LEAF DISEASE DETECTION AND AUTOMATED MEDICINE FOR AGRICULTURAL CROPS

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Abstract: India is known as agricultural countryDiseases to the plants incureseconomic loss to the country and also farmers suffer loss.Incorrectidentifying of disease and its severity leads to inappropriate use of pesticides. So the goal of our proposed system is to diagnose the disease by using image processing and IOT techniques by capturing images of plant leaf .Our proposed system is divided into two phases.In the first part defected leaf images are being captured.In the second part Agribot will spray the pesticide to the defected leaf.Image processing includes pre-processing of leaf images, and feature extraction followed by SVM based training and also classification for recognition of leaf..SVM is mainly used in detection of RGB colors and also for its classification.
Keywords: Agribot, Imageprocessing, IOT, SVM algorithm

I. INTRODUCTION

In the agricultural sector plants or crop cultivation have seen steady development in both the quality and quantity of food production, however, the presence of destructive insects and diseases on crops especially on leaves has hindered the quality of agricultural goods. If the insects present on crops and leaves is not checked properly and the timely solution is not provided then the quality and quantity of food will be decreased.Once the agricultural production reduces ,contryincures loss and poverty increases.Due to lack of food ,mortality rate increases.One of the major goal of farmers or agriculturalist is to eradicate disease
spreading insects.Commonly agricultural crops will face fungal disease.In many countrys farmers manually search for diseases spreading insects and spray pesticides to destroy them.This needs continuous monitoring of each plants.This is very difficult and also spoils farmers health.Due to this problems some farmers give up the work of crop cultivation.With the presenceof largevolume of plant species and their use in various fields, the quality of agricultural products has become a major issue in agricultural sector. Image processing technique is an effective automated technique. Thistechniquereduce the computational time and as a result, the automated leaf disease detection can be made much faster. In future, the farmer can make use of agribot and spray pesticide with less expense.

II. EXISTING SYSTEM

The existing system for plant leaf disease detection is directly monitoring of farms by farmers. This system requires large number of people to monitor and it also requires continuous monitoring of plants which will result in a large increase in labor cost when the land is too large.Direct monitoring of land is time consuming. To overcome this issue, leaf diseases are identified using image processing techniques however there's no correct application to classify the leaf once capturing its images and identifying its attributes. In plant leaf classification leaves have completely different morphological options. A number of the classification techniques being used are Fuzzy Logic, Principal component Analysis, K- Nearest Neighbor Classifier.

III. LIMITATIONS OF EXISTING SYSTEM

•System are not much efficient,slow and are not much accurate.
•Low accuracy
•High complexity
•More time consuming

IV. PROPOSED SYSTEM

Our project is to detect the plant disease and provide the solutions to recover from the leaf diseases.In our proposed system we are providing a solution to recover from leaf diseases and also show the affected part of the leaf by image processing techniques.To remove the challenges faced by our farmers we have come up with a new technique for identifying diseases and to spray pesticides to the leaves. Digital camera is used to capture the images of different leaves. Image processing techniques are applied to those leaf images to process and to get some useful information for further studies. Once it detects the disease, proper pesticide is sprayed to that infected leaf in a required amount. Disease detection is done through SVM (Support Vector Machine) algorithm which is a supervised machine learning algorithm used for classification.. By doing so, it has reduced farmer's tension regarding diseases that affect crops and also reduces the consumption of time and money fellows.

V. METHODOLOGY

The steps involved are:

- Load the image
- Enhancement
- Transfer the input image from RGB to LAB pattern
- Masking of green pixels
- Image segmentation
- Feature Extraction

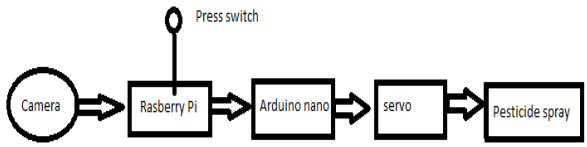


Fig 1. Block diagram of working model

Result:Here the input data disease, samples of agricultural leafslike paddy,ragi and ,jowarwith bacterial disease,sun burn disease,early scorch disease and fungal disease are considered.

VI. IMPLEMENTATION

Conversion of revised system design into an operational one ,is the process of implementation. The main objective is to put the new or revised system that has been tested into operation while keeping costs, and risk to the minimum. A critical part in this process is to ensure that there will be no disrupting in the functioning of the organization. The best method for gaining control while implanting any new system would be to use well planned test for testing all new programs. Before using production files to test live data, text files must be created on the old system, copied over to the new system, and used for the initial test of each program.In the implementation phase acquisition of the hardware and software is the other factor to be considered. Once the software is developed for the system and testing is carried out, next is the process of making the newly designed system fully operational and consistent in performance. Implementation is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective.This type of change is relatively easy to handle, provided there are nomajor changes in the system

System Implementation

There are three major types of implementation but the following are proposed for our project.

Parallel Conversion type of Implementation

This is the type of implementation where both the current system and the proposed system run in parallel. This happens until user gets the complete confidence on the proposed system and further cuts off the current system.

Phase - in method of implementation

This is the type of implementation where the proposed system is introduced phase-by-phase. Reducing the risk of uncertainty of proposed system is done in this phase.

Each program is tested individually at the time of development using the data and has verified that this program linked together in the way specified in the programs specification. Initially executable form of the application is to be created and loaded in the common server machine which is accessible to the entire user and the server is to be connected to a network. Documentation of the entire system which provides components and the operating procedures of the system is done in final stage.

Implementation is one of the stage in the project when the theoretical design is turned out into a working system. Thus it can be considered as the most critical stage in achieving a successful new system and giving the user the confidence that the new system will work and will be effective. The implementation stage involves investigation of the existing system and it's constraints on implementation, careful planning,designing of methods to achieve changes and evaluation of changes in the methods.

Result:Detection of spots or disease on infected part of leaf were tested on upper side or lower side sometimes on both the sides.If infected leaf is in height agribot can reach using its armand spray pesticides.

Support Vector Machine(SVM)

SVM algorithm is a supervised machine learning algoirthm.This is mainly used for classification.In SVM we plot each data item as a n dimensional space with the value of each feature being the value of particular coordinate.This is used in detecting the type of leaf disease.This is an land spread mapping network.They also have their work in Statistical Learning Theory.

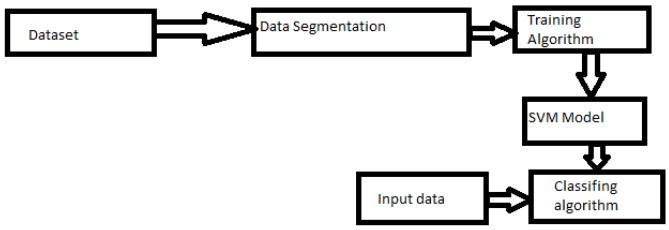


Fig 2. Flow of SVM Algorithm

Step 1: Load the Plant Leaf Disease Image dataset as Trained dataset

Step 2: Input image as test dataset

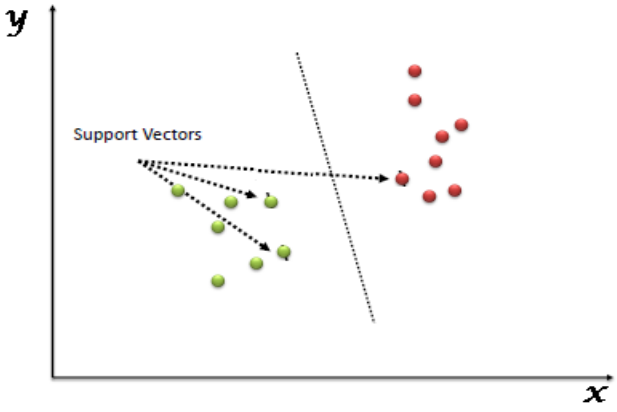
Step 3 : Build Model using SVM

Step 4 : Compare data by defining the features and the segments

Step 5 : classify disease

Step 6 : Spray pesticides

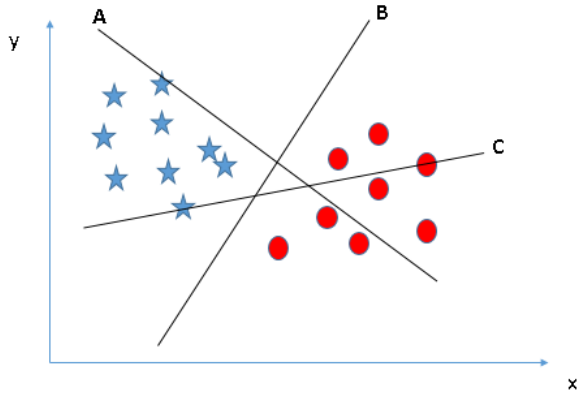
SVM Algorithm



Support Vectors are simply the co-ordinates of individual observation. The SVM classifier is a frontier which best segregates the two classes (hyper-plane/ line).

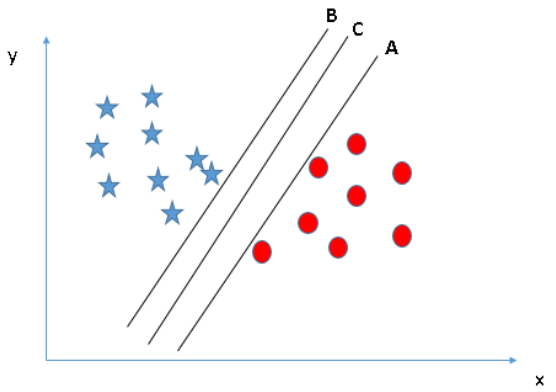
Working of algorithm

- Identify the right hyper-plane (Scene-1): Here, we have three hyper-planes (A, B and C). Now, identify the right hyper-plane to classify star and circle.

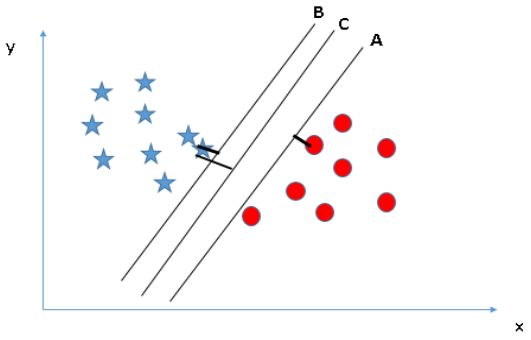


Here we need to remember a thumb rule to identify the right hyper-plane: "Select the hyper-plane which seperates the two classes better". In this scenario, hyper-plane "B" has excellently performed this job.

- Identify the right hyper-plane (Scene-2): Here we have three hyper-planes (A, B and C) and all are separating the classes.

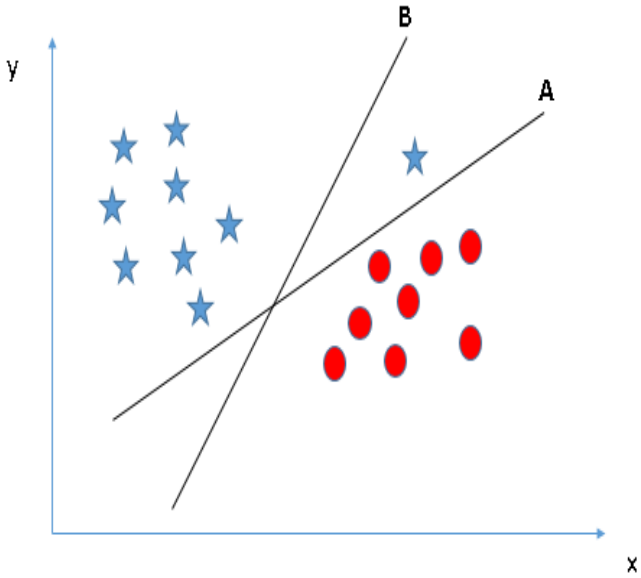


Here, maximizing the distances between nearest data point (either class) and hyper-plane will helpus to decide the right hyper-plane.



Above, we see that the margin for hyper-plane C is high as compared to both A and B. Hence, we name the right hyper-plane as C. Another lightning reason for selecting the hyper-plane with higher margin is robustness. If we select a hyper-plane having low margin then there is high chance of miss-classification.

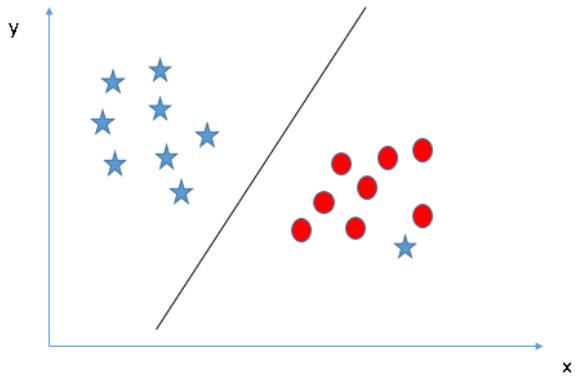
Identify the right hyper-plane (Scene-3)



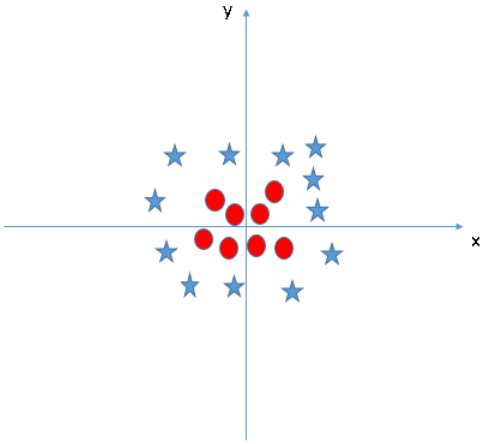
Suppose some have selected the hyper-plane B as it has higher margin compared to A. But, here is SVM that selects the hyper-plane which classifies the classes accurately prior to maximizing margin. Here, hyper-plane B has a classification error and A has classified all correctly. Therefore, the right hyper-plane is A.

Classifying two classes (Scene-4):

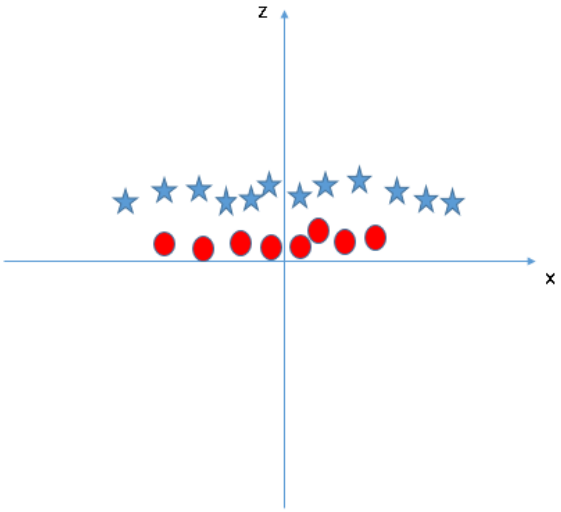
Here one star at other end is like an outlier for star class. The SVM algorithm has a feature to ignore outliers and find the hyper-plane that has the maximum margin. Hence, we can say, SVM classification is robust to outliers.



Find the hyper-plane to segregate to classes (Scene-5): Here we can't have linear hyper-plane between the two classes.



SVM can solve this problem. It solves this problem by introducing additional feature. Here, we will add a new feature z=x^2+y^2. Now, let's plot the data points on axis x and z:

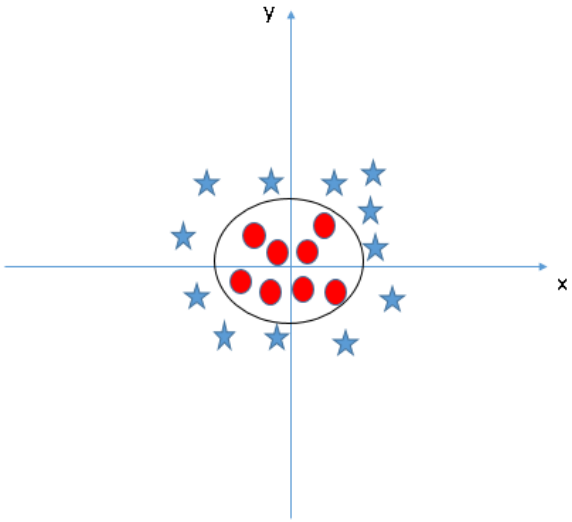


In above plot, points to be considered are:

- All values for z would be positive always because z is the squared sum of both x and y
- In the original plot, red circles appear close to the origin of x and y axes, leading to lower value of z and star relatively away from the origin result to higher value of z.

In the SVM classifier, it is easy to have a linear hyper-plane between the two classes. Here we should not add these features manually to have a hyper-plane. SVM algorithm has a technique called the kernel trick. The SVM kernel is a function that takes low dimensional input space and transforms it to a higher dimensional space. It is mostly useful in non-linear separation problem. It does some extremely complex data transformations, then finds out the process to separate the data based on the labels or by the outputs .

When we look at the hyper-plane in original input space it looks like a circle:



Main advantages of SVM are:

- Its prediction accuracy is high.
- Its working is robust when training examples contain errors.
- Its simple geometric interpretation and a sparse solution.
- Like neural networks the computational complexity of SVMs does not depend on the dimensionality of the input space.

VII. SYSTEM OVERVIEW

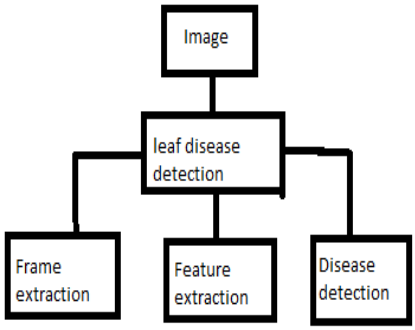


Fig:3 Flow of Image processing for disease detection

Initially vedio or image is captured by agribot,them frame is extracted for processing image.Next features are been

extracted .Once feature is extracted disease is detected.

VIII. RESULTS

The major image processing used for identification of leaf diseases is SVM .This approach can significantly support an accurate detection of leaf disease.By computing amount of disease present in the leaf,we can use sufficient amount of pesticides to effectively control the pests in turn the crop yield will be increased. Accuracyusing SVM algorithm for classification 83%.Diseases symtoms and spots are mostly found on leaves,stems also on crops.Validation of accuracy of algorithm:the proposed method was able to identify 8 test images correctly out of 10 test images.

IX. CONCLUSION

This paper deals with identification of diseased leaf and spraying relevant pesticides using agricultural robot. This robot which is used to detect diseases detects them at the initial stages and takes proper measure of the crops by spraying relevant pesticides in a limited amount and only to the infected part.

The major techniques for detection of leaf disease is SVM..This technique is used to analyze the healthy and diseased plant leaves.Software tools which are used for implementationis python language.By using this concept user can know the affected area of leaf by identifying the disease properly and also user can rectify the problem very easy and with less cost.

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