraction.

IMAGE PROCESSING

Image processing basically includes the following three steps.

- Importing the image with optical scanner or by digital photography.
- Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.
- Output is the last stage in which result can be altered image or report that is based on image analysis.

Purpose of Image processing

The purpose of image processing is divided into 5 groups. They are:

- Visualization - Observe the objects that are not visible.
- Image sharpening and restoration - To create a better image.
- Image retrieval - Seek for the image of interest.
- Measurement of pattern – Measures various objects in an image.

- Image Recognition – Distinguish the objects in an image.

Types

The two types of methods used for Image Processing are Analog and Digital Image Processing. Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques. So analysts apply a combination of personal knowledge and collateral data to image processing.

Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre- processing, enhancement and display, information extraction.

Problem Statement

There is no efficient tool available in the market to grade the grains, rice, lentils or the other products of the farm. The traditional method which is being practiced since decades is by human inspection. The human inspection comes with a lot of variables depending on factors such as knowledge, experience, alter motives, etc. This leads to unfair grounds for doing business. Hence, there is a need for developing an integrated tool for not only identifying the farm products but also grade them efficiently. This will help in maintaining the quality and provide a fair price for the products. We propose to develop an integrated tool to identify and grade farm products using Image Processing and Neural Networks.

2. Literature survey

2.1. CLASSIFICATION OF RICE GRAIN VARIETIES USING ARTIFICIAL NEURAL NETWORKS (MLP AND NEURO FUZZY)

AUTHOR: A. R. PAZOKI

Artificial neural networks (ANNs) have many applications in various scientific areas such as identification, prediction and image processing. This research was done at the Islamic Azad University, Shahr-e-Rey Branch, during 2011 for classification of 5 main rice grain varieties grown in different environments in Iran. Classification was made in terms of 24 colour features, 11 morphological features and 4 shape factors that were extracted from colour images of each grain of rice. The rice grains were then classified according to variety by multi layer perceptron (MLP) and neuro-fuzzy neural networks. The topological structure of the MLP model contained 39 neurons in the input layer, 5 neurons (Khazar, Gharib, Ghasrdashti, Gerdeh and Mohammadi) in the output layer and two hidden layers; neuro-fuzzy classifier applied the same structure in input and output layers with 60 rules. Average accuracy amounts for classification of rice grain varieties computed 99.46% and 99.73% by MLP and neuro-fuzzy classifiers alternatively. The accuracy of MLP and neuro-fuzzy networks changed after feature selections were 98.40% and 99.73 % alternatively.

2.2. ASSESSMENT OF QUALITY OF RICE GRAINS USING OPTICAL AND IMAGE PROCESSING TECHNIQUE

AUTHOR: ZAHIDA PRAVEEN

Rice is the most favourable and most consuming food for human being in all over the world and researchers are working to improve the quality of rice. The quality measurement of rice is also important because it is consumed as food as well as it is used for milling process in the national and international market. Many researchers have already worked on the quality of grain and proposed different techniques to characterize the quality of rice. Chalky is whiteness part in the rice grain and it is one of the most important parameter that is used to evaluate the quality of rice grain. We proposed an image processing technique using extended maxima operator to detect the chalky area in the rice. We also calculated the dimensions and color to classify rice grains. The experiment was performed on 22 sample images of rice grain to test the proposed method and was validated using visual inspection.

3. Existing System

In existing system used an image processing-based solution to classify the different varieties of rice and its quality analysis. An approach based on the combination of principal component analysis and canny edge detection is used for the classification. Classification and quality analysis is done by comparing the sample image with database image. Canny edge detector is applied to detect the edges of rice grains. Definition of quality varies according to our needs from the viewpoint of seeds, crop growth, crop product, post-harvest technology, consumer preferences, cooking quality, keeping quality, transportability etc. Quality trait is defined as a trait that defines the aspects of the produce quality. Grain quality evaluation is done manually but it is relative, time consuming, may be varying results and costly. To overcome these limitations and shortcoming image processing techniques is the alternative solution can be used for grain quality analysis. Rice quality is nothing but the combination of physical and chemical characteristics. Grain size and shape, chalkiness, whiteness, milling degree, bulk density and moisture content are some physical characteristics while amylose content, gelatinization temperature and gel consistency are chemical characteristics of rice. A solution of grading and evaluation of rice grains on the basis of grain size and shape using image processing techniques. Specifically edge detection algorithm is used to find out the region of boundaries of each grain.

Disadvantages

• Due to the increase in efficiency, cost and complexity of system also increase.

• Quality analysis is time consuming and costly.

Recommended system

In order to identify different types of grains and determine the purity of grains using image processing techniques based on various parameters including grain size and shape. We proposed again classification system based on machine learning and image processing algorithms. To proposed detailed classification of damage rice grains has been largely unexplored due to the lack of an extensive labelled image dataset and the application of advanced CNN models. That enables quick, accurate, and precise classification by excelling at end-to-end tasks, minimizing pre-processing, and eliminating the need for manual feature extraction. To Create a platform where we can analyse the Quality of rice based on Morphological Qualities Using Machine Learning and Image Processing Algorithms. The length, breadth, and length – breadth ratio of the rice grains are measured by counting and classifying the rice grains on the same basis, which is accomplished through the use of image processing techniques. In comparison to manual inspection, using image processing and machine learning algorithms to determine the quality of rice grain is a more accurate and time-saving method.

Benefits

• It classifies the rice grains quality with high accuracy

•It is also time efficiency.

4. System Architecture

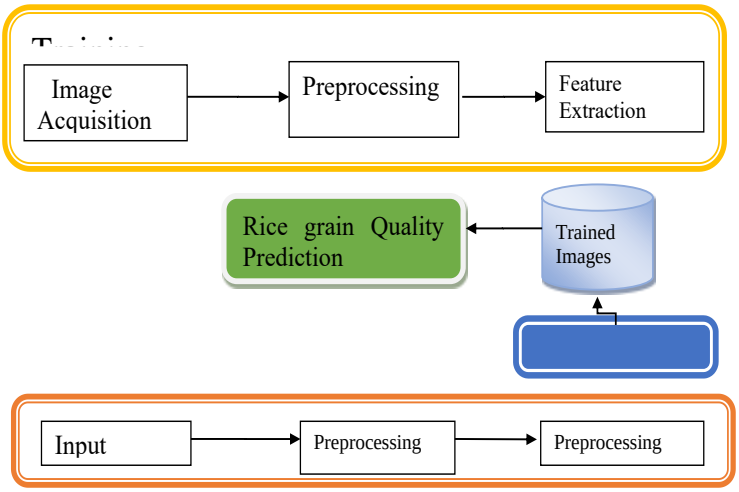

Fig. Architecture diagram of System

Rice has become an important source of energy, and is a fundamental piece in the puzzle to solve the problem of global warming. There are several diseases that affect plants with the potential to cause devastating economic, social and ecological losses. In this context, diagnosing diseases in an accurate and timely way is of the utmost importance. There are several ways to detect plant pathologies.

In this module, we can implement pre-processing techniques to convert RGB image to gray image and remove the noises from images. Using image resampling to reduce or increase the number of pixels of the dataset and improve the visualization by brightening the dataset. The first step in this process is to convert the acquired colour image to a grayscale image.

Segmenting an image into different parts or objects is the first step in image analysis. Subdividing an image usually results in the objects of interest being separated from the background. The accuracy of segmentation determines the success or failure of computerized analysis procedures. Edge detection is one aspect of segmentation. Thresholding is another approach. By segmenting an image, you assign a label to every pixel, so that pixels with the same label have similar visual characteristics.

Feature extraction is the process of extracting quantitative information from segmented images. Different algorithms of morphological features are used to identify and classify objects. Features extracted from images of rice kernels are Perimeter, Area, Minor-axis Length, and Major-axis Length using contour detection.

In this module can be used to Seven morphological and colour features are extracted from the images and stored in the knowledge base. Essentially, a Convolution neural network (CNN) maps any input pattern to one or more classifications. The test phase is extracted from the testing set (which is different from the training set) in the testing phase. Then those features are matched with the feature from the database created for the training image. Then the image with the matched is chosen to be recognized. To know the accuracy of the system, this process is repeated for all the test images.

5. Objectives

- To analyze the Rice grain Data Set
- To provide a quality rice grain using image processing.
- To obtain the high-quality rice grains.

Acknowledgements

We would like to express our deep and sincere gratitude to professor Mrs. B. Narmada M.E., for giving the opportunity and guidance throughout this research.

Conclusion

All over the world rice is most consuming food and the requirement and demand of rice in market is always high. In market rice demand is always cantered at quality of rice depending upon its factors like length, thickness Traditional methods to check this all aspects of rice can be very time-consuming process and have to done manually. Quality and purity checking of grains are commonly derived from human vision observation. Analysing the grain sample manually is a long and time consuming as well as sophisticated process, and having more chances of errors with the subjectivity of human perception. An attempt is made to grade the rice grains when subjected to pre-processing. Based on the rice grains, filtered image is performed from the original image to eradicate the noise. Later on we classify the different types of rice grains based on Edge detection and based on length-breadth ratio. We also conclude the quality of rice grains using length, breadth, etc. In this article, the image processing CNN algorithm is graded to rice on the basis of length, width, area and also worked on colour identification. From the results, it was concluded that some are results better while comparing one with other in quality that is based on area.

References

[1] SiddhantGhule "Quick analysis of Quality of Cereals, Oilseeds And Pulses", Department of instrumentation and control engg, Vishwakarma Institute of Technology, Pune ,2021.

[2] Pravan Kumar "Rice quality analysis using Machine Learning", Department of computer science, Saveetha School of Engineering, 2020.

[3] Dr. T. Avudaippan "Analysis Rice seed quality using Machine Learning Algorithms", Department of computer science, K. Ramakrishnan College of Technology, Trichy, 2019.

[4] S V More et al, "Rice grain Identification and Quality analysis Using Image Processing International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue: 12 | Dec 2019 www.irjet.net p-ISSN: 2395-0072 © 2019, IRJET | Impact Factor value: 7.34 | ISO 9001:2008 Certified Journal | Page 1727 Techniques".

[5] Jagdeep Singh Aulakh , Dr. V.K. Banga, "Grading of rice grains by image processing", International Journal of Engineering Research and Technology (IJERT), Vol. 1, Issue4, June 2012.

[6] BhupinderVerma, "Image Processing Techniques for Grading and Classification of Naiquinzhang et al, Analysis of the functions of TaGW2 homoeologs in wheat grain weight and protein content traits.

[7] MandeepSaini, JagjitSingh, NeelamRoop Prakash," Analysis of Wheat Grain Varieties Using Image Processing Review".

[8] Yosuke yoshika,"Chalkiness in Rice: Potential for Evaluation with Image Analysis".

[9] Andres M. Tuates Jr. *, Aileen R. Ligisan, "Development of a Computer Vision System for Brown Rice Quality Analysis".