

# IDENTIFICATION OF FRUITS RIPENESS BY APPLYING MULTI CLASS SVM ALGORITHM

Pooja N S<sup>1</sup>, Vanishree B S<sup>2</sup>, Suketha<sup>3</sup>

<sup>1</sup> Assistant Professor, Computer Science Department, Sahyadri College of Engineering & Management ,  
Kartnataka, India

<sup>2</sup> Assistant Professor, Computer Science Department, Sahyadri College of Engineering & Management ,  
Kartnataka, India

<sup>3</sup> Assistant Professor, Computer Science Department, Sahyadri College of Engineering & Management ,  
Kartnataka, India

## ABSTRACT

*In the present market, both the fruit and vegetable industry is subject to selection. Ripening is the method by which fruits achieve their desirable flavor, quality, color and other characteristics of texture. Checking and grading maturity is a well known method in all sectors. To bring an automated ripeness recognition system in image processing multiclass SVM algorithm is used. Data collection plays major role in this case , in the proposed method banana images are considered. A SVM method was used to classify the ripening stages by extracting features like texture and color. Experiment Results proves that the proposed method gives most accurate results.*

## 1. INTRODUCTION

All the fruits have its own climatic requirement to grow and its need be harvested at particular unripe state. One such fruit which we have considered to do the experiment is banana. Ripened fruit become softer and it's hard for the trader to handle and carry those fruits. So to increase the profit they will harvest banana at earlier stage and ripe the banana by using artificial methods. So the proposed method will identify the fruits ripeness using Multi class- SVM Algorithm. The color and texture value can considered as key attribute to classify of these fruits. But there are many disadvantages to manually detecting whether banana is ripened or rotten. It's very tedious and time consuming task and it require man power to check each stage of ripening.

Visual Characteristics of banana fruit plays a significant role in the classification stage. Bananas undergo mainly color and textural transformation during the maturation phase. Recently, fruit maturing color detection has been researched as promising non- destructive technique. A hybrid feature extraction technique that incorporates color Characteristics, texture shape characteristics has been used in the suggested method fruit picture as input and to enhance the efficiency.

## 2. LITERATURE SURVEY

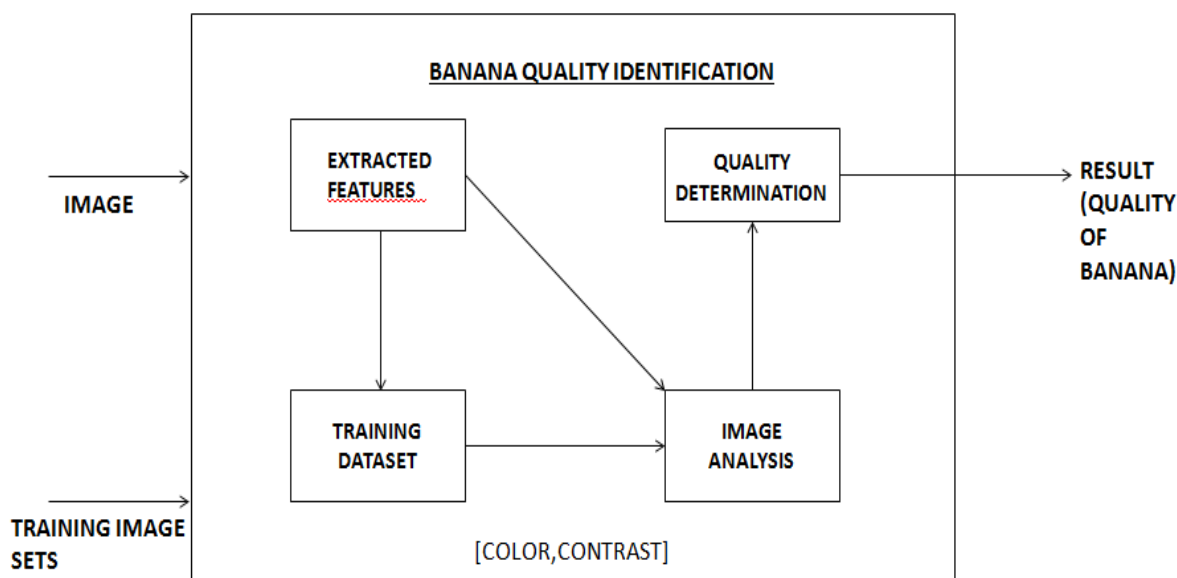
Segun E Adebayo, et.al [1] proposed the backscattering information with reference readings using several wavelength laser diodes to estimate quality attributes and discriminate bananas at various phases of maturation. An SVM model was constructed to predict the banana's quality characteristics as well as classify the banana into various phases of ripening stages. It was found that the various wavelengths values yielded coherent outcomes with all assessed models.

Udomsak Paeanpairoj et. al [2] proposed classification technique which has been applied on durian ripening fruit through diffusion gas analysis. They proposed various algorithms like Decision Tree, KNN, Naïve Bayes, Neural Network and Support vector machine (SVM). Various experiments were conducted and it proves that Support Vector Machines (SVM) is more accurate compared to other algorithm.

The existence and Density of pigments during maturing process of mango, changes in these pigments determines the color of mango. This paper proposes about the non-destructive technique based on machine vision system for real time color classification. RGB and HSI attribute values are used for more human perception. The value of sweetness is also detected using Hue component in mango [3].

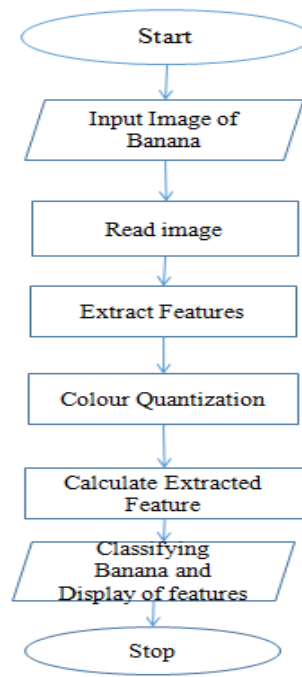
### 3. METHODOLOGY

The method proposed is implemented using multi SVM algorithm. Multi class SVM algorithm plays major role in classification of features. Right samples are collected which is images are fed as input to the system, the various image processing algorithms are applied, analyzed.



**Fig -1:** Architecture diagram of proposed method.

Architectural design of the proposed application is shown in Fig-1. The source image here will undergo various pre-processing stages. Most significant Morphological operation and binarization helps in cropping the image which focus only the fruit. Cropped image is then converted to RGB format and divided into Red, Green and Blue components. These components are further converted. All possible RGB combinations were analyzed and R/G is found to be the best ratio compared to others because of predictable behavior shown and the quality of banana and its category is shown to the user.

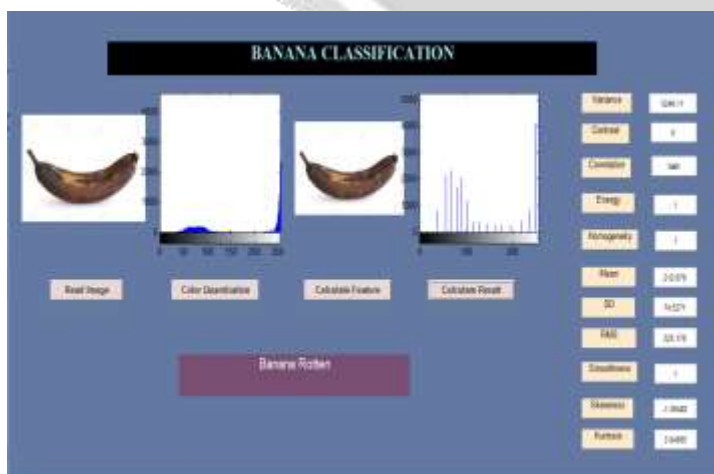






**Fig -2:** Flow chart of proposed method.

Input images with higher resolution gives more accurate values. The image background should be of light color, preferably white. Once the banana image is collected, next step is feature extraction. It includes two types of feature extraction-color feature extraction and texture feature extraction. These extracted values are used as input to classification technique. The proposed method uses multi-SVM technique which is a supervised learning algorithm. Here Classifiers need to be trained with dataset values to classify ripeness stage of banana. Once the system is trained the proposed method can be checked for accuracy by giving testing samples as input.

#### 4. RESULTS

The output will be in the form of featured values and information about the type of the Bananas. This information can be used to grade the Bananas, to find the defect Bananas and information regarding the features.



No.	Input Images	Expected Result	Actual Result	Status
1		Banana Red	Banana Red	Pass
2		Banana Green	Banana Green	Pass
3		Banana Normal	Banana Normal	Pass
4		Banana Rotten	Banana Rotten	Pass

**Fig-3:** Implementation result and Testing result for various images.

## 5. CONCLUSIONS

The traditional method for checking the type of bananas is very expensive and is filled with drawbacks. This system provides a method which is cost effective, and also helps to grade the bananas which will provide a better information to the farmers about the quality of bananas they have grown and to what price they can sell. All the above information and steps can be used by the industries for large scale quality and feature extraction. Can develop a hardware model consists of conveyor belt system, pi camera and sorting system and motor. The conveyor belt is supported by motor while helps to move the bananas in a large scale and pi cam is used to take the images of the bananas used for further process in real time.

## 6. REFERENCES

- [1]. Segun E. Adebayo, et al. "Banana Quality Attribute Prediction and Ripeness Classification Using Support Vector Machine", International Journal of Food Engineering Vol. 3, No. 1, June 2017.
- [2]. Udomsak Paeanpairroj, Wutthipong Chinnasri, "The Analysis of Fruit Ripening Level from Diffusion of Gases by using Data Mining Techniques", International Journal of Pure and Applied Mathematics, 2018
- [3]. Anil Verma and RajendraHegadi et.al. "Development of an Effective System for Remote Monitoring of Banana Ripening System", 2015 IEEE International WIE Conference on Electrical and Computer Engineering, December 2015.
- [4]. Rahul PralhadSalunkhe and Aniket Anil Patil, "Image processing for mango ripening stage detection - RGB and HSV method", Third International conference on Image processing, 2015.
- [5]. Neeraj Khara, "Real Time Condition Monitoring System for Tomato Ripening", IEEE International Conference on Recent Advance and Innovations in Engineering, May 2014.
- [6]. Pradeep Kumar Choudhary and Rahul Khandekar et. al. "Image Processing Algorithm for fruit Identification", International Research Journal of Engineering and Technology, Mar 2017.