A Project Report on

Plant Disease Detection

Submitted in partial fulfillment of the requirements for the award
of the degree of

Bachelor of Engineering

in

Computer Engineering

by

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Approval Sheet

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Abstract

Agriculture is a most important and ancient occupation in India. As economy of India is based on agricultural production, utmost care of food production is necessary. Pests like virus, fungus and bacteria causes infection to plants with loss in quality and quantity production. There is large amount of loss of farmer in production. Hence proper care of plants is necessary for same. This paper presents an overview of using image processing methods to detect various plant diseases. Image processing provides more efficient ways to detect diseases caused by fungus, bacteria or virus on plants. Mere observations by eyes to detect diseases are not accurate. Overdose of pesticides causes harmful chronic diseases on human beings as not washed properly. Excess use also damages plants nutrient quality. It results in huge loss of production to farmer. Hence use of image processing techniques to detect and classify diseases in agricultural applications is helpful.

Contents

Abstract

Agriculture is a most important and ancient occupation in India. As economy of India is based on agricultural production, utmost care of food production is necessary. Pests like virus, fungus and bacteria causes infection to plants with loss in quality and quantity production. There is large amount of loss of farmer in production. Hence proper care of plants is necessary for same. This paper presents an overview of using image processing methods to detect various plant diseases. Image processing provides more efficient ways to detect diseases caused by fungus, bacteria or virus on plants. Mere observations by eyes to detect diseases are not accurate. Overdose of pesticides causes harmful chronic diseases on human beings as not washed properly. Excess use also damages plants nutrient quality. It results in huge loss of production to farmer. Hence use of image processing techniques to detect and classify diseases in agricultural applications is helpful.

Chapter 1

Introduction

Agriculture is an ancient occupation. It plays an important role in our day to day life. Food is basic need of all human beings. To distribute food among large population needs proper amount of production. In India large number of population lives in rural areas where livelihood of people depends mostly on agriculture. Thus Indian economy mostly depends on agriculture. Hence increasing quality production has become necessary day by day. Monitoring of plants/crops and their management from early stage is utmost important. It includes various tasks like preparation of soil, seeding, adding manure and fertilizer, irrigation, disease detection, spraying pesticides, harvesting and storage [1]. Amongst these entire tasks spraying proper amount of pesticides has to be taken proper care. Pesticides are used to attract, seduce and destroy pests hence known as crop protection product. Pesticides are prepared by harmful chemicals or sometimes by biological methods to kill pests, weeds or infections on plants.

Large percentage of farmers in India sprays pesticides on cash crops, vegetables or fruit plants.Farmers manually checks diseases and spray pesticides accordingly. Pesticides if sprayed in large amount lead to loss in nutrients which ultimately aims to decrease in quality food production. Due to this, production gets affected by means of both quality and quantity. Also if they are not washed properly causes harmful diseases to human beings like chronic diseases. One of the most common practices of spraying pesticide is by using sprayer. In conventional agriculture mostly mechanical sprayer or hydraulic sprayers are used. Farmers basically spray manually sometimes in excess amount or in less amount. Further in most of the cases farmers do not use protective clothing. Hence harmful pesticides enter in body either by being inhaled or through skin or eyes.

Exposure to pesticides thus causes irritation of nose to most fatal diseases. Hence to avoid all above things and to increase yield by means of quality and quantity it is necessary to detect disease in proper amount and spray pesticides properly. Also farmer has to pay for labors too. They also have to work whole day with much more efforts. Hence need to overcome these drawbacks various techniques have been invented. Thus its important to detect diseases on plant/crop properly. When they are infected by diseases, there is change in shape, size and color. These symptoms can be checked manually but not in proper amount. Hence there are various image processing methods that detect diseases on plant leaf and stems. Using image processing techniques proper amount of disease based on color, texture or shape change of plants can be identified. These techniques can be used in Agrobot to detect various diseases. Next section gives a brief introduction of general block diagram for Agrobot.

Chapter 2

Objectives

- First and the foremost objective is to understand the life cycle of the specified plants.

- By applying various image processing techniques on the infected leaf images the project will determine the various stages of disease on leaf and as per the detected disease,curing techniques can be suggested.

- Users will be suggested to capture the clear images with fine background for better results.

Chapter 3

Literature Review

A study of visual symptoms of plant disease from analysis of colored images using image processing methods has been proposed. The RGB image of diseased plant has been then converted to H, I3a, and I3b. A set of maximum threshold cutoff has been used. A correct detection of infected part by disease with various ranges of intensities has been obtained using segmentation process. A K-means and neural network approach for detection of plant leaf/stem diseases has been proposed .

Sometimes deficiencies in minerals are also some of the factors affecting appearance change of rice leaves. Blast and Brown spots are cause of this deficiency. Image based techniques for detection of possible changes in rice leaves has been described. Similarly, soya bean rust is another harmful disease that causes damage to plants. Dust severity from multi-spectral images detection using image processing has been researched. The two disease diagnostic parameter namely, ratio of infected area (RIA) and rust color index (RCI) has been taken into account.

Centroid of leaf color distribution for detecting rust severity without segmentation has been used. Thus study of various plant diseases means studying visual pattern because it is difficult to monitor diseases on plant manually. Basic steps like image acquisition, pre-processing, segmentation, extraction; detection and classification of plant disease are used. K-means clustering followed by thresholding and feature extraction is described. Classification by using neural network ANN and BPNN has also been used for detection of disease. The support vector machine or SVM [13] is applied on cucumber leaves using principal component analysis. To carry out comparative test Radial Basis Function (RBF), polynomial and Sigmoid Kernel function has been used.

Overview of various crop diseases and image processing techniques has been discussed for classification and quantification purposes. Similarly oil palms are also severely affected by pests. Excess of fertilizers too causes damage to plant.High end image capturing device has been used to capture images of leaves surface followed by extraction of features like shape, color and texture of disease type.
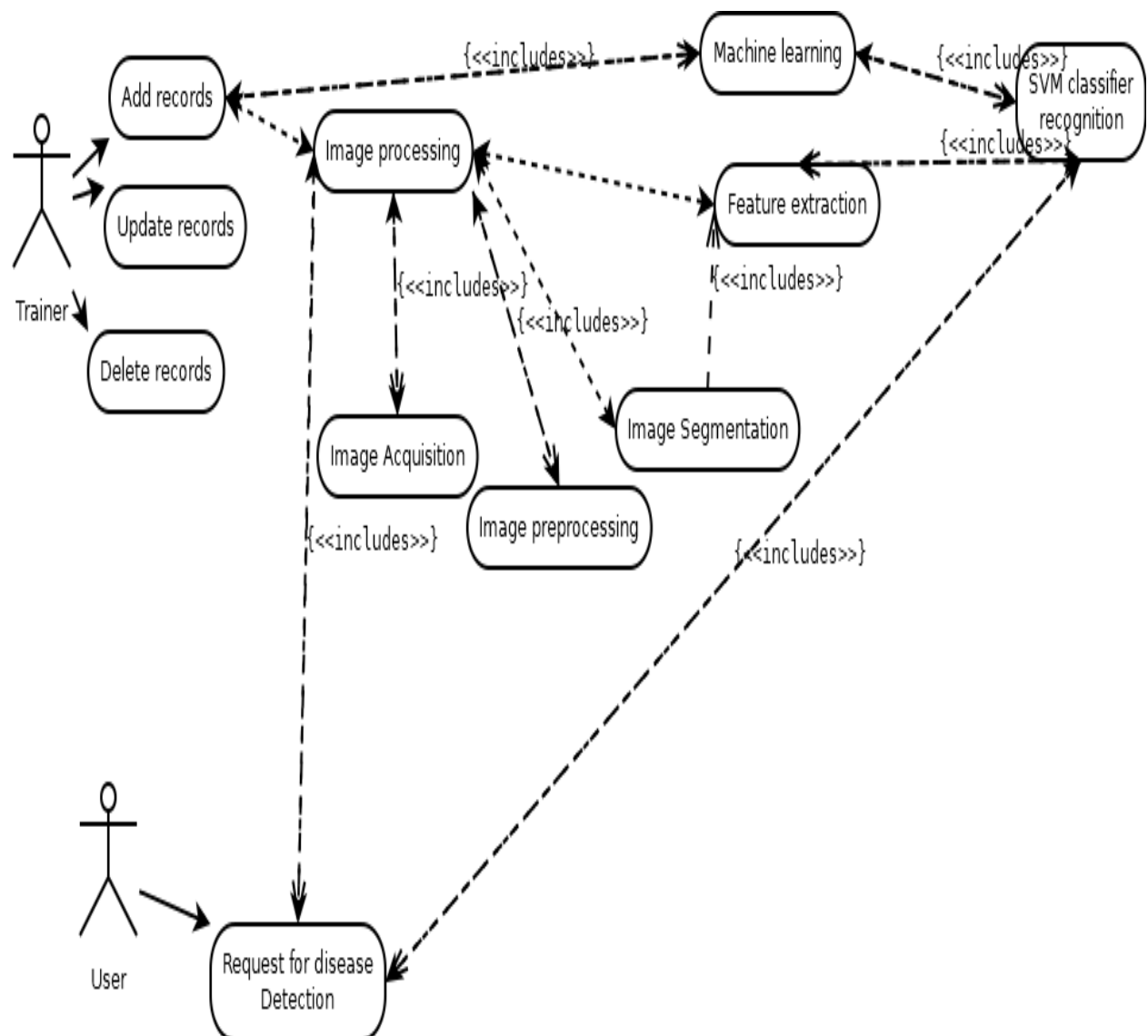
Chapter 4

Problem Definition

Identification of plant disease is very difficult in agriculture field. If identification is incorrect then there is a huge loss on the production of crop and economical value of market. Leaf disease detection requires huge amount of work, knowledge in the plant diseases, and also require the more processing time. So we can use image processing for identification of leaf disease. Identification of disease follows the steps like:

- Loading the Image

- Contrast Enhancement

- Convert RGB to HSI Colour Model

- Extracting the featues

- Training the datasets

- Comparing the affected leaves with the healthy leaves dataset

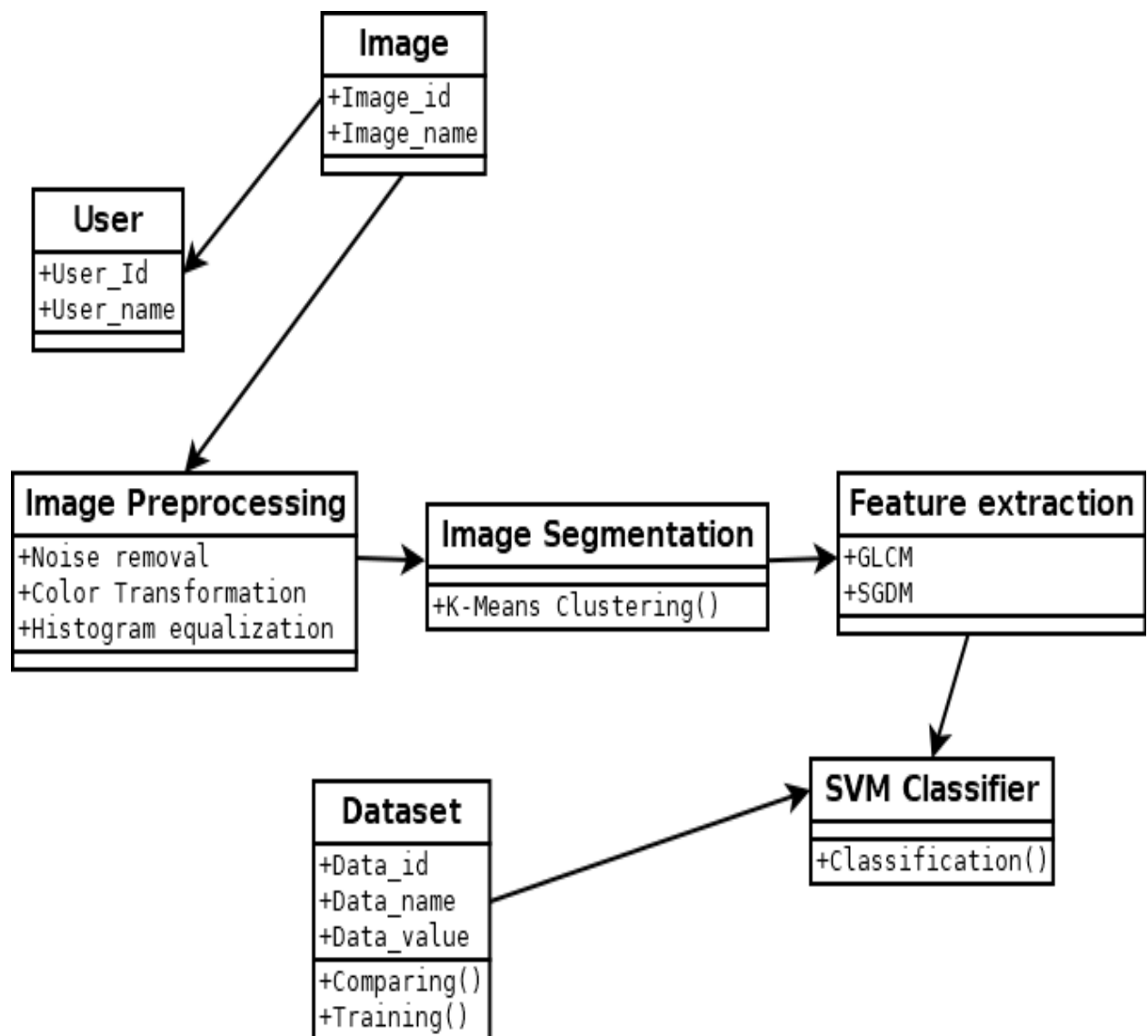- Based on the algorithms and techniques,detect the disease which infected the plant

Chapter 5

Use Case Diagram

Chapter 6

Class Diagram

Image

+Image_id
+Image_name

User

+User_Id
+User_name

Image Preprocessing

+Noise removal
+Color Transformation
+Histogram equalization

Image Segmentation

+K-Means Clustering()

Feature extraction

+GLCM
+SGDM

SVM Classifier

+Classification()

Dataset

+Data_id
+Data_name
+Data_value

+Comparing()
+Training()

Chapter 7

Summary

For proper and successful cultivation of crops it is necessary to detect diseases accurately. Hence from above discussion it can be seen that image processing techniques have proved useful in all means. We can accurately detect and classify diseases on various plants using all above techniques. K-means Clustering to detect infected objects and Neural Networks are thus commonly used for obtaining accuracy in detecting and classifying diseases.

The given system uses re-sizing, thresholding and Gaussian filtering for image preprocessing. To segment the leaf area, the K-means clustering technique is used for segmentation of image then feature extraction is done using both texture as well as color features. Then finally SVM classification technique is used to detect the type of leaf disease.

The database is created to store the outputs of a feature extraction.The database is used to keep track of disorders of the disease symptoms affected on different samples of leaves/crops that have been processed.