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RESEARCH ARTICLE

A Clustering Improved Curvature Analysis Approach for Plant Disease Identification

Sheetal
Student, M.Tech (CSE)
NCCE, Israna Panipat

Ranjeeta Kaushik
Assistant Professor, CSE Department
NCCE, Israna Panipat

Abstract- Agricultural Data processing is one of the major real time application of Image processing used to perform the agricultural object classification and disease identification. In this present work, plant leaf based analysis approach is defined for disease plant recognition. The presented work is defined as a hybrid system that includes the improved clustering approach, mathematical filters and the curvature analysis approach. The clustering is performed at the initial based on intensity variation analysis. Once the clusters are identified, the refinement over these clusters is performed using mathematical operators. At the final stage, the curvature analysis is defined to identify the disease area over the leaf. The analysis results show the effective disease ROI identification over the leaf.

Keywords: Leaf Analysis, ROI Identification, Curvature Analysis

I. INTRODUCTION

There are number of associated real time application of image processing.

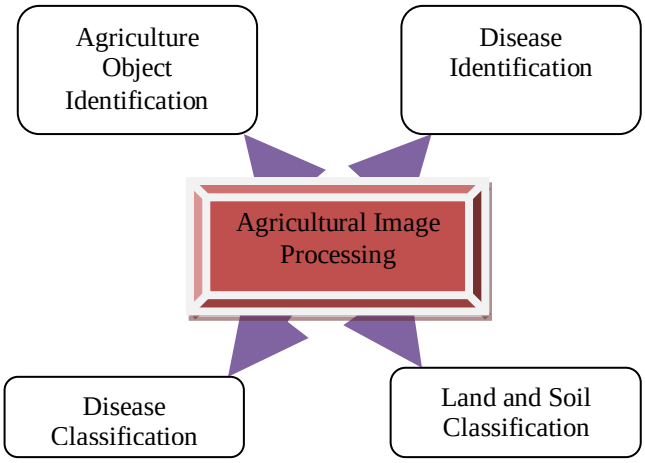

Figure 1 : Agriculture Application Areas

Agriculture Image processing is one of such application area used to recognize the agricultural object as well as to identify the disease over the agriculture data. The agriculture processing itself includes multiple application areas shown in figure 1.

The application area includes the classification and segmentation approaches individually or collectively. The segmentation approaches are applied on single image to identify the ROI over the image. The segmentation is used as the individual approach as well as used as the intermediate stage for other approaches. These approaches include the recognition and classification of object over the image.

The work includes the identification of the disease over different agriculture objects. These objects can be fruit, leaf, root, crop or the soil. The disease identification includes the detection of disease area over the object as well to separate the disease objects over the pool. These kinds of application areas suffer from different kind of challenges. These challenges include the availability of the images as well the image descriptive information of the plant disease. These challenges are shown in figure 2. It means, disease description is not easily available respective to the image type and the descriptive image form. Another

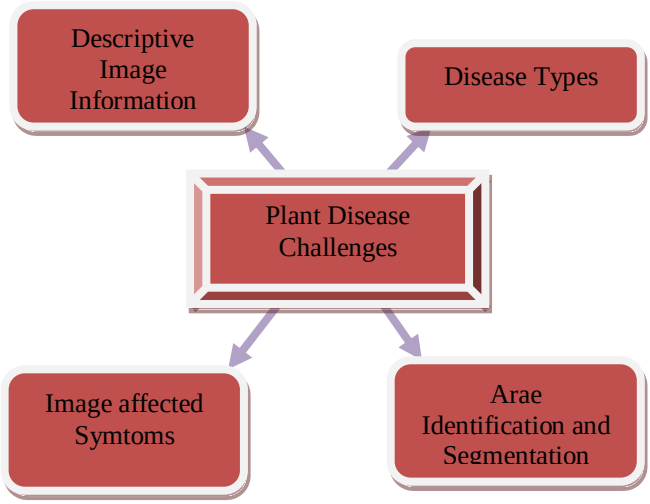

Figure 2 : Plant Image Processing

associated challenge includes the quality of the image. The disease identification can be performed accurately only in case of high quality images. The feature extraction from these plant images is also a challenge. The disease identification and its formation is required to recognize the disease area accurately.

In this paper, an effective model is defined to identify the disease over the plant leaf. The work is defined based on hybrid algorithm. In this section, the generalized approach for agriculture image processing is defined. In section II, the work defined by earlier authors is defined. In section III, the work the proposed model is defined along with methodology description. In section IV, the results obtained from the work are defined. In section V, the conclusion obtained from the work is presented.

II. RELATED WORK

In this section, the work defined by the earlier researchers in the area of agriculture image processing is defined. The work description related to the work is presented here under. Wu Chun[1] performed a work on SAR image processing for noise reduction over the images. Author proposes an amalgamation frame based on EMD and PCA algorithm. The frame can effectively filter the speckle noise and enhance the structure character which finally can be seen by people's eyes. Using the proposed method, the speckle noise of SAR image in different scale is filtered. At last, Author obtain the new denoised SAR image. S.Md.Mansoor Roomi[2] performed a work to perform the SAR image despeckling using DWT approach. This proposed algorithm uses new improved thresholding and polynomial soft thresholding function to threshold the non-edge component present in the corrupted image. Lavika Goel[3] performed a work on factor analysis for feature extraction using BBO approach. This paper is an analytical study and a performance based characterization of the most recent nature inspired image classification technique i.e. Biogeography based Optimization (BBO) that has been used for focused land cover feature extraction. The paper explores the behaviour of BBO over different terrain features of a multi-spectral satellite image and establishes the fact that the classification efficiency of BBO for a given land cover feature is proportional to the degree of disorder of the Digital number (DN) values of the pixels comprising that land cover feature when viewed in any of the bands of the multispectral satellite image. Patil Bhushan V.[4] performed a work on SDMS image processing. The principal idea of this system is to automate the inspection process of sheet metal components manufactured by small and medium scale industries. The motive behind developing SDMS is to reduce the time and labor spent by the industries for inspection of components. This paper shall throw light upon various aspects of image processing and will focus mainly on the details of SDMS as an application of digital image processing. H.B. Kekre[5] performed a work on SAR image segmentation using co-occurrence matrix. Author here proposed a new method as an edge detector for SAR images. It computes actual magnitude of slope in horizontal as well as in vertical direction by using any edge operator and then the resultant of these gradient of slope obtained and image of slope magnitude is constructed. On this image of slope magnitude canny's edge operator is used for getting segmented image. Dr.P.Subashini[6] performed a work on preprocessing approach for texture analysis on SAR image classification. This paper presents a preliminary study of image processing on the ice patterns in synthetic aperture radar (SAR) imagery. Here, analysis is done on the performance of texture features derived from the gray-level co-occurrence matrix based on image enhancement methods. The discrimination ability of the proposed method for texture computation is examined and compared by objective parameters. All experiments are conducted on several SAR images to provide generalizations of the results.

Triloki Pant[7] performed a work on unsupervised classification approach on SAR images. In this paper a contextual classification has been performed in an unsupervised way for SAR image. For this purpose, fractal parameters viz. fractal dimension and lacunarity is used. In order to apply the methodology, first of all a set of simulated SAR images has been generated and tested for classification and then the proposed methodology is applied on satellite SAR images. Noureddine Abbadeni[8] presented a content analysis and similarity identification under texture analysis for image reterival over the image. This paper addresses the fundamental issues of visual content representation and similarity matching in content-based image retrieval and image databases in general. In this paper, a new similarity model is introduced based on the Gower coefficient of similarity. This similarity model is exible and can be declined in several versions: non-weighted, weighted and hierarchical versions. This model was applied to a sample of homogeneous textured images considering two representation models: the autoregressive model, a purely statistical model, and an empirical perceptual model based on perceptual features such as coarseness and directionality. V Turkar[9] performed a work on SAR image classification using neural network approach. The proposed classifier is based on the artificial neural network which is developed in Matlab and it makes use of backscattering values. It is a supervised classification technique which is applied on the ALOS PALASR and SIR-C data. The classification accuracy after applying different speckle filters is compared with the classification accuracy obtained without applying filter. Michael R. Peterson[10] defined a work on image transformation on satellite images. Author present a set of fifty satellite images used to evolve image transforms appropriate for satellite and unmanned aerial vehicle (UAV) reconnaissance applications. Author identify the best training and test images. Kentaro Toyama[11] defined work on geographic location analysis for tag generation. This paper brings all of these issues together, explores different options, and offers novel solutions

where necessary. Topics include acquisition of location tags for image media, data structures for location tags on photos, database optimization for location-tagged image media, and an intuitive UI for browsing a massive location-tagged image database.

III. RESEARCH METHODOLOGY

In this paper, a hybrid model is defined for plant disease detection over the images. In this work a layered approach is suggested to perform the identification of disease in plant and to classify the collection of plant images based on the disease. To perform the disease identification in leaf image, at the earlier stage, the image segmentation will be applied to identify the image ROI. It will reduce the processing dataset. A color model based analysis will be performed to identify the image ROI. At the later stage, the multi parametric clustering will be implemented to segment different image out of these areas the effective identification of disease area will be performed. At the final stage, moment based analysis will be applied to identify the disease plant over the plant set. The presented work is about to reduce the false recognition rate and to provide the accurate disease identification over the leaf images. The work is defined as three main stages

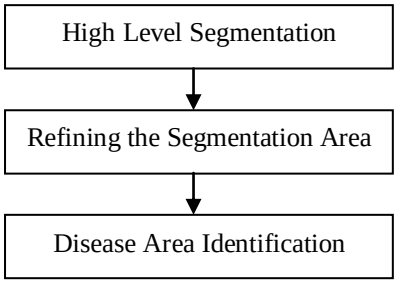

Figure 3 : Layers of Proposed Approach

The model begins with the input plant image. The image can be in the form of jpg or gif or tiff image. Once the image will be extracted, the preprocessing is performed to adjust the image size, brightness etc. The image will be transformed to the required form for the further processing. After the pre processing stage, the image ROI extraction will performed to identify the leaf area. Later on high level clustering process will be performed to separate the image areas under the intensity constraint. In this work, the intensity analysis based clustering task is performed. The model begins with the input plant image. The image can be in the form of jpg or gif or tiff image. Once the image will be extracted, the preprocessing is performed to adjust the image size, brightness etc. The image will be transformed to the required form for the further processing. After the pre processing stage, the image ROI extraction will performed to identify the leaf area. Later on high level clustering process will be performed to separate the image areas under the intensity constraint. In this work, the intensity analysis based clustering task is performed. At the final stage, moment based will be applied to perform the detection of disease plant.

A) Clustering

The method that is adopted for the clustering in this work is a distance-based partitional clustering. It uses Euclidian distance metric as the similarity criterion that guides the clustering process. Also it is a non-hierarchical method that does not find a hierarchical relation between the clusters formed. It is also a simultaneous clustering method whereas it considers the whole of the image at a time while performing the segmentation. The steps for a standard k-means clustering algorithm are as follows.

1. Consider a set of n data points (feature vectors) to be clustered. Here the data points are the image pixels.
2. Assume the no: of clusters as k, where $2 \leq k < n$.
3. Randomly select k initial cluster center locations.
4. All data points are assigned to a partition defined by nearest cluster centers. This is determined by using a distance measure to check the closeness of the pixels to the chosen cluster centers.
5. After the partitioning, the cluster centers are moved to the geometric centroid of their data points in their respective partitions.
6. Repeat steps 4 & 5 until the overall objective function is smaller than a given tolerance, or until the calculated cluster centers don't move to new points.

IV. RESULTS

In this present work, matlab based work is defined to perform the plant disease detection over the image. The results obtained from the work is given here under

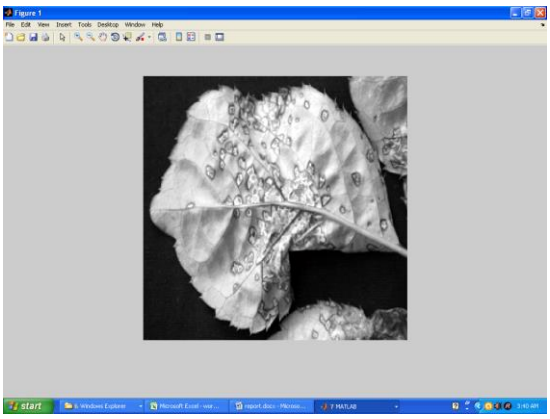

Figure 4 : Input Image

Here figure 4 is showing the input image. The first stage of work is to perform the segmentation over the image. The segmentation is defined here using improved clustering approach. The clustered outcome of the work is shown here in figure 5.

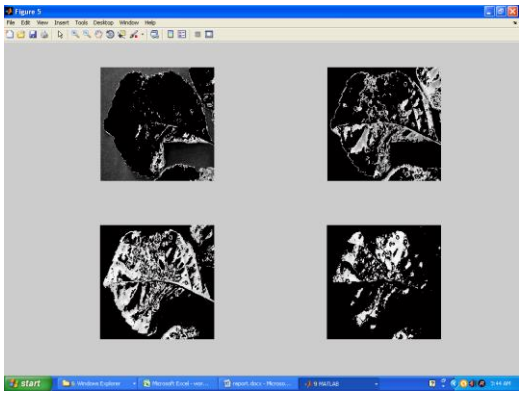

Figure 5 : Clustering Stage

Here figure 5 is showing the implementation result of improved clustering approach. Here the variation analysis based dynamic clustering is applied for high level area segmentation. The figure is showing the input image is converted to 4 clusters. The clustering is based on the feature and the moment analysis.

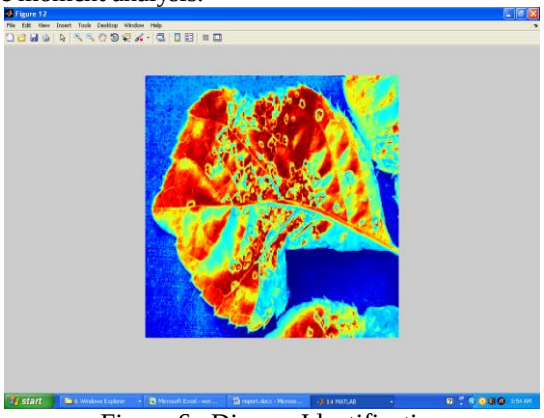

Figure 6 : Disease Identification

Here figure 6 is showing the disease identification over the leaf image. The figure is showing the effective classificaiton of approach. The classification has separated the background area, good leaf area and the diseae area.

V. CONCLUSION

In this paper, a hybrid model is defined for plant disease identification over the image. The hybrid model combined using clustering approach, mathematical operators and the curvature analysis. The obtained results shows the effective identification of disease ROI over the image

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