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A ART Network Integrated PCA model for Apple Disease Classification

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ABSTRACT

Fruit is one of the most critical agricultural object for which the quality vector really matters. This object is having the number of infectious and non infection us disease that occur under different vectors. To reduce the loss, there is the requirement to define some classifier to identify the fruit disease. In this work, a feature based ART network model is presented. This model used the ART network at the earlier phase and later on applied the PCA model for disease classification. The work is implemented in MATLAB environment. The result shows that the work has provided the significant results.

Keywords: Fruit, Art, PCA, infectious, Climate based, Critical.

I. INTRODUCTION

Agriculture image processing is having the complexities in terms of unavailability of the actual and real time dataset with accurate feature specification, constraint specification and problem domain specification. One of the common applications of plant image processing is to identify the plant disease. This disease can be identified based on the component level observations. These observations can be applied to leaf, flower, fruit, root etc. In this work, fruit processing model is presented for identification of relative disease. The fruit disease identification requires a classical feature driven model so that the deep observation to the apple can be applied under the expert control. This model includes the exert and adaptive processing under the essential disease symptom identification sot that the disease identification for growing fruits will be done. The fruit disease is generally very sensitive and increases very fast in other healthy fruits. These diseases include the common vector as well as specialized featured disease. There is the requirement to reduce the loses that occur because of the quality degradation. To reduce such loses, there is the requirement to identify the disease at the earlier stage and provide the effective solution. There are number of infect factors and relative areal of disease. These disease areas include twigs, leaves, braches etc. The common disease time occur in the fruit includes cab, rot and blotch. The first disease form is identified as the black and brown spots visible over the apple image so that the covered sported infection part is obtained. The covered red and block halos are obtained over the apple which is identified as the disease part. The rot is another disease form that occurs as the sunken brown area spot. These diseases are covered with the radial aspect. Another disease type is bloch identified as the fungal disease which darken the irregular surface of lobes over the fruit. The edge based shape specification is provided by these diseases.

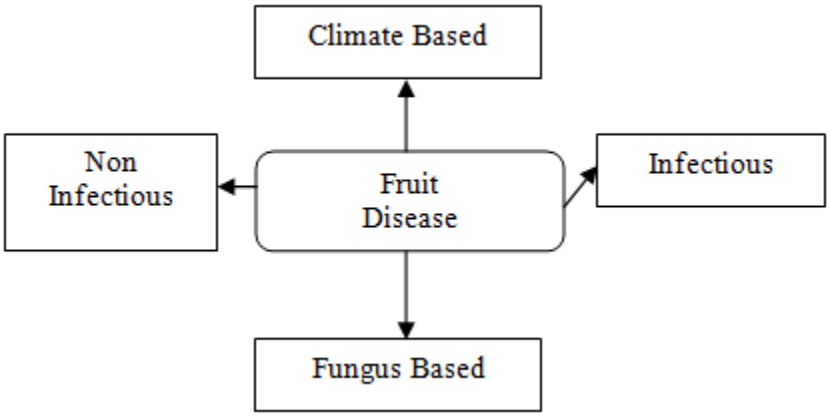

Figure 1 : Proposed Model

The plant disease can be of two types basically called infectious disease and non-infectious disease. The first disease type basically occurred and spread because of the natural agencies so that the pathogens over the disease category or the type are identified. The plant disease identification is done to locate the disease and the relative solution so that the disease prediction can be obtained from the work. The fruit disease identification is required to provide the time bound precautions so that the disease identification and the relative disease verification can be obtained from the work. This kind of identification can be obtained in terms of disease level estimation so that the disease identification and prediction can be obtained from the work. In this work one such method under ART network model is presented for disease identification. This is a weight driven method for feature driven classification.

In this work, a feature driven ART network model is presented for apple disease identification. The presented model used the PCA based distance adaptive method for identification of disease class. In this section, the requirement of plant disease processing and the standard disease problem in the fruits are identified. In section II, the work defined by earlier researchers is discussed. In section III, the proposed work model is presented. In section IV, the results of this work model are presented. In section V, the conclusion obtained from work is presented.

II. RELATED WORK

Today, agricultural image processing is one of the critical research issue. Lot of work is provided by different researchers for disease identification and classification. Some of the contributions of earlier researchers is presented in this section. Author[1]has defined a PCR assay based approach for the detection of three phytoplasma from the apple proliferation group. Author defined an an improved DNA and RNA extraction approaches to perform the disease detections in fruits. The main consideration of author was to improve the performance characteristics. Author also defined the work on assay based feature extraction so that the effective disease extraction will be performed. Author presented a comparative analysis

with conventional analysis approach so that the effective testing will be done under the sensitivity analysis. Author defined the comparison based on real time PCR assays[2].

Another work on virus detection and classification in plant disease was done by the author. Author defined the analysis on apple stem against the pitting virus, grooving virus and leaf spot virus. Author used the analysis based on assay based sensitivity analysis. Author defined the work under the consideration of pears and plants of apple so that effective detection will be performed. Author presented the work in the form of tool to identify and classify under these three kind of viruses [3]. Another work in was performed Author to perform the feature detection based on stem and calyx. Author defined the disease detection under the apple blemish detection in real time. Another challenging result oriented work based on figure analysis was done to differentiate the apples based on bruises and blemishes. Author defined the feature based parametric analysis based on the feature extraction on apple images. Author defined a vision processing under the quality feature analysis so that different apple components. Author achieve the accuracy level up to 94% in disease detection [4].

Author[5] defined a apple surface analysis based on the Raman technology. Author defined the spectral data analysis and the display in real time so under the high performance liquid chromatography. Author performed the work on apple surface to retrieve the fruit features and perform the promising detection of the disease[6]. In same year, Author has defined the leaf spot and mosaic virus detection in applied. Author defined a virus detection and classification approach under the internal control. Author defined the root stocks analysis so that the disease detection will be done effectively[7].

Author [8] presented a work on micro wound detection in apple and pear fruits based on the surface analysis using the sulphur dioxide. Author defined the spot analysis of wound under the virtualization process. The additional wound analysis is performed under the sizing analysis. SO2 fumigation and the fruit surface is been analyzed under the adjacent fruit analysis [9]. Another work on fruit disease prediction was done by Author in year 2013. Author defined the analysis under the controlled atmosphere storage. Author analyzed the fruit under the fungal attack in terms of infected fruit tissues and the infected growth of the tissues. Author defined the scenario under the diseases incidence analysis under the measured. Author defined predictive model under the packing houses to identify the crop disease. Author presents a work on the disease detection on imported fruits. Author worked on market disease detection under the risk of harmful plant pathogens. Author defined a supervision system based analysis to perform the disease detection [11].

Author presented a work on the apple fruit disease detection by performing an analysis using the local binary patterns. Author defined the image segmentation and k means clustering approach to perform the detection. To perform the disease and apple classification SVM based work is suggested by the author. The obtained results are about 93% accurate. Another fruit image based analysis to perform the infected fruit detection was performed in year. Author the work on the 3D images based on the ecological movement. Author defined the surface analysis to perform the disease detection [12].

III. RESEARCH METHODOLOGY

In this present work, an effective model is defined to perform the apple disease identification. The agricultural image processing is one of the major research area applied to achieve the effective mapping results. The work is here presented as a layered model to perform the extraction of the features and to provide the distance adaptive mapping. To train the image, the ART network is used as the classifier and later on the distance adaptive mapping of input image to the dataset is performed to recognize the input image and relative disease class.

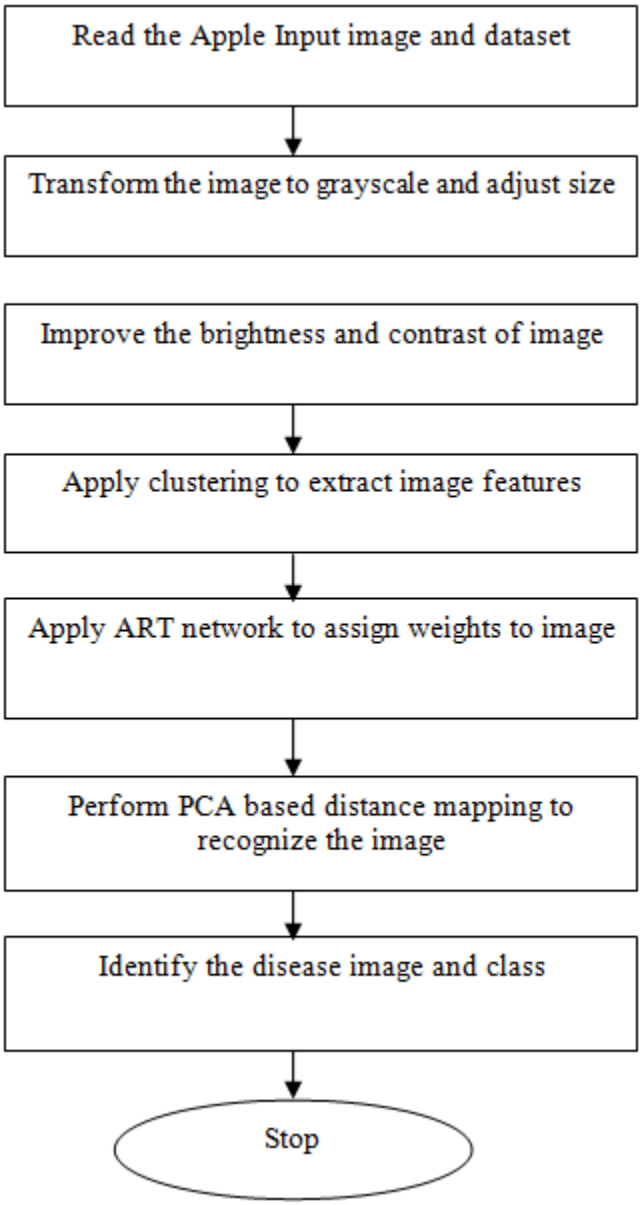

Figure 2 : Proposed Work Model

Here figure 2 is showing the proposed work model. In this work model, the process begins as the input image is accepted from the user. The image transformation to the grayscale and the size level adjustment are done. In next level the improvement to the image is done in terms of brightness and contrast vectors. The high level clustering is applied for feature extraction and later on the feature set is obtained from the work. The ART network uses the feature weights for high level classification and finally PCA is applied for low level classification.

A) ART Network

ART network can be defined as the characterization model applied over the training set to obtain the differential equation based mapping to derive the relative stabilized recognition over the dataset. This recognition model is based on the weight analysis which is analyzed under the convergence. The assumption based mapping can be applied with behaviour analysis to perform the clustering over the dataset. The interpretations are considered while performing the weight assignment or performing the mapping over the dataset. This method is abstract form of clustering architecture in which the weight and distance based recognition can be applied. This mapping model can be applied over the dataset to generate the trained

weights. Based on these weights the class of the input dataset can be obtained. This class is used as the input dataset based on which the recognition or the classification can be performed.

IV. RESULTS

The presented work is defined on one of the most common and costly fruit apple. The apple can have number of associated disease. The work is here defined to identify the apple disease and the disease class. To process the disease identification, a random set of apple disease instances are collected from number of available web sources. As the images are collected randomly, the images are of different color model, resolutions and sizes. The implementation of this proposed model is provided in MATLAB environment. To present work, the work is tested on different sample sets and the resonation rate obtained from the sample set is considered as the mapped result. The recognition rate driven results are shown in this section. The figure 3 is showing the results obtained for a sample set of 45 images out of which 43 provided the significant result. The recognition results are shown in figure 3.

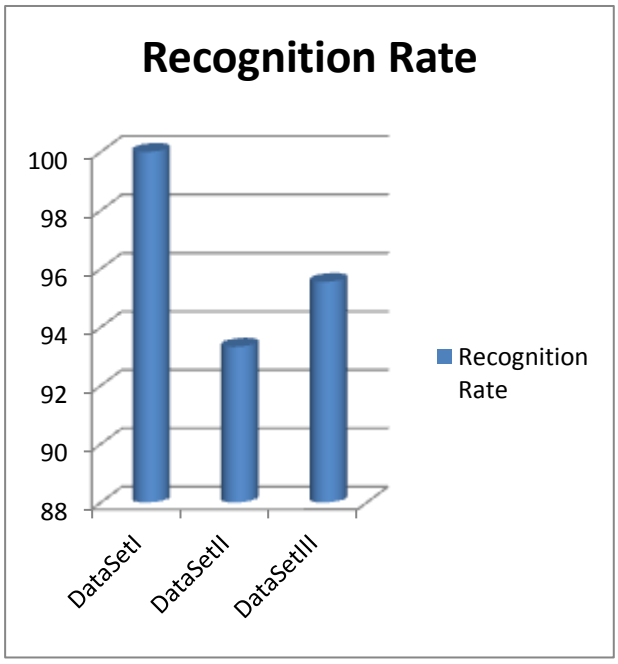

Figure 3 : Recognition Rate Analsyis

Here figure 3 is showing the recognition rate analysis obtained for three different datasets. The figure shows that the work has provided the 100% recognition for known dataset images and for other the recognition rate over 90% is obtained. It shows that the presented work model provided the significant results.

Conclusion

In this work, An ART integrated PCA model is provided for improving the fruit disease recognition. The work is applied for real time apple disease. In this paper, the presented work model is defined. The work also presented in the form of recognition rate obtained from the work. The results show that the work model has provided the significant results in term of recognition rate.

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