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OPTIMAL QOS AWARE NODE DEPLOYMENT FRAMEWORK FOR HETEROGENEOUS WIRELESS SENSOR NETWORK USING HYBRID COMPUTATING TECHNIQUES

[1]MR.SK JOHN, BANDELA SANJAMMA, [2]MALIREDDY CHANDU PRIYA, [3]KUKATLA AMULYA, [4]RASIM LAKSHMI BHAVANI, [5]BOLLAVARAM SHREYA

[1]Assistant Professor, Dept. Of ECE, RISE KRISHNA SAI GANDHI GROUP OF INSTITUTIONS

[2345]UG Students, Dept. Of ECE, RISE KRISHNA SAI GANDHI GROUP OF INSTITUTIONS

ABSTRACT

Identification of the leaf diseases is the key to preventing the losses in the yield and quantity of the agricultural product. The studies of the leaf diseases mean the studies of visually observable patterns seen on the plant. Health monitoring and disease detection on leaf is very critical for sustainable agriculture. It is very difficult to monitor the leaf diseases manually. It requires tremendous amount of work, expertise in the plant diseases, and also require the excessive processing time. Hence, image processing is use for the detection of leaf diseases. Disease detection involves the steps like image acquisition, image pre- processing, image segmentation, feature extraction and classification. In this paper we present an automatic detection of leaf diseases using image processing techniques. The presented system is a software solution for automatic detection and computation of texture statistics for plant leaf diseases. The processing system consists of four main steps, first a color transformation structure for the input RGB image is created, then the green pixels are masked and removed using specific threshold value, then the image is segmented and the useful segments are extracted, finally the texture statistics is computed. From the texture statistics, the diseases, if present on the plant leaf are evaluated.

INTRODUCTION

Agriculture is a critical sector that plays a vital role in the economy and food security. However, plant diseases significantly impact crop yields, leading to economic losses and food shortages. Early detection and classification of plant diseases are essential to ensure effective treatment and improved agricultural productivity.

Traditional disease detection methods rely on manual inspection by farmers or agricultural experts, which is time-consuming, prone to errors, and inefficient for large-scale farming. Advances in machine learning and computer vision provide a more effective solution for plant disease detection. Support Vector Machine (SVM), a widely used supervised learning algorithm, has shown promising results in classifying leaf diseases based on image processing techniques.

This paper presents a machine learning-based leaf disease detection system that utilizes image processing and SVM for accurate disease classification. The proposed system captures leaf images, extracts key features, and classifies them into diseased and healthy categories, providing a faster and more reliable alternative to traditional methods.

LITERATURE SURVEY

1. In this paper four main steps are first a color transformation structure for the input RGB image is created, and then the green pixels are masked and removed using specific threshold value followed by segmentation process, computing the texture features using color co- occurrence method for the useful segments, finally the extracted

feature are passed through the classifier. Support vector machines are a set of related supervised learning method used for classification and regression. The detection accuracy is improved by SVM classifier. The two class problem is then extended to multiclass problem where the detected leaf diseases are then classified into various categories. By this method, the leaf diseases can be identified at initial stage itself and the pest control tools can be used to solve pest problems while minimizing risks to people and the environment.

2. The process of image segmentation wasanalyzed and leaf region was segmented by using Otsu method. In the HSI color system, H component was chosen to segment disease spot to reduce the disturbance of illumination changes and the vein. Then disease spot regions were segmented by using Sobel operator to examine disease spot edges. Finally leaf diseases are graded by calculating the quotient of disease spot and leaf areas.

3. This paper wills two techniques for feature extraction and comparison of two techniques. Otsu Threshold: thresholding creates binary image from gray level ones by turning all pixels below some threshold to zero and all pixels about that threshold to one. K-Means clustering is an unsupervised learning task where one seeks to identify a finite set of categories termed clusters to describe the data.

4. This paper describes the segmentation consist in image conversion to HSV color space and fuzzy c-means clustering in hue-saturation space to distinguish several pixel classes. These classes are then merged at the interactive stage into two final classes, where one of them determines the searched diseased areas.

5. In paper authors presented technique in which pre-processing involved conversion RGB images to grey using the equation f(x)=0.2989*R+0.5870*G+0.114*B and removing objects and noise in image. Boundary & spot detection algorithms are configured in segmentation to find leaf infected part. After that H&B components and color cooccurrence methods are used to extract various features. Binary images are created from grey images by Otsu threshold algorithm and diseases are classified and identified using both artificial neural network and back propagation network along with K-means method.

PROPOSED SYSTEM

Theproposed approach consists of leaf and fruit image database collection, pre-processing of those images, segmentation of those images using k-means clustering method, feature extraction using GLCM.

System Workflow

1. **Image Acquisition:**
    - Leaf images are captured using a digital camera or mobile device.
2. **Preprocessing:**
    - Image enhancement techniques such as grayscale conversion, noise reduction, and contrast adjustment are applied.
3. **Segmentation:**
    - The leaf region is extracted using methods like Otsu’s thresholding or k-means clustering.
4. **Feature Extraction:**

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- Key characteristics such as color, texture, and shape are extracted using Gabor filters, Local Binary Patterns (LBP), and Histogram of Oriented Gradients (HOG).

5. Classification Using SVM:

- The extracted features are fed into an SVM classifier, which categorizes the leaf as healthy or diseased.

6. Disease Identification & Report Generation:

- If a disease is detected, the system provides recommendations for treatment and prevention measures.

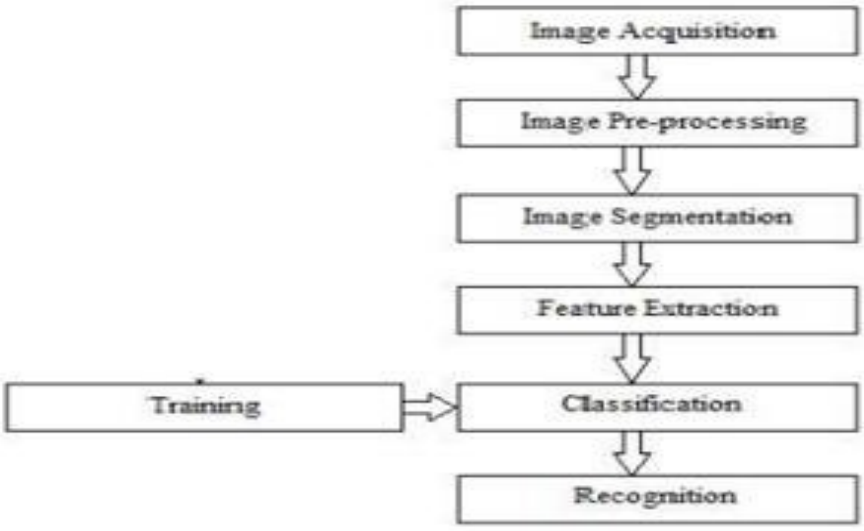

Figure.1 Block Diagram

SIMULATION RESULTS

Seventy-three images of leaf are used for learning and leaf disease detection result is shown in left side section.

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Figure. 2 Input and output image of leaf and output diseases is early Alternaria Alternata disease.

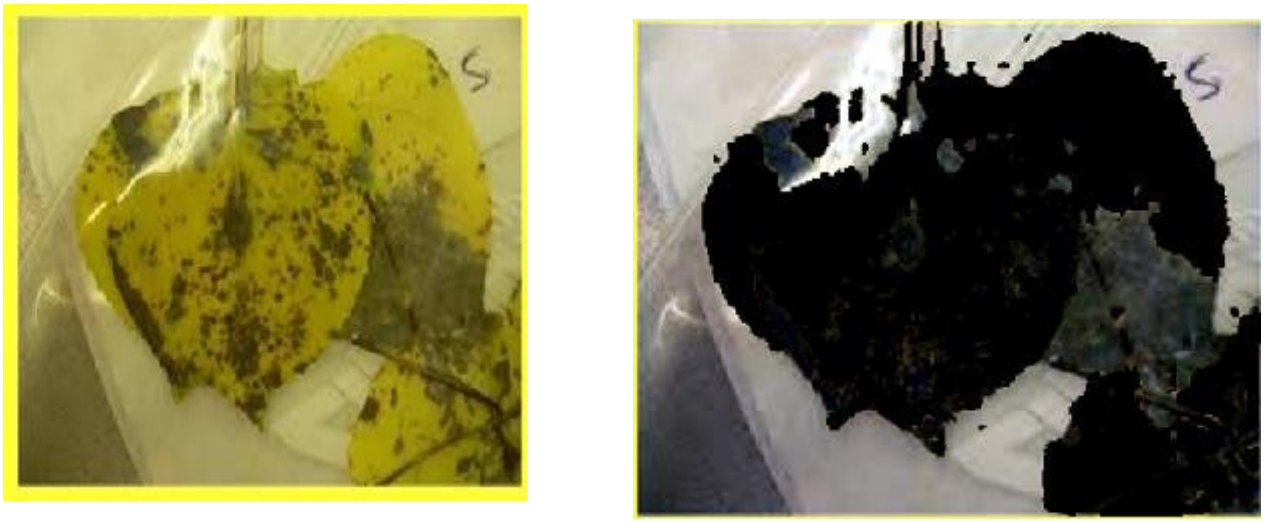

Figure.3 Input and output image of leaf and output diseases is early Cercospora Leaf Spot disease

ADVANTAGES

- Higher Accuracy: The use of SVM and image processing ensures reliable disease classification.
- Faster Disease Detection: Automated processing reduces the time required for disease identification.
- Non-Invasive Method: No need for physical sampling, reducing damage to crops.
- Scalability: Suitable for large-scale farms and smart agriculture applications.
- User-Friendly: Can be integrated into a mobile app or web-based system for ease of use.
- Cost-Effective: Reduces the cost of manual inspections and increases productivity.

APPLICATIONS

- Precision Agriculture: Helps farmers monitor plant health and optimize pesticide use.
- Smart Farming Solutions: Can be integrated into IoT-based agricultural systems.
- Disease Research: Supports scientific studies on plant diseases and treatment effectiveness.
- Government & Agricultural Agencies: Used for large-scale disease surveillance and prevention programs.
- Mobile Applications: Farmers can use smartphone apps to scan leaves and receive real-time disease reports.

CONCLUSION

This paper provides efficient and accurate plant disease detection and classification technique by using MATLAB image processing as shown in experimental results. The proposed methodology in this paper depends on K-means and clustering techniques which are configured for both leaf & fruit disease detection. The MATLAB software is ideal for digital image processing. K-means clustering and algorithm provides high accuracy and consumes very less time for entire processing. In agricultural field loss of yield mainly occurs due to widespread of disease. Mostly the detection and identification of the disease is noticed when the disease advances to severe stage. Therefore, causing the loss in terms of yield, time and money. The proposed system is capable of detecting the disease at the earlier stage as soon as it occurs on the leaf. Hence saving the loss and reducing the dependency on the expert to a certain extent is possible. It can provide the help for a person having less knowledge about the disease. Depending on these

goals, we have to extract the features corresponding to the disease. In future work, we will extend our database for more leaf disease identification.

In future development of the Leaf Disease Detection System aims to enhance its accuracy, scalability, and efficiency by integrating advanced technologies. One of the most promising improvements is the integration of Deep Learning, specifically Convolutional Neural Networks (CNNs), which can provide more robust and real-time disease classification by learning complex patterns in plant diseases. This will enable the system to detect multiple diseases with higher precision, even in challenging conditions such as varying lighting and background interference.

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