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Disease Identification of Pomegranate Fruit using Image Processing

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***Abstract*— India is among the country where most of the people depend on agriculture. The identification of pomegranates fruit disease is a challenge that can be made easy by using image processing for detecting diseases of fruit. With this system it is possible to detect type of disease, the affected area and severity of the disease. Now the proposed work is the first step towards the design of such device which helps for interpretation, the algorithm is implemented in MATLAB**.

Keywords—Identification

Introduction

India is among the country where most of the people depend on agriculture. And the major area which decides economy of the nation is agriculture. The agricultural yield's quality and production quantity is affected by ecological parameters like temperature, rain and other climate related parameters which are out of control of human beings. Another major factor which affects productivity of the yield is the disease; in this factor we can have control to improve the productivity for quality as well as for quantity of yield.

The main threat for pomegranate cultivation is diseases and insect pests. Therefore timely correct diagnosis and careful treatment essential to defend the yield from severe damage and severe loss. Plants diseases may be found in stem, leaves and fruit. Bacterial Blight, Alternaria and Scab are major diseases that affect the pomegranate fruits. The diseases affects to neighbor healthy pomegranate plants via wind, sprayed rain and through infected cuttings. In destructive diagnosis methods first the fruit is removed from plant and then measured. In non-destructive methods dimensions of fruit are measured without removing the fruit. The technology makes farmers to check the possibility of diseases at primary stages and make possible treatment. A methodology is developed to determine the type of disease the fruit is affected. The traditional approach of recognition of fruit infections is using the bare eye analysis from the professional specialists. Consulting professional experts is costly and time taking because to the unavailability of expert in nearby locations. Classification of fruit diseases and automatically detecting the symptoms as earliest as possible is very important.

For prevention of disease, it is required to be detected at early stage so that treatment can be done properly and avoid spreading of the disease. Advances technologies make it possible to use the images of diseased fruit and detect the type of disease. This achieved by using image processing technology, where features extracted from the images and further used with classification algorithms to make identification.

I. Literature Survey

Khot.S.T, Patil Supriya, Mule Gitanjali, and Labade Vidya [1]published a paper in the year 2016 on finding the affect of bacterial diseases on pomegranate fruit ,it shows features that are extracted, factors that are considered for the extracting information, types of information extraction and classification approaches used for plant identification and classification. In image pre-processing, images are resized. In segmentation, color segmentation is carried out. Colorfeatures, texture features and morphology operations are used for the feature extraction. Minimum distance

classifier like euclidian distance is used for classification.

Swati Dewliya, Ms. Pratibha Singh [2] published a paper in 2015,The image processing approach considered, consists following three steps, first makes conversion rgb to gray, apply median filtering, perform edge detection, and morphological operations are used for the image segmentation. Secondly, shape approximation technique are used for feature extraction, histogram of chain code and density of pixel widely used for feature extraction from the segmented image, both feature extraction technique are compared and in the third steps images are classified with a different kernel in Multi-class Support Vector Machine.

Tejas Deshpande, Sharmila Sengupta, K.S. Raghuvanshi [3] published a paper in the year 2014 on classifying pomegranate plant leaves diseases. They have considered Bacterial blight disease for the diseases classification work. In this work K-means clustering was used for image making segmentation of affected area. First Total pomegranate leaf area calculated say total_area and then total affected (i.e. diseased)area calculated say total_aff. After that disease severity has been found using total_aff/total_area. This is useful for plant pathologists, as according to 7 severity pathologist' scan suggest the preventive action. This is not directly useful for farmers.

Monika Jhuria, Ashwani Kumar, Rushikesh Borse [4] published in 2013, recommended away for fruit grading and disease detection. The main aim of proposed work was to study diseases on fruit or leaf and specify preventional solutions. Work was carried on apple and grapes. Digital image processing technique was used to carry out the work proposed. They have considered Color features, texture features and morphology features for extracting features. For making classification (ANN) Artificial_Neural_network was used. Back propagation(BPNN)makes weight adjustment while training images stored in training folder. The fruit grading made on the basis of spreading of disease.

Jagdeesh D. Pujari, Rajesh Yakkundimath, Abdulmunaf S. Byadgi [5] 2013 publication they have used statistical approach for detecting fungal diseases of fruits. Pomegranate, mango and grapes used for research work. First input image is preprocessed for converting into binary and then remove the noise. Secondly edge detection applied to image and box sub blocking is done. Then taking one box at a time feature are extracted. For experimentation image divided in to 5 x 5 blocks and then by using GLCM (gray level co-occurrence matrix) texture related features extracted.

Shiv Ram Dubey, Anand singh Jalal [6] proposed in 2012, an image processing technique for fruit related disease recognition. Apple is considered for the experiment diseases namely apple-scab, apple-rot, apple-blotch. K-means clustering used for segmentation of image. On segmented images feature extraction was carried. Features considered are 1. Color histogram, 2. Color coherence vector, 3. Local binary patterns and 4. Complete local binary patterns. Support-vector-machine (SVM) used making disease identification.

II EXISTING SYSTEM

Many methodologies have been proposed and implemented but those have limitations and constraints. Also some approaches are found to be having less accuracy because of either noisy images or choice inappropriate classifier. While using neural network classifier it requires learning time is long and defining classification rules and rule extraction is difficult and there is a lack of transparency.

Disadvantages

• Neural networks cannot be retraining is time consuming takes lot of time.

• Neural networks is a very complicated.

• Patterns revealing of neural networks is similar to those revealed by humans.

III PROPOSED SYSTEM

Clustering method is used and then fruit features extracted. The features are color, texture. The color features extraction made using the R,G,B and GLGM(Gray level Co-occurrence matrix) use for texture features extraction. Segmentation and

clustering methods are used to identify the diseases of the affected portion on pomegranate. For segmentation the image is first binary conversion is done then for focusing the area of interest and separating removing background. For segmentation. Clustering is used. Clustering gathers pixels so that pixels within each group are similar called clusters.
Classification methods used are PNN, KNN and SVM to make comparative analysis and find the best classifier.

Advantages

For image segmentation clustering algorithms are mostly used because, easy to implement and the classification methods used provide more accuracy.

IV DESIGN

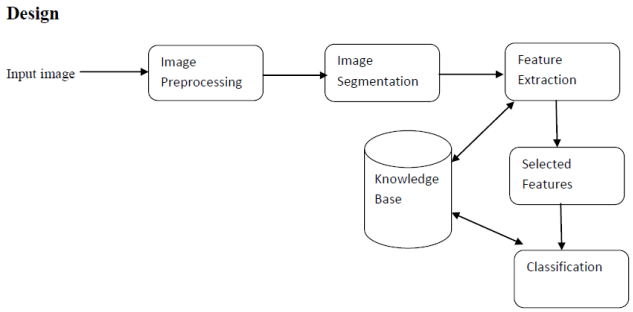

Fig 1 Architecture of System Design

Figure show architecture of diagnosis of pomegranate plant diseases using supervised classification system which is capable of recognizing type of the diseases. This approach is based on mainly 4 steps: Image Acquisition (Image Collection), image pre-processing and segmentation, extraction of features and classification in which fruit disease is predicted. Proposed work starts with creation of a dataset (i.e. image set) with all the images for training the system and then for testing. The image in dataset can have different formats such as *.bmp,*.jpg etc. Images can be read with the help of digital camera. Initially the images were preprocessed for better and clear image Segmentation was applied to mark the region of interest and extract from the input image. The segmentation output is used for the feature extraction and the feature set obtained is fed as input to Classification stage for training and classification in order to recognize the fruit disease.

V OVERALL ALGORITHM OF THE PROPOSED SYSTEM

The overall algorithm of the proposed system is as follows

Input: Testing image.

Output: Identification of fruit disease

Step1: Capture images of healthy and defective sample of fruits from the digital camera and store the images in dataset.

Step2: The sample images are read form stored training dataset; enhancing the image by making pre-processing. Using clustering (Fuzzy-C-mean or K-Means) segment the selected fruit image.

Step3: Appropriate features extracted and training file is generated.

Step4: Train the PNN (probabilistic neural network)using training data and then make detection/classification of image.

Step5: End.

VI RESULTS AND ANALYSIS

Fuzzy-C-Mean Results and Analysis

Single image features extraction by using fuzzy C Mean Clustering.

- Upload Image Button – for Selecting Image.
- Process Image – Makes pre-processing, Fuzzy C Means clustering and cropping.

- Feature Extraction – Extracted features from processed image.
- GUI for single image testing.
- Upload Image Button - for Selecting Image.
- Choose Classifier - Select classifier for testing
- Classify Button – Classifies the image according to selected classifier

Accuracy attained is around 98.3% and KNN Classifier gives accuracy attained around 100%

VII CONCLUSION

Current scenario Suggest to have an approach to automatically grade the disease on plant. The disadvantages of manual grading can be overcome by using this automated system and may aid the pathologists in terms of making accurate diagnosis.

The proposed system implemented by considering fruit features that can be extracted using fuzzy C mean and K means approaches. These approaches have been used for the identification of fruit disease types. The diseases that are affected on pomegranate fruit have been identified using KNN, PNN and SVM classifiers.

The results analysis shows that the results found are accurate and acceptable. Once the disease is identified the symptoms and prevention treatment solution provided to prevent further loss. Result analysis shows the KNN and PNN approaches are good.

VIII FUTURE ENHANCEMENT

This work can be extended to make classification fungal diseases on crops, cereals, vegetables. This work also can also be extended to detect and identify various diseases like bacterial, viral affected on agriculture or horticulture yields.

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