International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06i04.0047 ISSN: 2581-4621

GRADING AND QUALITY ANALYSIS OF RICE AND GRAINS USING DIGITAL IMAGE PROCESSING

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ABSTRACT

The quality of the food grains we consume is becoming increasingly important, and as people become more educated, their demand for high-quality rice. There is a potential that dealers will adulterate food grains. In most cases, quality is determined by visual examination, which is a manual procedure. In this study, an image processing approach is employed to try to automate the procedure and overcome the limitations of the human process. A reliable rice grain analysis and categorization system may considerably increase performance in both accuracy and time. This study field has gotten a lot of interest in recent decades because of its socioeconomic implications. We examined the work done in image-based rice categorization and grading in this research.

This laborious effort has an impact on farmers. As a result, the duties demand automation and the establishment of imaging techniques that can aid in assessing the strength of grain pictures. With computer image processing and neural network technology, a model of quality grade assessment and identification is developed that is based on appearance aspects such as morphology and colors. For training purposes, the morphological and visual characteristics are transmitted to the neural network. After that, the trained network is utilized to recognize unknown grain varieties, imperfections, and quality. Rice varieties such as basmati and jasmine, and others, can be assessed for quality analysis, and each can be classified into classes, namely Grade A, Grade B, and Grade C.

Keywords— image processing technique, neural network, morphological feature extraction, automation.

1. Introduction

The demand for high-quality food is rapidly increasing. As India's literacy rate improves, so will the demand for high-quality food items. After China, India is the world's second-largest rice producer. Rice supply is increasing, as is demand for high-quality rice. Because some traders deceive stores by selling low-quality food grains including particles such as stones, sand, leaves, broken and damaged seeds, and so on, there is a burgeoning need for high-quality food grains. This sort of low-quality rice is sold without inspection, and there is no specific method in place to identify such grains. As a result, it has become a point of controversy for both buyers and sellers. We are currently using chemicals to identify rice grain seed variants and quality.The product is also destroyed by the chemical key features, which is a time-consuming procedure. They can be prevented by using computer vision technology or a digital image processing system. When compared to chemical procedures, these methods are non-destructive, rapid, and economical, and they also seek to address the drawbacks of manual processes. A method of image processing is utilized to separate many attributes from rice grains and then classify them based on geometrical traits.Image noise and fading have been removed from the photos. Finally, the image was segmented using adequate segmentation techniques so that edges could be properly detected, and the image was restored. Using a Neural

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Network algorithm, the collected features are then used to classify rice grains.

2. Experimental Methods or Methodology

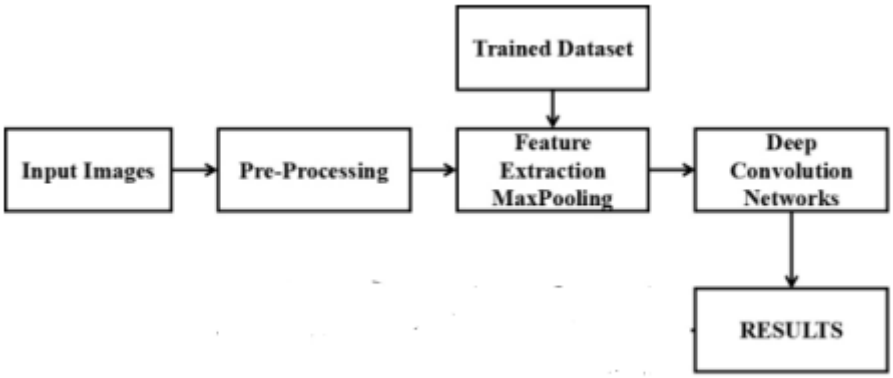

Fig 1. Block diagram of Proposed system

The proposed approach consists of three successive stages. It has four stages, Image is prepossessed by studying various parameters extractions such as color conversion, re-sizing and filtering is carried out by segmentation algorithms. This helps to identify the amount of lesions scattered over the body. Feature extraction is by Max Pooling and finally, rice grain image classified using Deep Convolution Network algorithm. Finally the classification results and quality prediction results will be shown as popup message, those process are done by using GUI in MATLAB.

3.Results and Discussion

3.1 Image Resolution

Pixels transform into inches through what's called "resolution," -- the amount of pixelsper areaunit on a computer. Resolution allows you to rework pixels into inches and back again. Two resolution definitions are often employed in place of 1 another. Pixel resolution is that the size (in bytes) of your image or its appearance on a visual display unit. This number is tied on to how big your image is on your disc drive. The byte-size of the image file is directly proportionalto the pixel count and its size on your display screen, which simply displays all the pixels in an exceedingly fixed one-to-one grid.

3.2 Pre Processing

This step is vital as acquired image is noisy. The pre-processing includes series of operations performed on acquired input dental image. Each of the acquired dental images is first subjected to rgb to grey conversion . a grey image could be a digital image that has only possible values for pixel i.e. 0-255.image resized to 500*500.image is filtered using median filter.

3.3 Median Filter

The Median Filter could be a non-linear digital filtering technique, often want to remove noise from a picture or signal. Such noise reduction could be a typical pre-processing step to boost the results of later processing (for example, edge detection on an image).

3.4 Convolutional Layer

A convolution—takes a group of weights and multiplies them with inputs from the neural network. Kernels or filters—during the multiplication process, a kernel (applied for 2D arrays of weights) or a filter (applied for 3D structures) passes over a picture multiple times. to hide the whole image, the filter is applied from right to left and from top to bottom. Dot or scalar product—a operation performed during the convolution. Each filter multiplies the

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weights with different input values. the whole inputs are summed, providing a novel value forevery filter position.

3.5ReLu Activation Layer

The convolution maps are responded to a nonlinear activation layer, like Rectified linear measure (ReLu), which replaces negative numbers of the filtered images with zeros.

(a)PoolingLayer:The pooling layers gradually reduce the dimensions of the image, keeping only the foremost important information. as an example, for every group of 4 pixels, the pixel having the most value is retained (this is named max pooling), or only the common is retained (averagepooling).Pooling layers help control overfitting by reducing the amount of calculations and parameters withinthe network. After several iterations of convolution and pooling layers (in some deep convolutional neural network architectures this might happen thousands of times), at the top of the network there's a standard multi layer perceptron or “fully connected” neural network.

(b)FullyConnectedLayer: In many CNN architectures, there are multiple fully connected layers, with activation and pooling layers in between them. Fully connected layers receive an input vector containing the flattened pixels of the image, which are filtered, corrected and reduced by convolution and pooling layers. The softmax function is applied at the tip to the outputs of the fully connected layers, giving the probability of a category the image belongs to – for instance, is it a car, a ship or an airplane.

OUTPUT IMAGE

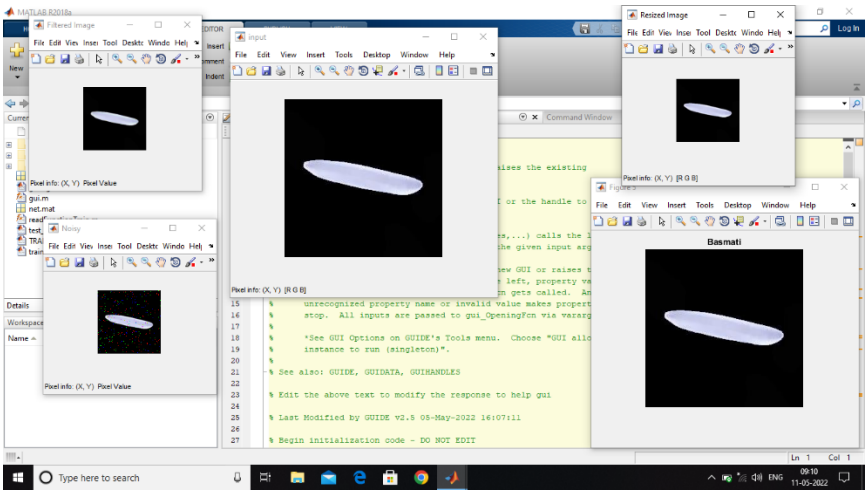

Fig 2.Output Image

CONCLUSION

This project is designed using conditional neural network models and image processing ideas, this study aims to give a superior technique for identifying different types of grains and rice quality based on colors and geometrical aspects. The study takes into account various dietary grains such as wheat and rice. More than 500 photos were utilized to evaluate the algorithm, and the accuracy of recognizing grain was determined to be 99.9 percent. Whereas the accuracy of recognizing grain quality and grade is 92 percent and 91 percent for each grain variety, respectively. Even though the problem is not radically new, previous algorithms used a significant number of colors, textural, and morphological features, which rendered the algorithm incredibly slower due to the extensive computations. Thus the efficient method for segmentation of food grains containing limited attributes is provided and eliminating limitations such as repetitive and time consumption.

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