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Fruit Disease Detection and Pesticides Recommendation System

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ABSTRACT—- Production of fruit crops is a very necessary part of India. It is important in terms of economy and nutritional value, and it feeds not only humans but other living beings also. the trees provide shelter to living beings. Also, it absorbs many harmful gases and gives us pure and free oxygen. Fruits are a lot better than junk food, which has become the cause of many diseases today.Keeping these aspects in mind, the fruits must be prevented from getting infected with diseases at an early stage itself. This paper reviews the various image processing methods that can be used to detect diseases in fruits based on symptoms. Then the research gaps for every paper have been highlighted. This paper aims to help other researchers get to know the various methods that can be used in fruit disease detection.

I. INTRODUCTION

Fruit harvesting is an occupation with roots dating from ancient times. the livelihood of the farmers depends on this profession. Fruit production creates employment opportunities; it provides energy and shelter to human beings and animals. This occupation can overcome poverty. the economic growth of any country depends upon the production of fruits. Besides this, many industries use fruits to fetch the profit for their businesses. Also, fruits are very healthy and have low cholesterol, and when consumed, it gives us numerous benefits at a cheap rate. Hence, if the fruits' diseases are not treated early, we may lose many benefits of this trade, and a particular fruit may enter into extinction. Future generations will not know whether such a fruit had even existed earlier.India has been known as the biggest fruit promoter. After China the India has been considered as the other major promoter of the fruit. India is also known as the fruit crate of the globe. India is the largest cultivator of apple, citrus, banana, grape, mango and guava. Also, India is a huge minimal effort maker of fruit, but the lack of workforce, poor chilly storerooms, and the wasteful post yield administration and less involvement of technology, universally India just contributes 1% in the fruit business. In India, the wastage of fresh fruits has been assessed at very high order, i.e. up to 30- 35% of the aggregate production.Fruit quality has been destroyed massively by the different diseases. Due to the tree disease most of the tree parts such as branches, leaves and twigs are affected. An early appraisal of contamination of fruits can prevent the losses and help to maintain a strategic distance from extra reach of diseases. For the agricultural industry different image processing applications has been developed.

The disease recognition imaging systems are still great challenges of the computer vision to get outcomes closer to the degree of the human visual system.The fruit disease recognition is very difficult via manual inspection due to the regular changeability of fruit skin and the presence of different types of diseases [3]. It is necessary to examine the health of the fruit as well as detection of disease for getting disease control measures for minimizing and preventing losses in yield caused by fruit disease.

II. LITRARTURESURVEY

As per a research paper, manual detection of diseased fruit is difficult and time-consuming; the authors have proposed a web-based system through which even the non-experts can identify the Disease through symptoms. the authors have considered three apple disease types: Apple Blotch, Apple Rot, and Apple Scab. They have suggested a solution.

Dubey and Jalal [1] have discovered the architecture for sorting different kind of vegetables and fruits. They have also surveyed the image processing application for fruit and vegetable classification and analysis [3].An architecture of

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imaging system discovered by the Kim et al. [4] for automatic detection of apple defect. S. Kanakaraddi [5] proposed the classification of disease of chilli fruit using color features. Kleynen et al. [6] have classified the infected or normal images using the bayesian classifier. Leemans et al. [7] proposed the defect segmentation based on the color information. A framework is proposed for fruit disease classification and detection using completed local binary patterns (CLBP) [8].Dubey and Jalal have proposed the fruit disease classification using ISADH based texture features [9]. [10] Proposed the framework for fruit disease detection and classification. J.D. Pujari [11] proposed the framework for classification of anthracnose fungal Disease using neural network classifier. J. D. Pujari [12] also proposed the classification of plant disease using color and texture features and classification done by using artificial neural network,Classifier.

III. PROPOSED METHODOLOGY

The main aim is to design a system which is efficient and which provide disease name and pesticides name as fast aspossible. In this paper, we have used different types of diseases of apple fruit namely, Rot, Scab and Blotch in order to verify and validate the given approach. For the fruit disease recognition and categorization automatically we have experimentally approved the importance of clustering method (K-means clustering algorithm) used for the segmentation of disease and for training and classification multi-class support vector machine is used as a classifier. We have proposed the framework which mainly contains four steps as shown in Fig.1

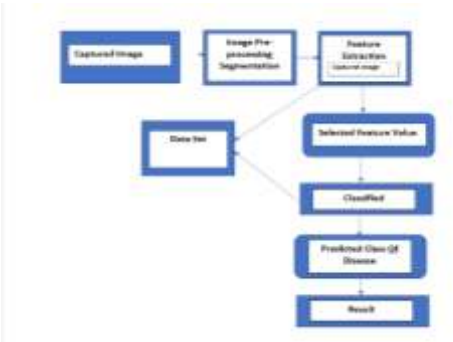

Fig.1.Block diagram

A. Image Pre-Processing:

Imageshouldbeprocessedbeforesendingtot healgorithm for testing and training purpose. For that purpose,inthisprojectimageisscaledorresizeinto150x 150dimension. As we used color image so that we don't needanycolorconversiontechniquesandthatpre-processedimage is directly passed to algorithm for training and testingpurpose.

B. Feature Extraction:

In an image processing and computer vision for solving different computational Problems of different applications the features give the relevant information. Features may be an outcome ofneighbourhoodpixels operation. Features also represent the specific structure in the image. In the given solution we have used texture, color and shape features in order to verify given solution. Improved sum and difference histogram (ISADH), color coherence vector (CCV), gray level co-occurrence matrix (GLCM), completed local binary pattern (CLBP) and zernike moments (ZM) features are used in order to identify and classify the diseased and normal fruits.

C. Feature extraction:

Feature extraction refers to the process of transforming raw data into numerical features that can be processed while preserving the information in the original data set. It yields better results than applying machine learning directly to the raw data.

D. Convolutional Neural Network :

Oncepre-processingisdone,thenCNNisusedfortraining purpose and after that we get trained model. ThatCNN method is written with help of tensor flow. By usingthis model, we classify the image that system is getting afterpre-processingoftestingimage.Thenwegetparticulardise ase name or healthy leaf name if there isno disease onthat leaf and that disease name is send to android applicationand with the help of that disease name we get particularpesticidenamewhichhelpfarmertotakeresp ectiveactioninordertodecreasepercentageofdisease.

E.Canny Edge Detection:

We are used the Canny edge detection is a technique to extract useful structure information from different vision object and dramatically reduced the amount of data to be processed. It has been widely applied in various computer vision systems

F.Active contour:

Active contour is a segmentation method that uses energy forces and constraints to separate

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the pixels of interest from a picture for further processing and analysis.Active contour is defined as an active model for the segmentation process. Contours are the boundaries that define the region of interest in an image. A contour is a collection of points that have been interpolated. The interpolation procedure might be linear, splines, or polynomial, depending on how the curve in the image is described.Active contours are the technique of obtaining deformable models or structures in an image with constraints and forces for segmentation. Contour models define the object borders or other picture features to generate a parametric curve or contour. The curvature of the models is determined using several contour techniques that employ external and internal forces. The energy function is always related to the image's curve. External energy is described as the sum of forces caused by the picture that is specifically used to control the location of the contour onto the image, and internal energy, which is used to govern deformable changes

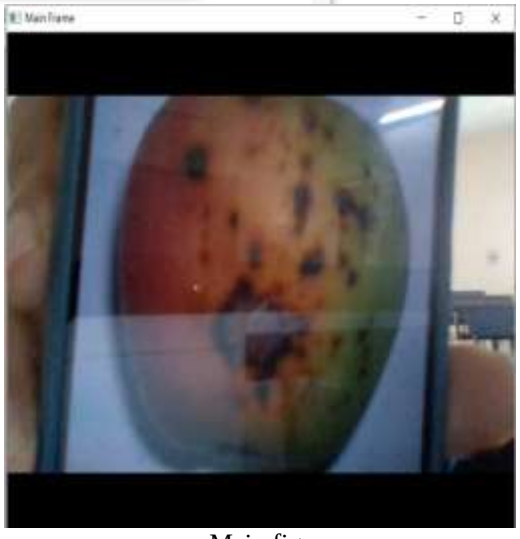
IV. PERFORMANCE ANALYSIS

The performance analysis of convolution neural networkfor classification & prediction of pesticide for fruit disease isperformedonapple datasets.In this segment, we depict the dataset of apple fruit diseases and discuss about the execution and the proficiency of the framework

Accuracy:

Fig.Accuracy

Contour fig



Main fig.

V. CONCLUSION

In this work the fruit disease images are classified usingconvolutionneuralnetwork.xperimentally verified and approved. The given method classified the diseased and normal fruit images using three classes of apple disease Blotch, Rot, and Scab. Our experimental outcomes show that the given solution can significantly support automatic identification and classification of apple fruit diseases. Based on our experiments, Aswecanseefromimagesthatthehighestaccuracy

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