Identification and Recognition of Banana Phases Using Deep Learning

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Abstract- *There is a need for high standard production at a very quick rate in food processing. Nendran bananas is very unique as it is the only type that is consumed in many forms and at other stages of ripening. Major production and marketing in kerala and tamilunadu. Nendran banana freshness can be classified using image processing, which is the good method for grading the bananas. And also Banana auctions and marketing is the main challenge in farming, the user can Identification and Recognition of Banana Phases and upload to the portal.*

Keywords- Nedran bananaripening, Image Processing, Feature extraction, Identification and Recognition

I. INTRODUCTION

Banana is one of the top most agriculture product, Kerala is occupies 50% of the whole area the use of nedran banana is to help in powder works as a prebiotic and nadran banana is one of the source of potassium, magnesium, dietary fiber, vitamin b6 and calcium.The nedran banana is helps in healthy eyes, and to build the strong bones in the body.And also this is good for weight loss and good for health. Itis good for reducing blood pressure (bp), and boost the immune system and good power food of babies. Nendran bananas freshness can be classified using image processing, which is the best method for grading a banana [12, 13].

Banana *auctions* is the main challenge in farming, and its need more time and human resources. In this model introduce the banana classification and banana recognition, the user can upload their fruit and check ripping stage, he can predict banana fruit in the portal

II. LITERATURE SURVEY

J.M. Aguilera and F. Mendoza present the Application of image Analysis for classification of Ripening Bananas, this work presented of classification of Ripening bananas and this work done only single banana [1].

Nazrul Ismail is present the Real-time visual inspection system for identifying fruits using computer vision and deep learning techniques, this work presented Images are taken from an Internal Feeding Worm database of the Comprehensive Automation for Specialty Crops Dataset images were clipped to 128*128 pixels size. Different deep learning models like DenseNet-121, NASNet-A,ResNet-50,MobileNetV2, EfficientNet-B0, and Efficientnet-B1 got different specificity, sensitivity and accuracy and this work only Single view images was taken for testing and training [2].

Ebenezer Olaniyi Et.al is present an Intelligent identifying system for bananas fruit using Neural Network arbitration. This work isonly 100 images are taken in image acquisition. Down sampling the images. In this system sorting a image using neural network. sigmoid function are used as the activation function because of its simplicity in derivative and its soft switching characteristics and this system Number of dataset is less. It contains only 100 images [3].

Automated fruit identifying system, this system is finding healthy and defective apple and mango fruits. The system begins with a DC motor that is programmed using Arduino to rotate 180 degrees of each fruit. A red circle will appear around a fault on the inspected surface of fruit in the analyzed image if there is one. And this system is Misclassification is more Accuracy is not defined.[4].

A Framework to Reduce Fruit Image Misclassification, this system is this work six different types fruits sorted good and bad quality. Nearly 12000 images are taken as dataset each fruit contain 2000 datasets. MFC Inception method are used to classification and comparing with other learning models. And this system done only two type of sorting only good and bad quality[5].

Fruit quality detection using OpenCV/Python this system is RGB image converted into color space. Then converted into Single channel mask back into 3 channels. Finding good or bad tomato images using black and white images. And this system is only Number of dataset is less, Multiple angle input is less[6].

Jaya Siland Santanu Phadikar they present Rice Ripening Stage identification Using Pattern Recognition in

11th International Conference On Computer And Information Technology it will shows the rice ripening stages and identification[7].

Mr.Khushal Khairnar and Mr.Rahul Dagade they present the Ripening Stage Detection And Diagnosis On banana Using Image Processing , it will detect the Ripening stage of the banan using image processing concept[8].

C.Affonsoet al present The fundamental distinction between CNN and previous classification algorithms is that CNN can extract the features from raw image pixels, where as prior classification methods required a list of characteristics characterizing an image as input[9].

K. J. Karande and S. Gaikwad present the Image Processing Approach For Identification Of Ripening Stage On Pomegranate Fruit they done to Identification Of Ripening Stage On Pomegranate Fruit using Image Processing Approach[10].

Chunxia Zhang, and Xudong Li they present Design Of Control banana Ripening Stage System Based On FPGA&DSP in Second International Conference On Networks Security, Wireless Communications And Trusted Computing in 2010[11].

Prabira Kumar Sethy is enhanced the Apple fruit size estimation using a 3D machine vision system.

For apple detection, a colour camera was used to take photos of apple tree canopies. The first strategy, based on the 3D coordinates of pixels in apple regions, had a 69.01% accuracy rate. The second approach based on pixel size - had an 84.08%[14].

K. Zhang et is present the deep learning recognition of tomato leaf disease and they measured the effectiveness of such networks using the SGD and Adam optimization approaches, and they found that the ResNet using the SGD optimization approach provides the good performance, with an 96.51% accuracy rate of [15].

III. PROPOSED SYSTEM

The proposed model is presented in the fig.1 it shows the overall system architecture of how the banana dataset is preprocessing and Train the model and deployment. Using deep learning model to predict the banana classes for real time image. The User open the portal and upload the image, this model recognize the image and display the result like Unripen, Semiripen, Ripen or Rotten Stage.Previous works are done by

only single banana [1] , but this work will work with both single and bunches of banana.

Convolutional neural network (CNN) is helps in banana image recognition, The CNN algorithm is high accuracy for recognition exact stages of banana for both single banana and bunches of banana.
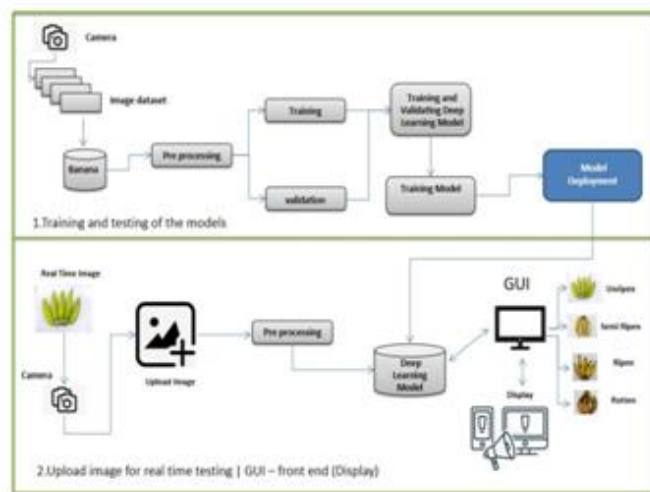

Fig. 1 – proposed System

The fig. 2 shows the graphical user interface (GUI) for this system. The user register or login the portal and upload their real time banana image, it can be single banana or bunches of banana, the model will convert to grayscale , binarization and threshold image and predict or recognize the image and display the results.

Fig. 2 – GUI/ Front – End

Dataset

Dataset is the main things of . All the images were collected in high resolution .jpg format. We collected lot of bunches of banana and take different bunches and single pictures of banana in all stages 1000+ pictures of all stages. We classified the nedran banana into 4 classes

1.Un-Ripen stage :

The Unripen stage banana is the 1st stage of grading . The nedarn banana is help in powder works as a prebiotic and nadran banana is one of the source of potassium, magnesium, dietary fiber, vitamin b6 and calcium.The nedran banana is helps in healthy eyes, and to build the strong bones in the body. And also this is good for weight loss and good for health.

2.Semi-Ripen :

The next 2nd stage of nedran banana is semiripen stage, the nedran bananas are different from other varieties of banana

3 Ripen :

The ripen banana is good for reducing blood pressure (bp), and boost the immune system and good power food of babies.

4.Rotten :

This is last stage of banana grading system. The rotten banana use in banana bread and sugar scrub and also shoe shine

Below fig.3 is shows the sample dataset of the proposed system contains the all 4 classes of nedran banana

Fig. 3 –Sample Dataset

CNN Model

The below fig. 4 shows the convolution neural network architecture, the CNN Models are mainly used for identifying patterns and recognition, first collect the dataset and extract the feature and classification using layers. Output layer predict the stage of banana like unripen, semiripen, rotten and ripen stage.
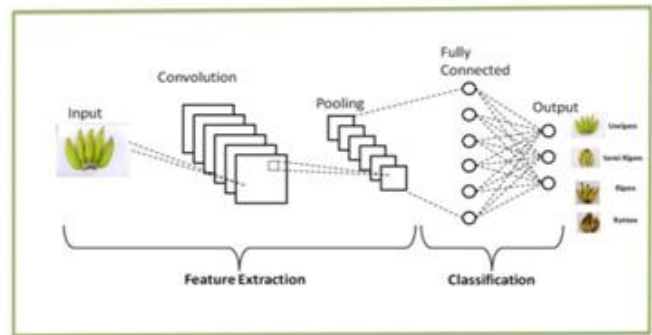

Fig. 4 – CNN Architecture

Steps Below For Banana Image Classification Using CNN:

Input : Real Time Banana Image

Output :Recognize The Banana Stage

Step 1: Start
Step 1: Upload Preprocessing Dataset showing in Fig. 3
Step 2: Train The Model Using CNN showing in Fig. 4
Step 3: Model Deployment
Step 4: Upload Banana Image showing in Fig. 6
Step 5: Using Model To Predict Banana Class
Step 6: Display In Recognize Type showing in Fig. 7
Step 7: Stop

This above steps are implications Methodology of this work. When user upload the banana image show in fig. 6 it extract the features and predict the class using trained model show in fig. 4 and display the correct stage of nedran banana

IV. EXPERIMENTAL RESULTS AND DISCUSSION

The below fig. 5 Shows the summary of our CNN model. We are getting total 8,357,636 parameters all parameters are trainable.

Fig. 5 – Summary of Model

Using This model we get 91% of accuracy rating .and train this model with 100 epoch and 15 steps_per_epoch getting high accuracy rate with this large dataset fig. 3 after build the model we save in to one file , using this file during testing the real time banana images. We can upload single and bunches of banana fig. 6

It will recognize the stage of the banana

Below fig. 6 shows the GUI of proposed system, user upload the real time image for testing by clicking of choose file, after selecting file click on upload image button
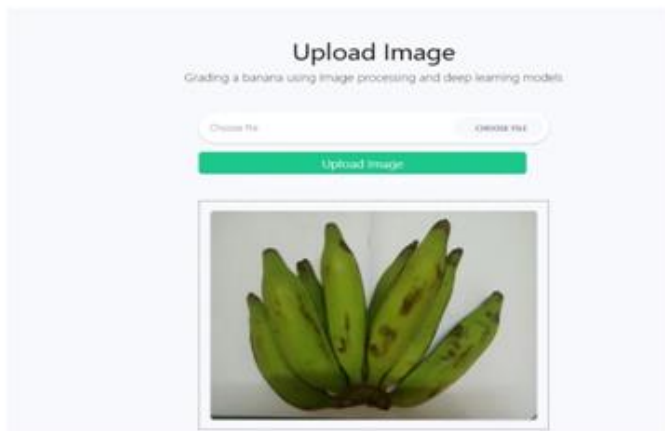

Fig. 6 – Upload Image for Testing

After upload image it will recognize the stage of banana using trained model, below fig. 7 shows the grayscale image and threshold image with results
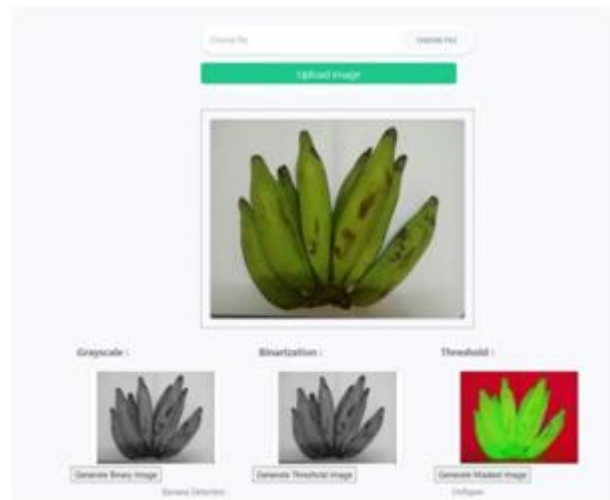

Fig. 7 – Recognize the stage of banana

When upload the Green color nedran banana to testing fig. 6 the system convert to grayscale and binarization and extract the features of the image and it is displaying the unripen stage show in fig. 7

The below fig. 8 is testing another class image

Fig. 6– Results of Testing image

We upload to yellow- black color nedarnbanana and it will convert and extract the features show in fig.1 and fig. 4 and it is displaying the Rotten stage show in fig. 8

V. CONCLUSION

In this study of Identification and Recognition of Banana Phases using CNN models that were used to assess a collection of pictures that included Unripen, Semiripen, Ripen, and Overripen.The convolution neural network architecture is first collect the dataset and extract the feature and classification using layers. In this model done the banana classification and banana recognition, the user can upload their

fruit and check ripping stage, he can Predict banana fruit in the portal.

In the future, model overfitting should be minimized, and the model should be trained using a variety of banana classifications. And try collect more dataset for all variety of banana

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