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Rice Quality Analysis Using Deep Learning

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Abstract **- Most human beings globally prefer Rice as the most favorable and most consuming food. The price in the market depends on the quality of rice. In earlier days the type and quality of rice were determined by observation through naked eye. Due to technological advancements, an automated system is being implemented that recognises and classifies the rice kernels quality using digital imaging methods and a classifier called Support Vector Machine (SVM). Holding the image, pre-processing the captured image, segmentation, and feature extraction using MATLAB are all included in the process. A deep learning technique is used in our proposed approach to identify and interpret the rice based on the scheme. Experimental results obtained are considered to be the best results, when compared to the existing system.**

Index Terms - Rice, Neural Networks, Fuzzy C-Mean, segmentation, Feature extraction

INTRODUCTION

Rice is the most vital food crop and also staple food of over ½ the world's population.. India stands top most position behind the first largest cultivator of rice china by cultivating approximately forty four million hectares of land.One of the factors that depends on Manual checking are conditions under the technician works,salvage recovery and the rate of cleaning.Amylose Content and Gel consistency are some of the characteristics of to determine quality of rice.In order to overcome the disadvantages caused during manual checking and using image techniques proposed earlier an accurate automated technique has been developed using Convolution Neural Network where FCM(Fuzzy C-Mean) is used as a classifier.The results proved that the proposed system is more accurate than the previous techniques used before to determine the quality of rice.

EXISTING SYSTEM:

For the analysis of quality of rice the rice sample is visualized by a technician.Rice quality is primarily determined by two factors: physical and chemical characteristics. Moisture quality, grain purity, and the presence of immature grains are physical criteria.These criterias are influenced by environmental conditions during processing, method of crop production, soil conditions, harvesting, and the practices done before harvesting.[1]Wasin Sinthupinyo developed an automated classification of paddy rice seed using machine learning algorithms, and the SVM provided the highest accuracy. around 92%,[2]Colored rice quality inspection system using machine vision.[3] Namitha Patel used an image processing method to analyse rice consistency based on physical attributes.

PROPOSED SYSTEM:

In our Paper the Deep Learning approach is employed to recognize, process, extract and classify the rice grains in a non-contact manner and CNN model is used to classify the output in an efficient way by using an matlab.The working model of the system is as shown below.

A. DATASET

A collection of data is called datasets. Here, all the data can be obtained in the rice image of the data. The image of the rice grains are acquired through a high quality camera sensor system. Sample images of rice granules are captured and stored for training and testing purposes**.**

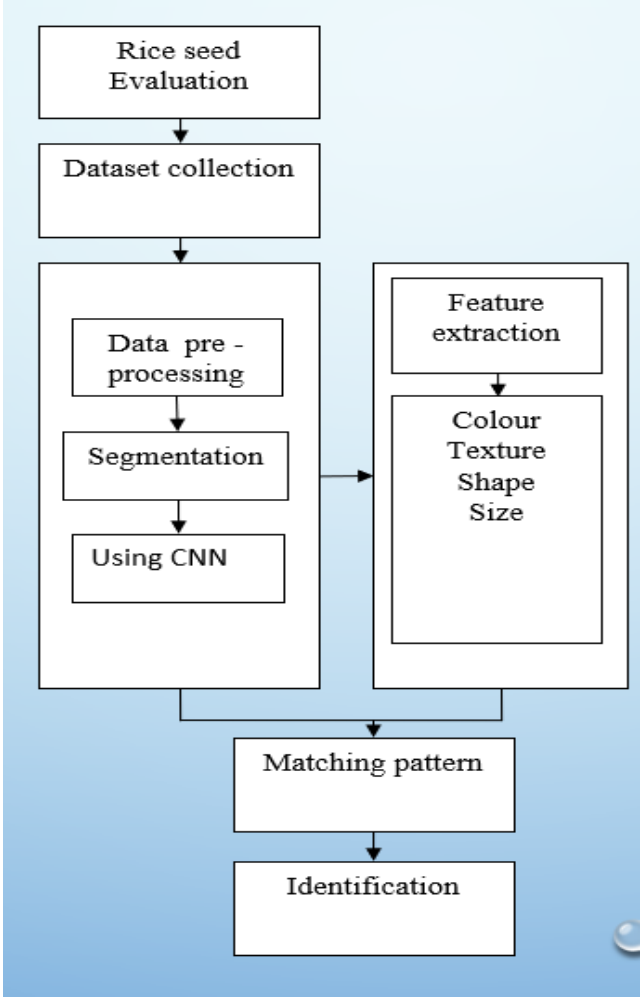


FIG 1: BLOCK DIAGRAM

B. PREPROCESSING:

A pre-processing Technique is used to remove the unwanted data from the input data such as noise,remove blur in image and enhance quality.Image pre-processing is the phenomenon where the images are resized, contrast of the images are adjusted and the image is converted into grayscale, and finally into black and white and uses gaussian filtering in preprocessing sensation and scale space implementation.

C. SEGMENTATION

Segmenting the image into several parts assists to locate the objects and boundaries in an image.Once the image is pre-processed, the Region of Interest (ROI) is segmented out based on the picture.Fuzzy C-Mean is used for segmentation of an image.

1. **FUZZY C-MEAN:**Unsupervised clustering algorithm known as fuzzy c mean clustering is implemented that segment an image by combining pixels which consists of similar or approximately equivalent values into a cluster, and different pixel values in other clusters,and these clusters replicate the segments of the metamorphic image.It provide the degree of membership from 0 to 1 for each by producing fuzzy partition.

D. CONVOLUTION NEURAL NETWORK

The findings of CNNs are extremely precise in terms of identification. CNNs can be retrained for recognition new activities, allowing you to extend the capabilities of existing networks.A convolutional neural network might have tens or many layers, every or that learns to discover totally different image options.

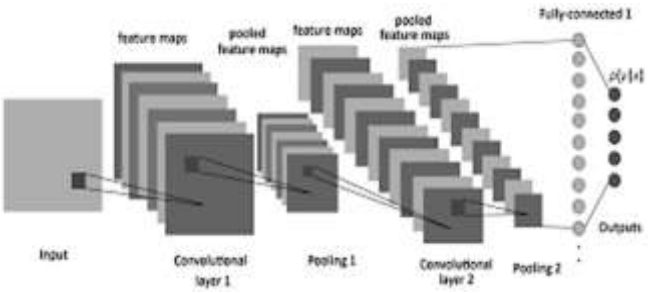


FIG 2: ARCHITECTURE OF CNN

These layers amendment information so as to be told data-defined characteristics.There are 3 most common layers in the architecture of cnn.In architecture of convolutional neural network. There are three common layers mostly such as [1]Convolution which filters images,[2]Activation of ReLU which allows fast training and Negative values are converted to zero and positive values are maintained,[3]polling simplifies the output by down-sampling.

E. CLASSIFICATION

Classification is the approach by which images are grouped into different classes based on the features extracted from them. Classification is an output layer of the system. In this work, CNN classifier algorithms have been used to classify the rice grains and the results have been obtained by the system.
The Software parts used in this system is **MATLAB R2019b**.

MATLAB:
Matlab is a Matrix-oriented language used for computing, visualization and programming in an easy-to-use environment.The software comes in the form of a core program and addition of libraries or toolboxes.

RESULTS

In this system the dataset is provided and the required sample images are given for processing to analyze the quality.Initially the system has been trained and the result is as shown below in fig 3 with accuracy over 95%.

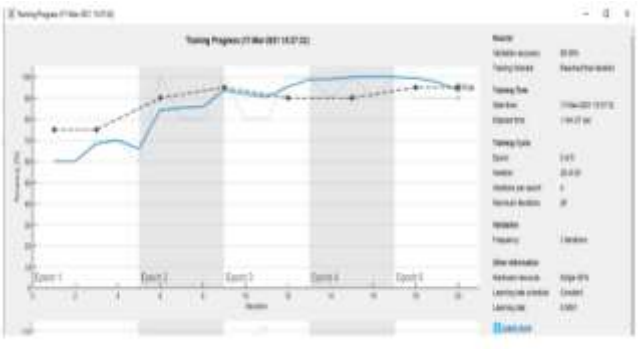


Fig 3: Training Process Graph

The sample input is given as follows

Fig 4 :Sample input

The image is provided for preprocessing to remove unwanted noise.

Then the image was provided to FCM for segmentation.

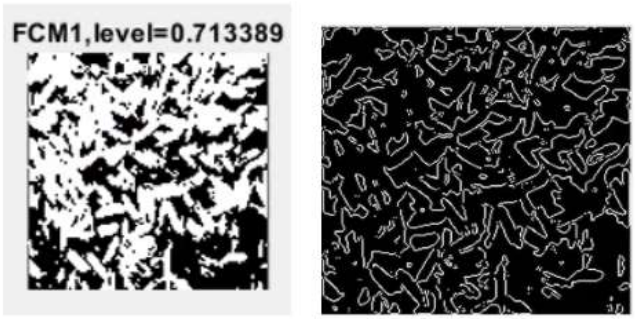
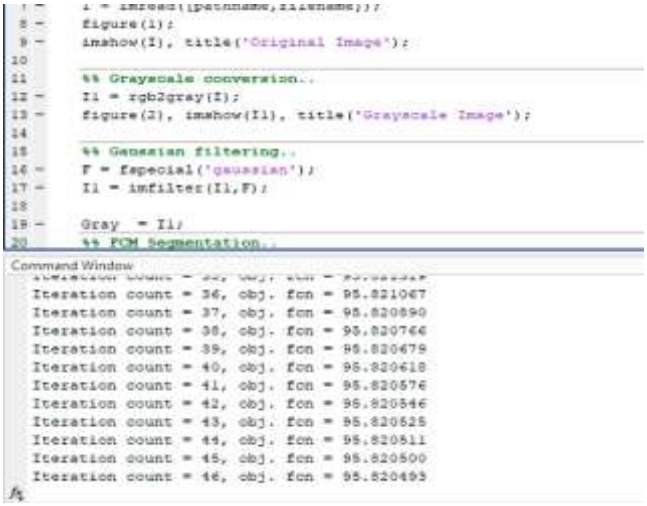
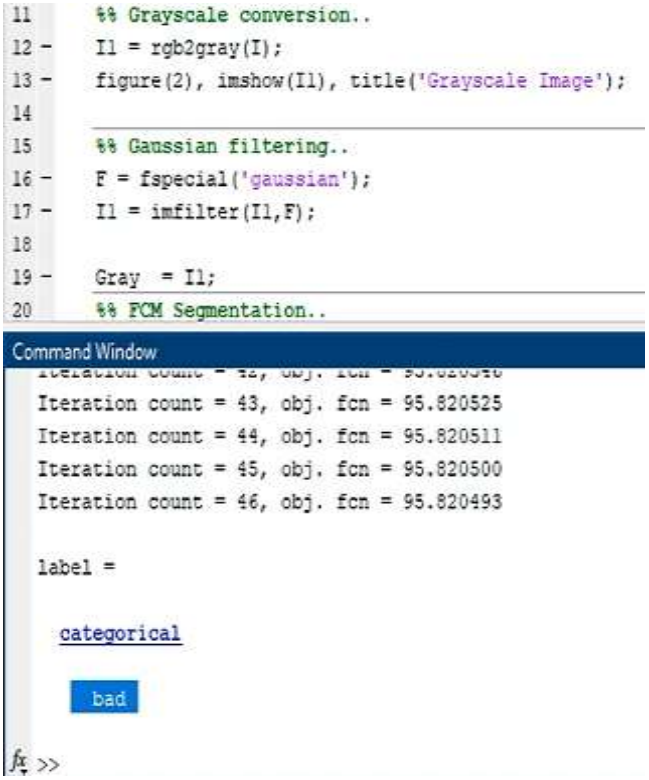


Fig 6 :Segmentation using FCM

Then the image is given to the Convolution Neural Network and maps with the previously trained data set and it learns by itself and displays the output.The filters will begin as terribly easy options like brightness and edges,as well as an increase in the sophistication of features that describe the object.



The Output of the given sample is as shown below:



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