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Plant Disease Detection using Decision Tree Algorithm and Automated Disease Cure

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Abstract -Quality and quantity of the plants are affected by plant diseases. Plants are often subjected to various factors like viral, bacterial or fungal diseases that cause degradation. In order to tackle this issue, a system is introduced which will detect if a plant is affected by a disease or not, with a greater accuracy, by processing the appropriate plant images and spray the medicine automatically if it is found diseased. The image processing is the method which is applied to process the digital information. For example, the tomato plant leaf disease detection is the technique which is applied to detect disease from the input leaf images. In this work, technique is applied which is based on extraction, segmentation and classification. Textural features are extracted from the image using GLCM algorithm. The decision tree clustering algorithm is used for the segmentation of input images. The decision tree classifier is applied which will classify the input image into two classes. This leads in an improved accuracy of disease detection, moreover classifying the data into multiple classes. Furthermore, based on disease detection the system sprays a fertilizers and pesticides, which reduce human work.

KEYWORDS: GLCM, decision tree, image processing.

1. INTRODUCTION

Disease on plant leads to the significant reduction in both the quality and quantity of agricultural products. The protection of plants and crops in the farming fields is extremely important. The particular diseases are identified using image processing and rectified automatically.

There are many technology and application that have been developed to support in agriculture field. Almost of those technology and application requires of a knowledge-base for their process.

Plant diseases affect the growth and crop yield of the plants and make social impacts on agriculture. Recent studies reveal how plant disease affect the plants. Plant leaf diseases cause economic losses to the farmers. Early detection of the diseases deserve attention. Biological aspects are the most important aspect for detecting plant disease. Disease detection is the vital step for disease management. The detection is periodically carried out by human experts. Disease on plant leads to the significant reduction in both the quality and quantity of agricultural products. The protection of plants and crops in the farming fields is extremely important, because they form the basic needs of humans every day. Digital information is extracted from the images using image processing technique.

2. LITERATURE SURVEY

A. An Expert System

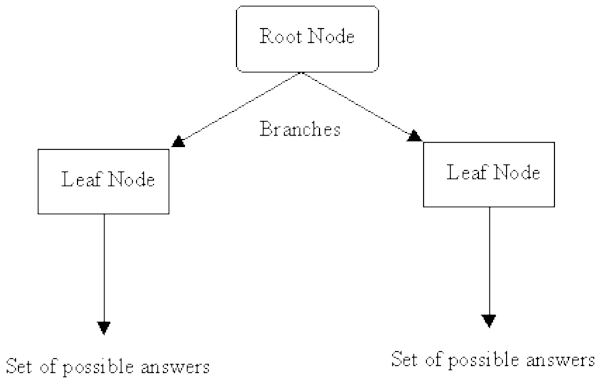
An Expert System for Diagnosis Rice Plant Disease has been developed and used in agriculture widely.There is a lot of study about expert system based on knowledge-base for diagnosis plant disease which is different in terms of method, type of disease and case study. Following are some of research that working on Expert system found in the literature.

Expert System for Diagnosis of Disease of Tomato Plant has developing for diagnosis and identifying a disease in rice. In the paper present two of diseases in rice plant. There is a neck burst disease and the other one is a leaf burst disease. This system consists of knowledge-base, inference mechanism and user's interface. User may answer the question in form of Yes and No through user's interface and the system will be matching answer from user with knowledge base to identify the diseases. [1]Diagnosis System for Chili Disease by using Data Classification Technique has been developed for diagnosis plant disease in chilli by using a decision tree to diagnosis a disorder and identifies its disease. This system represents 14type of disease which develop a model by using Weka 3.7. [2]Expert System in Detecting Coffee Plant Diseases has been developed, which create an application that help researcher or observers working in coffee plantation to diagnose plant disease in coffee plant. The method used is a fuzzy logic-based expert system and

decision tree with hierarchy classification. The result of the system comes with 85% of system accuracy. [3]

B. Decision Tree

The proposed of an expert system for diagnosis a disease is to find the correct answer for user. Which starting with the most general information and ending with the diagnosis of the disease. In many expert systems, decision tree is one of the most important algorithms used in developing of expert system. Due to its structure that built a classification or a regression model in a form of tree. Its break down a dataset into a small subset. The final result of a decision tree is easily to transform to a rule by mapping from a root node to leaf node one by one. Following are some of a research that using a decision tree algorithm. The decision tree was used in Using Decision Trees in Data Mining for Predicting Factors Influencing of Heart Disease. The main objective of this paper is to find a better decision tree algorithm and then the algorithm was used for extracting rules to predicting a heart disease.



3. PROPOSED METHOD

Affected crops is identified through image processing techniques.The proposed system consists of three main steps namely feature extraction, segmentation and classification. GLCM algorithm is used to extract the textural features. The SVM classifier is replaced with the decision tree classifier in the proposed work to classify data into multiple classes.

In this experiment representing 16 attributes of infected leaf symptoms with 120 of leaf image dataset which categories into 5 types.

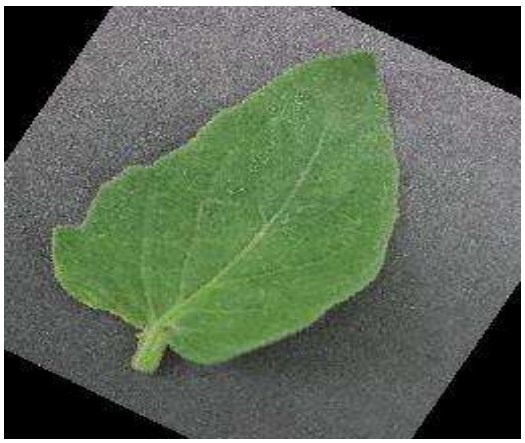


Fig -1: ORIGINAL LEAF IMAGE

Fig -2: AFFECTED LEAF IMAGE

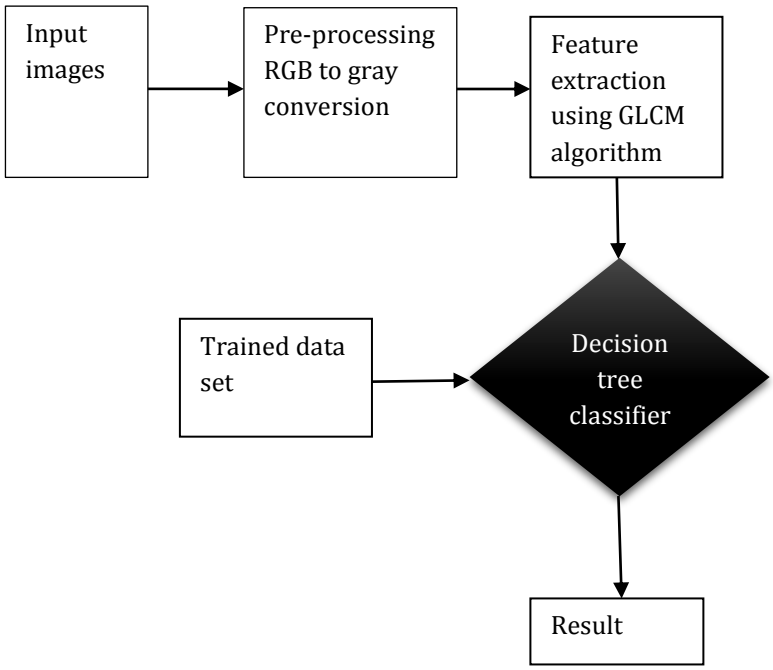
Fig -3: EARLY BLIGHT

Fig -4: LATE BLIGHT

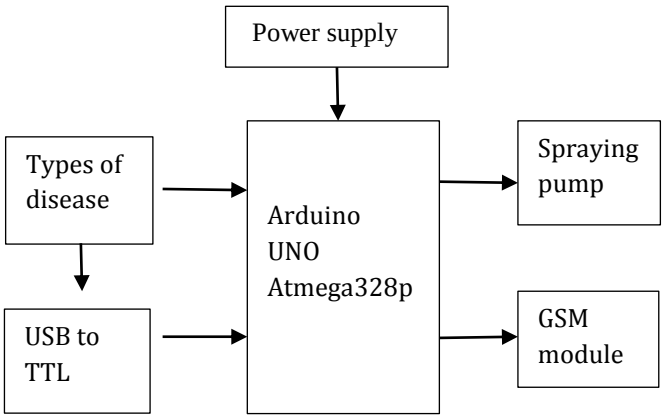
Fig -5: LEAF CURL

Fig -6: BACTERIAL SPOT

These are the above images of the diseases which our paper is going to handle with.



This is the flow diagram which represents the sequence of steps used in image processing.



BLOCK DIAGRAM OF PROPOSED SYSTEM

4. SPECIFICATIONS:

A. ARDUINO UNO

The 14 digital input/output pins can be used as input or output pins by using pin Mode (), digital Read () and digital Write () functions in Arduino programming. Each pin is operating at 5V and can get or receive a maximum of 40mA current, and has an internal pull-up resistor of 20-50 Ohms which are disconnected by default. Some pins have specific functions as listed below:

- **Serial Pins 0 (Rx) and 1 (Tx)**: Rx and Tx pins are used for receiving and transmitting TTL serial data. They are connected with the corresponding ATmega328P using USB to TTL serial chip.

- **External Interrupt Pins 2 and 3**: These pins are designed to trigger an interrupt on a low value rising edge or falling edge, or a change in value.

- **PWM Pins 3, 5, 6, 9 and 11**: These pins provide an 8-bit PWM output by using analog Write () function.

- **SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and13 (SCK):** These pins are used for Serial Peripheral Interface communication.

- **In-built LED Pin 13:** This pin is connected with a built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW.

B. GSM MODULE V3.0

SIM800 is a quad-band GSM module that works on 850MHz, 900MHz,1900MHz,1800MHz DCS. It has one UART port. It has one USB port that can be used for updating firmware and for debugging. It also features GPRS multi-slot classes and supports CS-1, CS-2, CS-3, and CS-4 GPRS coding schemes. Audio channels in there that includes microphone as input and receiver as an output. SIM800 has one SIM card interface.

- Power supply: 6-12V@2A.
- Low power consumption (100mA@7V-GSM mode)
- GPRS multi-slot class 10.
- Embedded high-gain SMD antennas for GPS & GSM.
- Directly support 4*4 button pad.
- USB/Arduino control switch

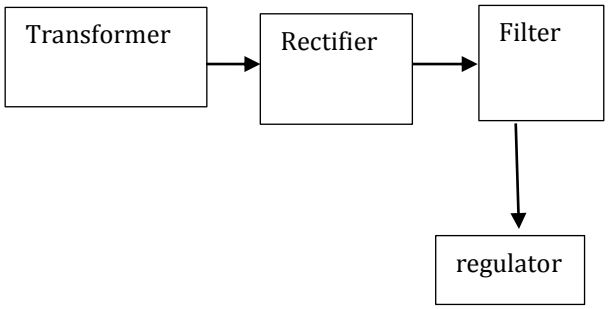
C. USB TO TTL TECHNOLOGY

- Plug-and-Play (hot-pluggable)
- USB 1.1 and 2.0 compatible
- Port powered - no external power needed
- Supports 300 baud to 115,200 baud rates
- 3 feet (1m) cable for convenience
- Transmit/Receive LED indicators
- Easy to install included drivers
- Built-in surge and static protection

Fig -7: USB TO TTL

D. POWER SUPPLY

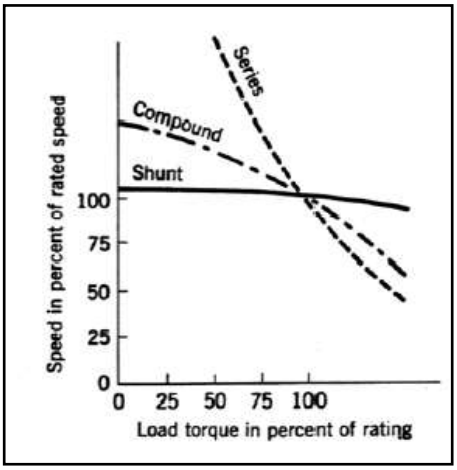
All electronic circuits work only in low DC voltage, so we need a power supply unit to provide the appropriate voltage supply for their functioning. This unit consists of transformer, rectifier and regulator. Transformer converts 230ac voltage into desired dc voltage. A diode rectifier provides full wave rectified voltage that is initially filtered by simple capacitor filter to produce dc voltage. A regulator circuit use this dc input to provide dc voltage.



BLOCK DIAGRAM OF POWER SUPPLY

E. DC MOTOR

A DC motor is used to drive a mechanical load. The load on the motor is adjusted by varying the generator field current. By increasing the field current of the DC generator the load on the DC motor increases. In general DC motors are characterized by their torque-speed relationship which is shown below:



Graph of Torque and Speed

5. CONCLUSION

For future developments, it can be enhanced by developing the system for large access for areas of land. The sensors and microcontrollers are successfully interfaced and wireless communication is achieved between various nodes. Our project deals with identifying the diseases through image processing techniques and the diseases are treated with suitable medications using spraying pump with the help of motor. The identified disease is notified to the user using GSM module. All observations and experimental tests prove that this project is a complete solution for field activities and irrigation problem.

6. REFERENCES

[1] Sanjeev S Sannakki, Vijay S Rajpurohit, V B Nargund, Pallavi Kulkarni,"Diagnosis and Classification of Grape Leaf Diseases using Neural Networks",IEEE proceedings of 4ICCCNT, 2013

[2] S. Arivazhagan, R. NewlinShebiah, S. Ananthi, S. Vishnu Varthini, "Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features", CIGR Journal ,Vol. 15, No.1, 2013.

[3] Arti N. Rathod, Bhavesh Tanawal,Vatsal Shah, "Image Processing Techniques for Detection of Leaf Disease", Vol 3, Issue 11, 2013.

[4] Jayamala K. PatilBharti, "Advances in image processing for detection of plant diseases", Journal of Advanced Bioinformatics Application sand Research, Vol 2, Issue 2, pp 135-141, 2011.

[5] Camargoa,J.S.Smith, "An image-processing based algorithm to automatically identify plant disease visual symptoms", Biosyst Eng., Vol 102:9–21, 2009.