



Classification of crops using ANN

Anandkumar, Lalitha Y S

Abstract. This paper presents study on image processing techniques used classify the crop images. Advanced computing technology helps to improve yield of agriculture products with increasing population of the world and less resources of food. Identification of automatic crop classification based on types is the most important problem. Automatic identification of crop type could help farmers for application of fertilization, pesticides and harvesting of different crop species on-time for the improvement of the production processes of food industries. In this work, Artificial Neural network was used to classification of Guava, Papaya, Banana and Pomegranate crop images. The result shows 90% accuracy in the classification.

Keywords: ANN, Classification, Crop images.

I. INTRODUCTION

Crops are primary and necessary requirements of human beings. Scholars now put attention on the use of Robotic technology in agriculture from the computer, AI, mechanical, electrical sciences. Classification of crops is vital for successful management and monitoring of diversity, crop productivity, disaster compensation and environmental monitoring.

Classification of effective data process is most important because it will help incorporate to determine the exact levels of control to separate and distinguish different the datasets. This paper presents Artificial Neural Network (ANN) algorithm which has been used for the crop classification because it has no prior assumptions about the statistics of data. It is vital for successful management and monitoring of diversity, crop productivity, disaster compensation and environmental monitoring.

II. PREVIOUS WORK

For any research activity work, literature survey help the scholars to motivate for the innovative of a new research concept on the successful result. Many researcher carried out work and published on the advancements of image processing for features extraction and classification. For grading of plants, some researchers has suggested fast and accurate method based on rectification is not possible.

computer image processing. The output give new technique for detection and plant classification.

Goutum Kabala proposed works which will allow the user to recognize and also classify the banana leaf based on the leaf type which will help in increasing the yield to the formers [1]. Monzurul Islam proposed an approach which presents a path on diagnosis of automated plant leaf types on a massive scale [2]. PreethaRajan developed an automatic system for pest identification using image processing techniques. The SVM is trained by color feature to classify the leaf and pest pixels. The unwanted elements are removed by Morphological operations in the classified image [3]. Dr. G. H. Agrawal explained about the estimation of different plant climatic parameters and using picture handling, inspecting discovery of leaf sickness and using the IOT method, transfers the whole data over web[4]. Yan Cheng Zhang proposed fuzzy feature selection approach fuzzy curves and surfaces to select features of cotton leaf type leaves image. In order to get best information for diagnosing and identifying, a subset of independent significant features is identified exploiting the fuzzy feature selection approach. The results show that the effectiveness of features selected by the FC and FS method is much better than that selected by human randomly or other methods [5].

III. METHODOLOGY

There are 5 components in the system. They are (I) Data Collection (II) Preprocessing of the image (III) Segmentation of the image (IV) Features Extraction (V) Classification. Fig 1 represents the flow work of the project describing the stages of processing

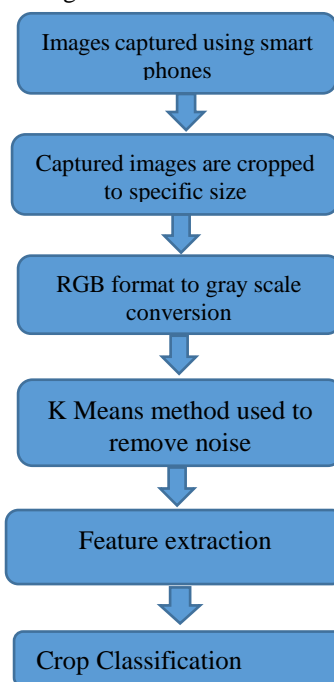


Fig 1. System

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Architecture

A. Image Database

Image dataset which contains 1000 images and 4 categories is considered for this work so that the system become more realistic. In the dataset, each category contains 150 training and 100 test clips [6].



Fig 1. Leaves of guava, Papaya, Banana, Pomogranate

Some of the training and testing images are filled with noise, intense colour. The system architecture is given below.

B. Image Preprocessing

The image input has the resolution of [1024*1600] then the processing of the system may be slow due to the higher resolution. Hence rescaled to 255*255 by using available inbuilt mat lab functions.

```
Img = imread ("Filename.jpg");
Resizeimage=imresize (img, [255,255]);
```

Image Restoration is a simple process of taking the corrupted pixels of image and cleaning them. The restoration process allows the user to redefine the brightness, contrast adjustment and the other features of the images. It's not a de-noising method, but allows the user to smoothening the image by using the simple method like point spread function, venar filter and de convolution method etc. The noise is an undesirable signal present in the image. It might have been caused during the storage transmission or processing.

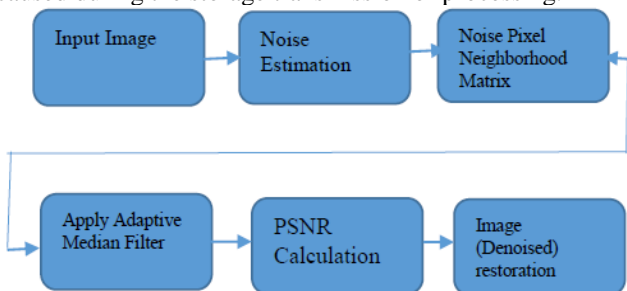


Fig 2. Block diagram of image de-noising



Fig 3. De-noised image of Banana

We have used adaptive median filter for the de-noising of image. It is equivalent to the mean filter but performs the de-noising by preserving the valuable information in the image. It is a type of nonlinear filter which means for any two images A and B. The sum of median $A(x) + B(x)$ is not equal to the sum of median $A(x) + \text{median } B(x)$.

C. Texture scanning and segmentation

Region based texture scanning and image segmentation the process of image segmentation is considered to be vital in digital image processing. As by the use of segmentation methods we can divide the image according to the requirements and extract the part of the image which can be used for later processing.

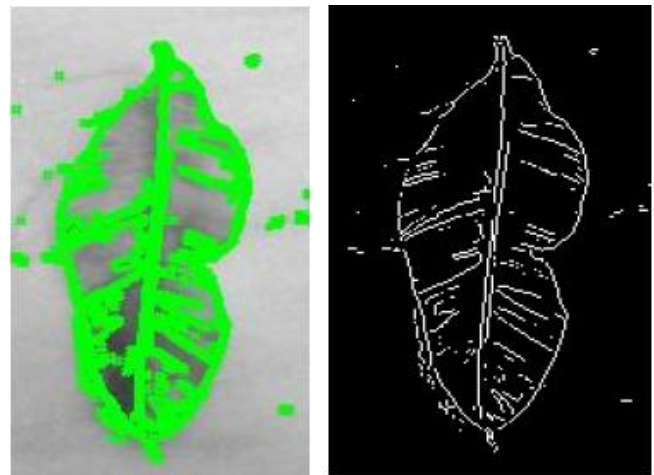


Fig 4. Segmented Banana Image

In our present technology we have used region based image segmentation method to overcome a drawback of other systems. In general detection of a image pixel in the image and multilevel image segmentation are the two important and closely related task. Which combine provides solution to problem faced by other techniques, we use a hierarchical structure based region based approach for image segmentation by combining of the detection and image segmentation. The system is simultaneously operations on pixels region and the image pixel present in it.

D. Feature extraction

For any physical image pixel pattern is an important attribute which distinguish visible behavior from the other image pixels. Pattern is consisting of parameters such as

1. Height of an image pixel.
2. Width of an image pixel.
3. Boundaries of an image pixel.
4. Line curve of an image pixel.

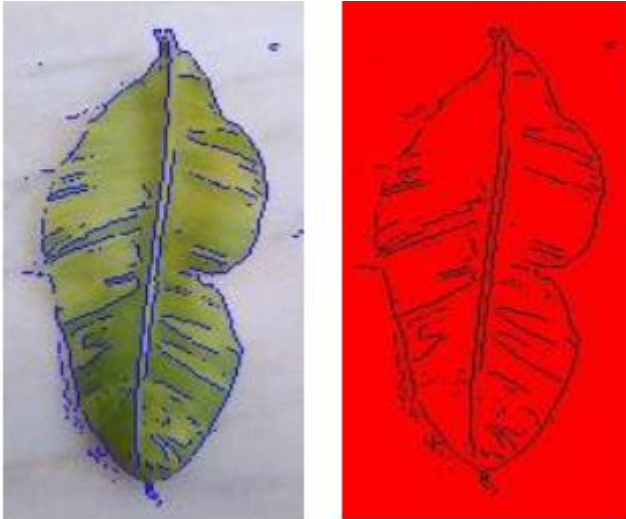


Fig 5. Feature Extracted Image.

By using these parameters we can extract and determine is pattern feature based on the available prestored database. In recognition of crop leaf type, pattern of crop leaf part placed important attribute and it works efficiently for sign detection. It is considered to be robust for changes with the illumination condition. As it detects a pattern depending on the image edges and will reduces whole size of the image to the small regions instead of complete image.

The proposed process it quite challenging when the images are de-patterned by the obstacles. Hence, we need to apply a better boundary detection algorithm to extract the better pattern from the image.

E. Ann Classifier

Artificial Neural Network will takes input as leaf image apply computational model that works on and converts it into corresponding output label. It requires less preprocessing efforts.

IV. EXPERIMENTAL ANALYSIS AND RESULTS.

The dataset contains 1000 images and 4 categories is considered for this work so that the system become more realistic. In the dataset, each category contains 150 training and 100 test clips [6]. For classification, Artificial Neural Networks method proposed. There are three input layers, three hidden layers and three output layers. The ANN normally consists of **nodes**, and an arrow represents a connection from the output of one node to the other node. The keras, is a Python API which is belongs to the neural network. Each batch size taken as 20 and the model has been educated for 500 epochs. Here four leaf plants are checked by using ANN classifiers. The accuracy result graph is shown below.

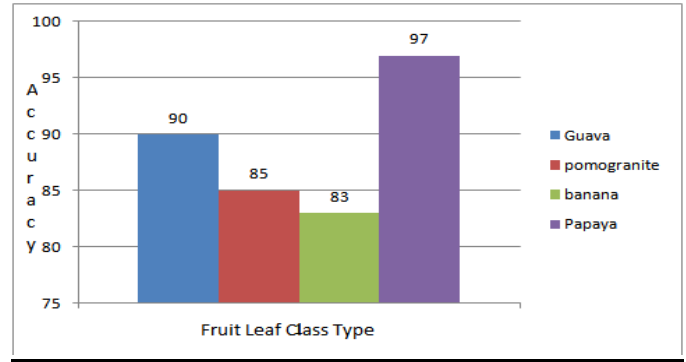


Fig 3. Accuracy Graph

V. CONCLUSION

In this paper it’s been proposed a novel approach which performs plant leaves type detection and classification by using the DIP methods as explained in the above segments. Proposed system of detection and classification of leaf type by using ANN classifier is performed on the database as the training in which the feature values are recovered and store in the system database. User input sample image is passed to the system to extract the features. The image is than processed in multiple stages by using the region based image segmentation neural network feature classification feature based ANN classifier to give final result.

We also use the de-noising method initially for removing the possible noise present in the image. Later image can be processed and image labeling for perception will increase the accuracy. With help of advanced fuzzy classifier the result has shown in accurate on the given dataset for about 85% to 92%. And the system is user friendly which will give user the efficient result to the user.

The future work of the proposed method includes recognizing the leaf type in multiple leaves and providing the user the cure and precaution messages to user.

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Classification of crops using ANN

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Anandkumar completed his M.Tech in Computer science and Engineering. Currently pursuing Ph.D in VTU RRC, Belgaum. He doing research on image processing and published 2 international journals and 1 national journal.



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