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Multiple Fruit Identification in Tree Using Color & Texture Information

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ABSTRACT*:* on this paper proposed Multiple fruit identification in tree and this paper gives an insight into the results of a survey based on fruit identification and classification. The survey depicts the credibility of choosing the appropriate classifier and the feature extraction methods for correct and exact recognition of the fruits. It also reports on the accuracy and performance of each method implemented in the papers taken into consideration. Morphological features, color features, intensity based features and other features are extracted from the fruit images and these are subject to various types of classifiers like Probabilistic Neural Network(PNN), Support Vector Machine(SVM), Back Propagation Network(BPN) and K-Nearest Neighbor(KNN) algorithm. The goal of this paper is an overview of the techniques implemented in fruit identification and classification.

KEYWORDS: Reality- PNN, KNN, Morphological features

I.INTRODUCTION

The fruit industry plays a vital role in a country's economic growth. They account for a fraction of the agricultural output produced by a country. It forms a part of the food processing industry. Fruits are a major source of energy, vitamins, minerals, fiber and other nutrients. They contribute to an essential part of our diet. Fruits come in varying shapes, color and sizes. Some of them are exported, thereby yielding profit to the industry. Fruit sorting and grading are performed before export. This determines the quality of the fruits which is an important factor in the food processing industry.

The various applications of fruit recognition and classification are in agricultural and horticultural fields, in robotic fruit harvesting, where robots detect fruits on trees grown in large plantations, which can later be harvested. It also finds application in plantation science and in supermarkets to identify fruits. It can also be applied for educational purpose to enhance learning, especially for small kids and Down syndrome patients [2]. The performance and accuracy of each method implemented in the papers surveyed are discussed. This paper is organized into 3 sections. Section II describes the survey.

II.LITERATURE SURVEY

Ms. S. Mahalakshmi et al [1] this paper proposed for fruit identification and classification using survey of insight into outputs based system. The survey represents the believable of opting for suitable classifier and the function extraction ways for right and precise cognizance of the fruits. It includes stories on the accuracy and efficiency of every approach implementation, Morphological elements, color points, intensity cantered elements and other elements are extracted from the fruit pix and these are discipline to quite a lot of varieties of classifiers like Probabilistic Neural network(PNN), support Vector laptop(SVM), back Propagation community(BPN) and ok-Nearest Neighbor(KNN) algorithm. The intention of this paper is an overview of the techniques applied in fruit identification and classification.

Shiva Ram Dubey et al [2] described the economic and production losses in agricultural industry worldwide are due to the presence of diseases in the several kinds of fruits. In this paper, a method for the classification of fruit diseases is proposed and experimentally validated. The image processing based proposed approach is composed of the following main steps; in the first step K-Means clustering technique is used for the defect segmentation, in the second step color and textural cues are extracted and fused from the segmented image, and finally images are classified into one of the

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classes by using a Multi-class Support Vector Machine. it have considered diseases of apple as a test case and evaluated our approach for three types of apple diseases namely apple scab, apple blotch and apple rot and normal apples without diseases. Our experimentation points out that the proposed fusion scheme can significantly support accurate detection and automatic classification of fruit diseases.

Hetal N. Patel et al [3] This paper presented to the fruit detection based on algorithm, to effective locating on fruit tree, and it is one of the major efficient for the fruit harvesting system. In efficient feature extraction trained and to find fruit and image processing algorithm. And this algorithm have main goal of calculating one of kind weight for facets like intensity, color orientation and approximate locations of the fruit within an image. The 90% for a different fruit image on a tree for an efficiency detection different kind of fruits images. This technique can be applied concentrating on fruits for robotic fruit harvesting.

III.PROPOSED SYSTEM

Figure 1 represents the overall methodology of proposed system in this initially will consider the query image as input image and this input image is subjected to pre-processing stage, in this particular process will go for resizing of image, color conversion and mainly contrast enhancement for better efficient results, next the pre-processed mage is subjected to k-means segmentation by using adaptive k-means clustering technique and finally will go through the fruit localization process and according to clustering and localization the fruit can be identified and result is obtained. An efficient method for fruit localization is achieved in this way.

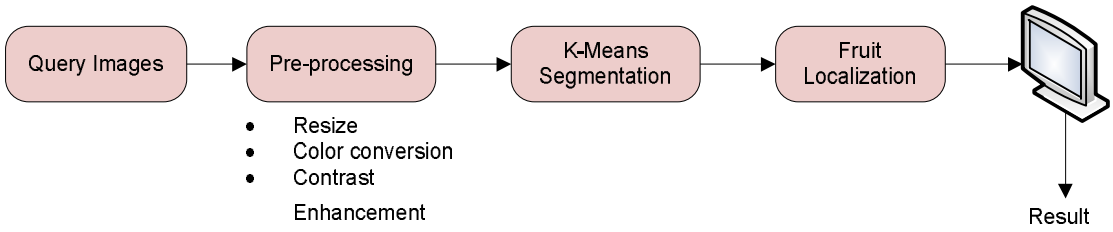

Figure 1: Architecture of Proposed System

A. PRE-PROCESSING

Different pre-processing steps like image gray conversion, image enhancement, Noise reduction, Contrast enhancement and image dilation are followed. Gray conversion involves converting the input RGB image into Gray color plane as in eq. (1). Image enhancement involves finding the histogram equalization of the input image for even distribution of the pixel values to get better enhanced Image. By which the Braille dots are made bolder for easy identification. This approach also involves noise removal to get the noise free image by applying filter. Because of the uncontrolled scanning condition the brightness in the image may vary do to which the quality of the dot gets reduced hence adjusting the contrast to get the contrast enhancement is very necessary [05]. To the obtained enhanced image some kind of dilation is done to get proper circular dot present in the Braille character. Orientation of image is also adjusted for proper alignment of the scanned Image.

$$\text{Grayscale} = ((R+G+B)/3) \quad (1)$$

B. SEGMENTATION

Image segmentation is an important part of image processing and it also has various applications in engineering, biomedicine and other areas. So far, a number of methods have been developed with the aim to identify the distinct region of objects in the image. This paper is devoted to application of three different methods of segmentation which are the watershed distance transform, gradient watershed transform and region growing method on microscopic crystal image. Before segmentation, the image was enhanced by pre-processing methods, such as denosing and adjusting of intensity. Segmentation is considered for both overlapping and nono overlapping objects by all methods. Segmentation of the overlapping objects by the region growing method has been improved by certain mathematical processes that are described in this project.

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Feature Extraction: The measurements of one or more functions are called as features. Quantifiable property of an object is specified by each of these features and only significant information's are later picked from these features. Features are classified into different types which are listed below,

C. GENERAL FEATURE

Features which are application independent are called general features. Features come under these category are Texture, shape and color features. These features are further divided based on the abstraction level: Pixel level features – These are the features calculated at each pixel. Features can be location or color features. Local features- These are the features calculated on image segmentation or edge detection considering subdivision of the image bands. Global features- If the entire image or a sub area of an image is considered for feature extraction then it is global feature.
Domain specific feature – Features like finger prints, human face and conceptual features which are application independent are called as domain specific features. All these features are coarsely divided into two types called low level features and high level features. Low level features can be extracted directly from image whereas the extracted high level features should be based on low level features. Proposed methodology considers extrema, centroid and branched points kind of features after thinning the signature. These extracted features are then passed to BPNN block for further comparison.

D. K MEANS ADAPTIVE CLUSTERING

K-Means algorithm is an unsupervised clustering algorithm that classifies the input data points into multiple classes based on their inherent distance from each other. The algorithm assumes that the data features form a vector space and tries to find natural clustering in them. The points are clustered around centroids.$\mu_i \forall_i = 1 \ldots . k$ which are obtained by minimizing the objective.

$$V = \sum_{i=1}^{k} \sum_{x_j \in S_i} (x_j - \mu_i)^2$$

Where there is K Cluster $S_i, i = 1,2, \ldots , k$ and μ_i is the centroid or mean point of all points $x_j \in s_i$ As a part of this project, an iterative version of the algorithm was implemented. The algorithm takes a 2 dimensional image as input. Various steps in the algorithm are as follows:
1. Compute the intensity distribution (also called the histogram) of the intensities.
2. Initialize the centroids with k random intensities.
3. Repeat the following steps until the cluster labels of the image do not change anymore.
4. Cluster the points based on distance of their intensities from the centroid intensities.

$$c^{(i)} := \arg \frac{min}{j} \left\| x^{(i)} - \mu_j \right\|^2 \qquad (2)$$

5. Compute the new centroid for each of the clusters.

$$\mu_j := \frac{\sum_{i=1}^{m} 1\{c_{(i)} = j\} x^{(i)}}{\sum_{i=1}^{m} 1\{c_{(i)} = j\} x} \qquad (3)$$

where k is a parameter of the algorithm (the number of clusters to be found), i iterates over the all the intensities, j iterates over all the centroids and μ_j are the centroid intensities.

E. **Morphological Operation**

Morphological operations are affecting the form, structure or shape of an object.

The dilation

The dilation process is performed by laying the structuring element B on the image A and sliding it across the image in a manner similar to convolution (will be presented in a next laboratory). The difference is in the operation performed. steps:
1. If the origin of the structuring element coincides with a 'white' pixel in the image, there is no change; move to the next pixel.

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2. If the origin of the structuring element coincides with a 'black' in the image, make black all pixels from the image covered by the structuring element.

The erosion

The erosion process is similar to dilation, but we turn pixels to 'white', not 'black'. As before, slide the structuring element across the image and then follow these steps:

1. If the origin of the structuring element coincides with a 'white' pixel in the image, there is no change; move to the next pixel.
2. If the origin of the structuring element coincides with a 'black' pixel in the image, and at least one of the 'black' pixels in the structuring element falls over a white pixel in the image, then change the 'black' pixel in the image (corresponding to the position on which the center of the structuring element falls) from 'black' to a 'white'.

These two basic operations, dilation and erosion, can be combined into more complex sequences. The most useful of

Opening and closing

These for morphological filtering are called opening and closing [1]. Opening consists of an erosion followed by a dilation and can be used to eliminate all pixels in regions that are too small to contain the structuring element. In this case the structuring element is often called a probe, because it is probing the image looking for small objects to filter out of the image. See Fig. 7.6 for the illustration of the opening process.

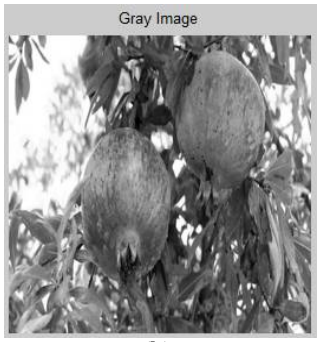
Notation:

$A \circ B = (A \ominus B) \oplus B$

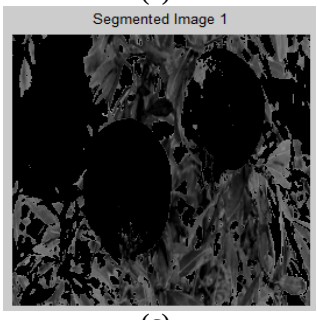
IV.RESULTS

In this Figure 2: Represents the Input image which is shows in Figure (a), after it converts the binary Image using Color conversion which is Shows in figure Binary Image, and ROI selecting image the that was shows in Figure (g) ROI Selected Image, the Segmented images are shown in (e), (f), (g); the finally we got one image that is marked image that shows in figure (h) Marked Image respectively.

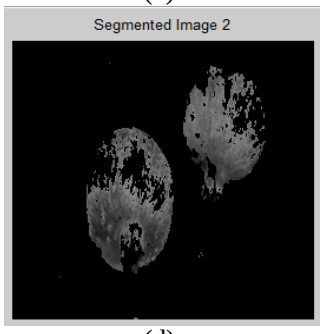
(a)



(b)



(c)



(d)

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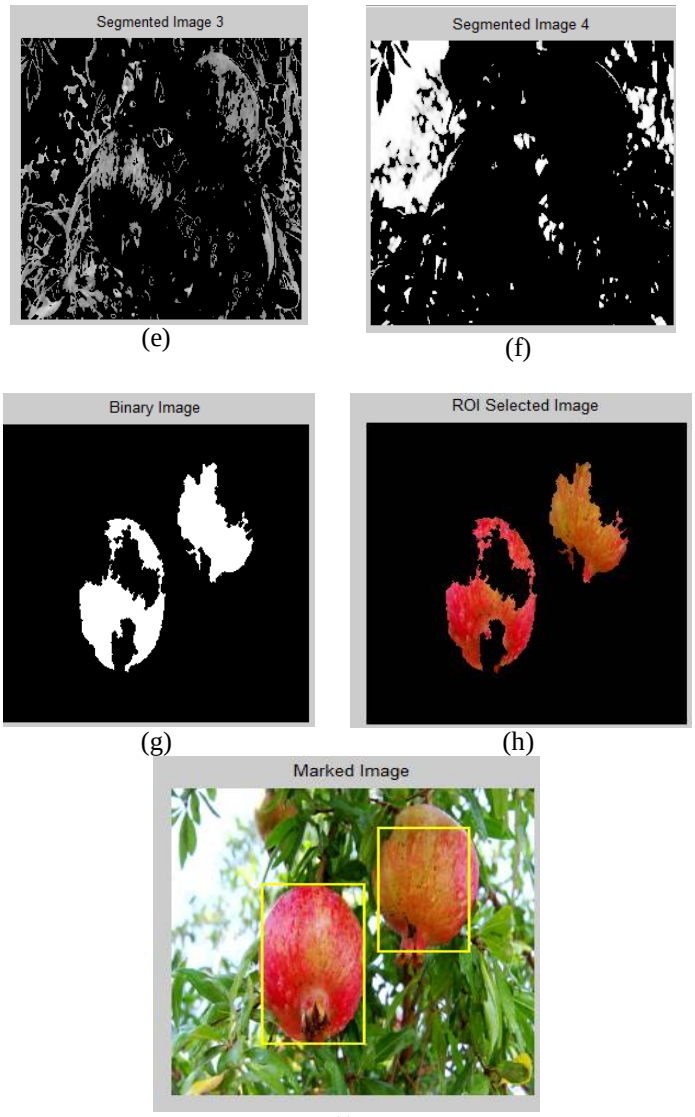

(e) (f) (g) (h) (i)

Figure 2: (a) Input image; (b) Gray Image; (c) Segmented Image1; (d) Segmented Image 2;(e) Segmented Image 3;(f) Segmented Image4;(g) Binary Image; (h) ROI Selected Image; (i) Marked Image

V. CONCLUSION

According this project we concluding the various applications of fruit recognition and classification are in agricultural and horticultural fields, in robotic fruit harvesting, where robots detect fruits on trees grown in large plantations, which can later be harvested. It also finds application in plantation science and in supermarkets to identify fruits. It can also be applied for educational purpose to enhance learning, especially for small kids and Down syndrome patients [2]. The performance and accuracy of each method implemented in the papers surveyed are discussed.

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