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# RICE QUALITY ANALYSIS USING DEEP LEARNING

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***Abstract: - Rice is the primary means of financial support in southern India. Over eighty percent of the world's population relies on it as a primary source of nutrition. Worldwide. Rice fields of varying varieties are farmed, and the harvested rice is then exported. Determine which grains are flawed and when assessing the quality of rice, it is essential to make a distinction between the various types of rice. An automated method for detecting and classifying the many varieties of rice grain is presented here. This method makes use of digital photographs, which are widely recognized as a useful means approach for extracting the characteristics of rice grains without the need for direct human interaction. Images are typically captured with the help of a camera. The image that was captured is then processed using several algorithms, including those for image preprocessing, filtering, segmentation, and edge identification. Image processing and deep learning methods are utilized in this investigation to perform the calculation of the quantity of rice required depending on the good and bad states of the system.***

***Keywords: -CNN, Deep learning, Image processing.***

## I. INTRODUCTION

Machine vision's ability to evaluate rice's quality is one of its most essential applications. Several academics believe that the geometry of an object carries more information than its aesthetic elements, such as how the colour of different instances of the same object differs. However, it is not possible to provide a precise outcome at this time. You can also identify the problem with the quality of the rice. To ensure the rice's quality, it is necessary to handle the seeds directly when collecting samples. The primary objective of this strategy is to supply an alternative way for quality control and rice analysis that minimizes the amount of labor, money, and time that is required. Rice quality is essential to the growth of agronomic and horticultural crops, therefore it is essential to know how to evaluate rice quality. Use image processing and deep learning techniques to evaluate the quality of the rice and determine whether it is good or terrible.

## II.RELATED WORKS

Rice quality is defined by two physical and chemical factors that are used to analyze and categorize rice grains. These metrics are used to evaluate and classify rice. When evaluating the accuracy of your measurements, it is necessary to identify

both the border region and the end locations. The mean value of the features is calculated and used in Mat Lab [1,] which takes these values into account. Mat Lab is the application of the image processing method that is carried out on the sample beads.

The colour of the grain, its size, and its form are important characteristics that help determine the quality of rice. Neural Network Classifiers assign a quality rating of good, horrible, or middling to each of the results and precision measurements [2].

An automated method for recognizing the various varieties of rice seeds using artificial vision technology and a detection system consisting of an inspection machine and an image processor Unit is presented here. This method may be used to automate the identification process. A backward neural network was constructed so that the quality of the rice seed could be determined by using it. The method was able to enable the inspection of various types of rice seed based on the visual characteristics of those rice seed. [3].

The answer to the problem of assessing and classifying the quality of Krishna kamod rice through the use of image processing methods and soft computing. Feeding Direct procedures made with neural networks are utilized in order to locate high degrees of quality. The trained multilayer Feed Forward Neural Networks discover long seeds, tiny seeds, and seeds of an uncertain quality. [4]

Data mining constitutes the primary focus of their employment. Because K signifies a process that relies heavily on the starting point of the clustering and the center's position relative to its local best, The front is used first, and then the beginning cluster that was supplied is applied to the front of the end. An strategy that combines clustering and optimization is used here [5] so that we can choose the most effective group centre.

The process of ageing the three lines of hybrid rice served as the impetus for developing the optimization method. At the point where the lines for sterility, maintenance, and restoration intersect. The auto process can be thought of as a form of swarm search, while hybridization is an example of evolutionary process. They are combined in the appropriate ratio in order to facilitate the computation of convergence and speed that is required for the entire process [6].

Both sets of distinct functions and sets of integrated functions each received their own unique model that was developed specifically for them. The accuracy of categorisation is determined not by morphological or colour criteria, but rather by textural characteristics. As a consequence of this, the architecture of neural networks generates varied degrees of accuracy for various feature sets.

## III. SYSTEM ANALYSIS

The quality of rice is determined solely by a combination of the grain's physical and chemical characteristics. The grain size and shape, chalkiness, and whiteness of rice are examples of its physical characteristics, whereas the concentration of amylose, gelatinization temperature, and gel consistency are examples of its chemical features.

The research suggests a method for sorting and evaluating rice grains based on grain size and form by utilising SVM on machine processing techniques, particularly an edge detection algorithm, to figure out the region of the borders of each grain in our existing system. This would allow for rice grains to be sorted and

evaluated in accordance with their size and shape.

• The overall performance worsens when machine learning methods are utilised.

• The precision is poorer. • The handling of feature extraction is problematic from a computational standpoint..

## IV. SYSTEM ARCHITECTURE

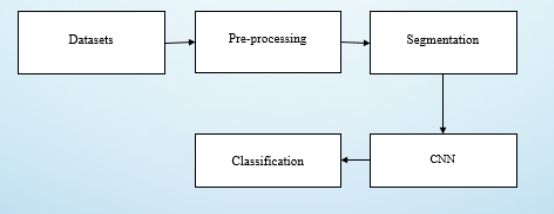



**Figure 1: - System Architecture**

The research presents an alternative method for evaluating quality that cuts down on the amount of time and money needed for the approach that we have suggested.

The processing of images is an important and highly specialised area of technology that has seen substantial development in recent years.

In order to evaluate the quality of rice, a convolution neural network is utilised, which is based on deep learning techniques.

The system architecture provides an overview of the processes that will be utilised during this investigation on the quality of rice.

Picture processing and image classification, both of which are based on the deep learning Alex net model that is used by the system, are the two most important operations involved.

• It has a high level of precision;

• It enhances the performance of the system when used instead of image processing;

• It is easy to control segmentation and feature extraction.

## V. SYSTEM MODULES

**Module 1: Dataset Collection**

**Module 2: Preprocessing**

**Module 3: Segmentation**

**Module 4: Classification**

A data set is a collection of data that has been gathered together in one place. You can locate all of the data that is displayed in the rice picture of the data right here. When capturing the image of the rice grains, a camera sensor system of extremely high calibre is utilised. Because of the significant impact it has on both the quality of the extremely minute grains of rice and the efficiency of the system as a whole, the suggested pixel size is 8 megabytes (mb). For the purposes of testing and training, photographs of rice granules are taken and stored.

Preprocessing: A method known as "preprocessing" is used to cleanse "input data" of any extraneous information. The process is also referred to as separating the signal from the noise in data. The process of resizing photos, altering image contrast, and converting the image to grayscale and then black and white so that it may be displayed on the system is known as image pre-processing. Because to the use of these approaches, undesirable visual distortions, noise, and blur can be removed from a picture, resulting in an image of higher quality that is appropriate for further processing. In order to process the picture in the appropriate manner, the Gaussian filter was applied to it.

The process of segmentation involves dividing a picture into parts so that things

and boundaries within the image may be located more easily. Labeling each pixel with qualities that are comparable to those of other pixels allows for the identification of objects and the borders that surround them. After the image has been preprocessed, the region of interest (Roi) is extracted from the image using segmentation. In this particular instance, fuzzy C-mean techniques are utilised.

The fuzzy c-mean algorithm for image segmentation: The process of splitting a digital image into many segments, often referred to as image objects, is referred to as image segmentation. These segments are collections of pixels. The representation of a picture is simplified or altered through the process of segmentation in order to create something that is both more meaningful and simpler to analyse. In the fields of image processing and computer vision, the fuzzy c-mean clustering method is a well-liked unsupervised clustering strategy due to its ease of use and high level of performance.

Classification is the process of categorising photos according to the properties extracted from them, and the term "classification" refers to this process. The categorising process represents the system's output layer. In this investigation, CNN classifier procedures were used to categorise rice grains, and the system collected the data necessary to come to these conclusions.

A sort of deep learning network known as a convolution neural network (CNN) or convnet learns directly from input, eliminating the need for human feature extraction in the process. CNNs are remarkable at recognising patterns in images and differentiating between objects, faces, and landscapes. They are also very effective at identifying faces. They may also be used to categorise non-image data such as audio, time series, and signal data. This is one more application for their versatility. There are three primary reasons why CNNs are so prevalent in deep learning. First, CNNs are used to directly learn features, which means that they cut down on the amount of manual feature extraction that is required. CNNs are capable of producing extremely precise recognition results. The capability of CNNs to be retrained to perform additional reconnaissance duties paves the way for the expansion of existing networks.

A convolutional neural network could have tens or even hundreds of layers, all of which are trained to recognise different parts of a picture. Each training image undergoes a series of filtering operations at different resolutions, and the results of these operations are then used as input for the subsequent layer of processing. Filters can begin with basic features such as brightness and edges and eventually develop into attributes that uniquely characterise the element being filtered.

## VI. SYSTEM REQUIREMENTS

### HARDWARE REQUIREMENT

Processor Type -Pentium -IV

Speed -2.4 GHZ

Ram - 4 GB

Hard disk -20 GB HD

### SOFTWARE REQUIREMENT

- Operating System - Windows 7
- Software Programming Package - MATLAB R2020a or R2020b

## VII. RESULT AND DISCUSSION

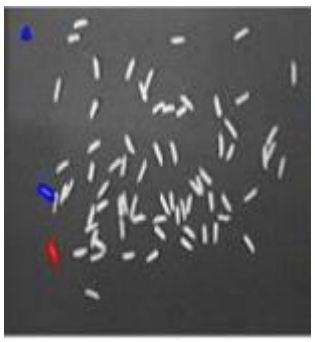
The rice test was carried out in the Mat lab, and parameters such as perimeter, area, firmness, filled area, and centroid were recorded. Circularity is a logic formed from the aforementioned features that is used to carry out the Primary classification, that is, to differentiate between rice.

Circularity= 〖(Perimeter) ^2/ (4*π*(filled area))

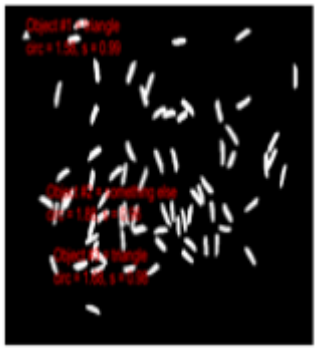
**Samples used**

**Figure 2. samples used**

**Results on processing**



(a)



(b)

Figure 3(a),(b) samples used

**TABLE 1 Extracted Features for Rice**

| RICE | | | | | |
|---|---|---|---|---|---|
| | AREA | FILLED AREA | SOLIDITY | PERIMETER | CIRCULARITY |
| | 16308 | 16308 | 0.960 | 620.257 | 1.877 |
| | 12322 | 12322 | 0.97 | 509.669 | 1.677 |
| | 11376 | 11376 | 0.940 | 546.946 | 2.09 |
| | 16182 | 16182 | 0.967 | 620.46 | 1.89 |
| | 13323 | 13325 | 0.9 | 556.09 | 1.84 |
| | 13874 | 13874 | 0.95 | 525.941 | 1.586 |
| | 15590 | 15590 | 0.970 | 575.888 | 1.691 |
| | 16227 | 16228 | 0.959 | 622.084 | 1.89 |
| | 12494 | 12494 | 0.96 | 559.401 | 1.993 |
| | 16160 | 16160 | 0.962 | 586.408 | 1.69 |
| | 14317 | 14317 | 0.976 | 527.603 | 1.54 |
| | 14844 | 14844 | 0.963 | 557.902 | 1.668 |
| | 17002 | 17002 | 0.963 | 589.399 | 1.62 |
| | 15065 | 15065 | 0.97 | 543.684 | 1.561 |
| | 13892 | 13892 | 0.977 | 569.005 | 1.854 |
| | 14683 | 14683 | 0.945 | 596.828 | 1.93 |
| | 12182 | 12182 | 0.972 | 535.666 | 1.87 |
| | 13192 | 13192 | 0.9733 | 550.81 | 1.8 |
| | 12574 | 12574 | 0.966 | 503.669 | 1.60 |
| | 16155 | 16155 | 0.9486 | 579.273 | 1.6 |
| AVG | 14388 | 14388.25 | 0.962 | 563.84915 | 1.77 |

## VIII. CONCLUSION

The quality of food grains is a topic that is highly scrutinized by today's consumers. In this model, an automated rice grain quality evaluation system that is based on CNN classifiers is investigated to ensure that rice grain quality is maintained. Ponni and matta are two different types of rice grain that are the subject of current research. The technique that was suggested was used to identify and classify rice grains based on the morphological and geometric characteristics that distinguish them from one another. The results of the experiments suggest that the CNN classifier that was developed has a satisfactory level of accuracy overall.

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