Abstract

Conventional Expert systems, especially those used in diagnosing diseases in agricultural domain, depend only on textual input. Usually abnormalities for a given crop are manifested as symptoms on various plant parts. In order for the expert system to produce correct results, end users must be capable of mapping what they see in the form of abnormal symptoms, to answer the questions asked by the expert system. This mapping may be inconsistent if a full understanding of the abnormalities on the plant or in the questions being asked does not exist.

This thesis explores the idea of augmenting a traditional diagnostic expert system model, with an image analyzer. The goal of this augmentation is to automatically detect, extract, and classify abnormal features on a plant leaf, thus reducing the need of human interaction and increasing the accuracy of the diagnosis. The result of applying this approach is presented through the use of cucumber diseases as a test case.

The first contribution of this research was building an automatic image analysis system for detecting and understanding leaves symptoms in the cucumber crop. We have suggested a classification for these leaves symptoms into four categories in addition to the normal category. These categories are Yellow Spotted category (***YS***), White Spotted category (***WS***), Red Spotted category (***RS***) and Discolored category (***D***).

This system includes a segmentation technique for isolating abnormal symptoms from an infected leaf. The system allows computation of various shapes and color features of these symptoms. An Artificial Neural Network (ANN) is also part of this system to distinguish between different categories of symptoms.

The second contribution was integrating an image analyzer to a diagnostic expert system to automatically detect and diagnose leaves abnormalities and consequently more accurate diagnosis is reached and the number of question to the user is reduced.

Chapter 1: Introduction

Chapter 2: Expert System: An Overview

Chapter 3: Review of Image Processing