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Leaf Disease Detection using Smart Phone

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Abstract: Although professional agriculture engineers are responsible for the recognition Development of disease detection, visualization and classification system is significantly explored in precision agriculture. A similar study performed for crops using leaf images.

A diseased leaf is classified into three categories. Average accuracy values are reported for all the considered combinations which are also found to be better than existing ones. leaf samples further prove the suitability of the proposed system for detection, info gathering of leaf diseases, intelligent systems can be used for their diagnosis in early stages. The systems that have been proposed in the literature for this purpose, are often based on facts described by the user or image processing of leaf photos in visible, infrared, light etc.

The recognition of a disease can often be based on symptoms like lesions or spots in various parts of a plant. The color, area and the number of these spots can provide the disease that has mortified a plant. A Phone application is described here capable of recognizing diseases through photos of the leaves with an accuracy higher than 90%. This application can easily be extended for different leaf diseases and different smart phone platforms.

The mobile applications can access a centralized server with all the database info and image database of leaf diseases using cloud computing as the central medium. We are going to use SIFT or SURF algorithms in order to achieve a leaf disease identification system by feature extraction and matching of test image with the image database on the server.

Keywords: Leaf disease detection, Image Processing, Feature Extraction, SIFT.

I. INTRODUCTION

A. Motivation

Currently, there is need for a modernized approach. In the traditional approach the farmer professionals play the major role. They takes more time for the disease detection for the particular crop. Detection may take more than a day too. In order to solve this problem, the Farmer are given knowledge and information about disease diagnosis and prevention. Secondly, a reliable and readily available Android operating system is required. In order to improve the above condition, we can make use of technology in a smarter way.

B. Problem Statement

The agricultural production cost can be significantly increased if plant diseases are not detected and cured in their early stages. The plants have to be monitored all the time in order to detect the first symptoms of a disease before it is spread to the whole crop. Professional agriculture engineers may not be available to continuously monitor a crop if for example the crop resides in a distant region. Remote monitoring through machine vision can offer an alternative option. Molecular analysis may have to be performed in order to confirm if a plant is affected by a specific disease. The plant disease diagnosis can be based on several symptoms that are described in detail.

The progression of the symptoms in time can vary significantly depending on the biotic agents and they can be classified as primary or secondary.

More than one pathogens can infect concurrently a plant. The symptoms that appear in this case may differ from the symptoms caused by the individual pathogens. The symptoms of a pathogen can be often expressed as fungal or bacterial leaf spots. Spore structures may also be present.

The plants can be also being injured by air pollution or by soil/air chemicals. An image processing technique that can be implemented as a smart phone application is presented in this paper for the recognition of plant diseases. The described image processing technique can be used either as a various application or it could be combined with cloud.

II. LITERATURE SURVEY

A. Semi Atomic Leaf Disease Detection and Classification for Soybean Culture

This technique was proposed in 2017 by Sukhvir Kaur , Shreelekha Pandey and Shivani Goel where they explain the paper as Development of automatic disease detection and classification system is significantly explored in precision agriculture. In the past few decades, researchers have studied several cultures exploiting different parts of leaf images. By using concepts of k-means is designed and implemented to distinguish healthy leaves from diseased leaves. In addition, a diseased leaf is classified into categories.

Experiments are performed by separately utilizing color features, texture features, and their combinations to train three models based on support vector machine classifier. Results are generated using many images collected from different dataset. Acceptable average accuracy values are reported for all the considered combinations which are also found to be better than existing ones. The system is shown to efficiently compute the disease severity as well. Visual examination of leaf further proves the suitability of the proposed system for detection, classification.

B. Potato Leaf Diseases Detection and Classification System

In 2016 Mr. Girish Athanikar and Ms. Priti Badar published this paper which explains neural network based detection and classification of Potato leaf samples using Segmentation of K-Means Clustering. Algorithms are developed to acquire and process complex images of single leaf samples.

Different leaves like healthy and diseased are considered for the study. The developed algorithms are used to extract over 24 (colour, texture and area) features. The texture features are extracted from the gray level co-occurrence matrix (GLCM). A back Propagation Neural Network (BPNN)-based classifier is used to identify and classify the unknown leaf that is the leaf is healthy or diseased, if leaf is diseased one then classify the disease related information like (name, cause, pesticides). The colour, texture and area features are presented to the neural network for training purposes. The algorithm is then used to identify and classify the unknown leaf samples.

The classification is carried out using variety of features sets, viz., colour, texture and area. Classification accuracies of over 92% are obtained for all the leaves samples (healthy and diseased) using all the three feature sets.

C. Plants Disease Identification and Classification Through Leaf Images

In 2018 Sukhvir Kaur, Shreelekha Pandey and Shivani Goel published the work which mainly explains The symptoms of plant diseases are evident in different parts of a plant; however leaves are found to be the most commonly observed part for detecting an infection. Researchers have attempted to automate the process of plant disease detection and classification using leaf images. This manuscript summarizes the advantages and difference of all such studies to throw light on various important research aspects. The performance of techniques are analyzed to identify those that seem to work well across several crops or crop catgoriest. Discovering a set of reliable techniques, which highlights several points of consideration along with the future research directions. The survey would help researchers to gain understanding of computer vision applications in crop disease detection.

III. PROPOSED SYSTEM

A. Goal and Objectives

1) Help to prevent and detect disease of plants at run time .
2) To send the detected disease information to the farmer .
3) To give suggestion to the farmer to over come through that particular disease.
4) To secure data on the cloud using SIFT algorithm.

B. Statement Of Scope

Android : - The System can be used to connect at real time to Arduino and receive data on the phone. The data will be analysed and real time detection and prevention measures will be applied using the data.

Cloud Computing: - The System can be used to handle location data and handle alerts if a vehicle is caught in accident. The data will be helpful in providing information to rescue workers and monitoring using Google Maps.
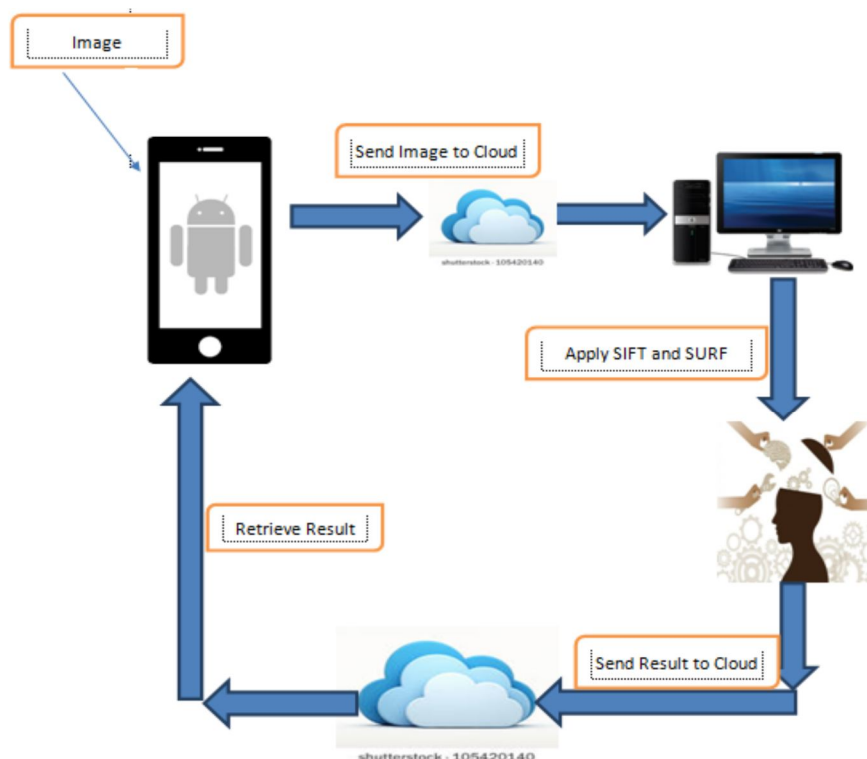
IV. SYSTEM ARCHITECTURE

A. System Architecture

Fig: System Architecture

This system is the collaboration of the cloud storage and the processing of data using the android application. This helps in the giving the accurate result to the user through internet services.

B. Algorithm

1) *SIFT (Scale Invariant Feature Transform):* The scale-invariant feature transform is a detection algorithm to detect and describe local diseases from the images. It was developed in Canada by the University of British Columbia and published by David Lowe in 1999. This algorithm include various applications like image recognition, navigation, image processing, 3-Dimensional modelling, gesture recognition, video tracking, individual identification of wildlife and match moving. SIFT algorithm contains the key points of feature objects are first extracted from dataset of reference images which stored in a database. An crop disease is recognized by a providing image by individually comparing each feature from the provided image to dataset and finding candidate matching features based on Euclidean distance of their feature vectors. From the images data-set, partial data-sets of key points that agree on the object and its location, scale, and orientation in the new image are identity to filter out good matches. The determination of consistent clusters is performed rapidly by using an efficient hash table implementation of the generalized Hugh transform. Each cluster of images that agree on an object and its pose is then subject to further detailed model verification and subsequently outliers are discarded. The probability that a particular set of features indicates the presence of an object is computed, given the accuracy and number of probable false matches. image have pass all these tests can be identified as correct with high confidence.

V. APPLICATIONS

A. Image reorganisation systems
B. Any identification system
C. disease Monitoring

VI. CONCLUSION

In this project, we are developing a novel approach to provide Smart Leaf Disease Identification system. The basic idea of the project is integrating Image Processing, Machine Learning and cloud computing together to achieve a user independent Leaf Disease Identification system. We have assembled mobile computing, cloud computing and desktop together to build a whole new system which is accurate and reliable. It is more intelligent in recognizing harmful environments in a day to today industry structure. The proposed method is found to be better on many criteria as compared to existing studies. Moreover, the proposed system is designed and tested using a sufficiently large data-set collected manually which contains images with various Leaf Diseases.

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