LEAF DISEASE IDENTIFICATION AND CROP FIELD MONITORING

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Abstract

In this paper, we propose a method through which the agricultural land are monitored automatically for the basic needs. The plant health is being monitored using the Leaf Colour Chart (LCC) and SVM classifier. From the results necessary fertilization is done to the field. The proposed system uses the database technique in identification and sensors to monitor the level of water, pH, actuators are deployed for necessary fertilization.

Keywords- *HOG,SVM classifier, Sensor.*

1. INTRODUCTION

Agricultural methods involves manual implementations in most of the cases so it may cause damaged crop or any fertilizer added more without knowledge can damage the crop. In general human makes error. So to avoid this and also identify the disease if the leaves are affected by any, this system is implemented.

The main objective is to detect the disease or the deficiency of the leaf. Since there are many kinds of deficiency many farmers can't identify the proper type as many resemblance is found this leads to deployment of wrong fertilizer and farming techniques. The goal is to find the crop requirement and also to implement it for the nourishment of the crop. Also to monitor the basic crop needs such as water, pH , fertilizer levels and deployed actuators perform the required task automatically.

In Existing System, the identification and determination of the disease or the deficiency of the leaf is done by Neural Networks (NN) technique but this fails to identify the proper deficiency and also the system holds very less data. The existing system also uses the colour technique called green masking by the level of green in leaf the deficiency was determined.

2. PROPOSED SYSTEM

The proposed system is about the automation of the crop field monitoring and fertilization based on the requirement. Here the SVM classifier and HOG algorithm are used in identification of the deficiency. The Proposed system contains sensors that determine the water level, pH value and the fertilizer level and activates the motors based on the requirement. Each sensor is set with a threshold value and then they are compared with on field values and motor is operated.

The leaf colour chart is been used where the leaf is been stored and they are added to the database. The MATLAB is used in identifying the deficiency. The hog algorithm is been used in extract features of the leaf. The SVM classifier compares the extracted feature using the hyper-plane technique where the image at data base features are compared with the trained image.

3. BLOCK DIAGRAM

The Block diagram shown in Fig 1 is for the crop field monitoring and identification of the leaf disease . It consists of DC motor and 3 sensors. The sensors are directly connected with the ADC to give input to the microcontroller and operate the motors in turn with respect to their values. An Lcd is been used for the display of the type of disease affected and the values of the sensor.

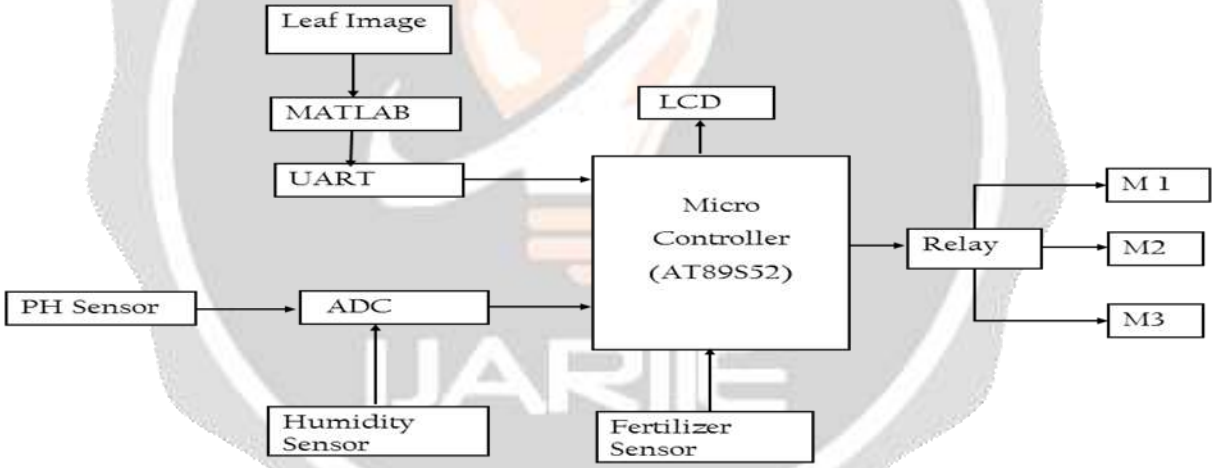

Fig-1: Block diagram of proposed system

The other part is interfaced with the microcontroller using UART and RS232. The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals.

Atmel89S52 is the microcontroller used for the interfacing of the components. It consists of the 8k bytes of flash memory. The fertilizer sensor is a near infrared sensor which is operated based on the reflection and absorbance

technique. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.

4. MATLAB FLOW PROCESS

Fig 2 shows the process involved in MATLAB for the detection of the leaf disease. In the preprocessing steps the image of the leaf is been resized and the gray scale conversion is been done. After the preprocessed image the hog algorithm is been implemented and the features are extracted. Then the features are used in the SVM classifier and the deficiency type is being displayed on the lcd.

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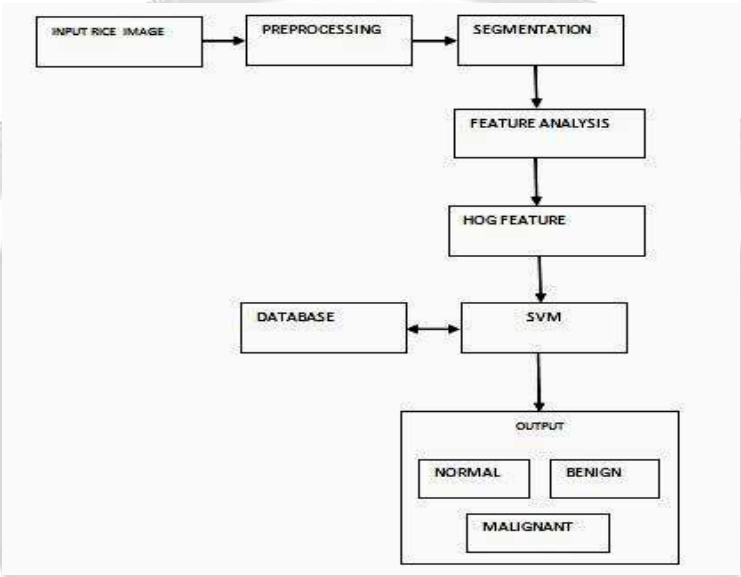

Fig-2: MATLAB flow process

ADVANTAGES

The advantages of proposed system are automation process no misjudgement of the leaf deficiency and their perspectives.

APPLICATIONS

It can be used in agriculture, small scale farming, and agricultural research institutes.

5. RESULTS

This paper is based on embedded system. MATLAB is included to show the leaf affected disease. Hence images from both the domains have been included. HOG algorithm is used for the processing of image, it has improved accuracy than other algorithm techniques.

The image processed results and their snapshots are provided below. In the hardware part the sensors are placed o to the required position in the field and the values of the sensors are recorded continuously when the values exceed the normal threshold value set it operates the motor using the relay connected to the microcontroller.

Fig 3: Resized image

Fig 3 shows the image that is resized for the processing steps.

Fig 4: Filtered image

Fig 4 shows the image converted to gray scale, since processing of image in the RGB domain is difficult and comparing the coordinates become too complex.

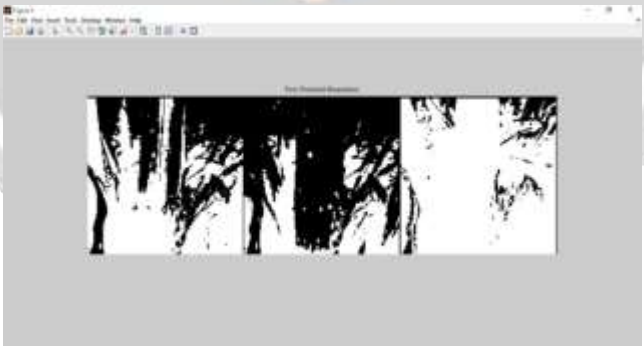

Fig 5: Threshold binarization

Fig 5 shows the threshold binarization of the image processed based on the foreground and background techniques.

A. Mechanical model

The mechanical model for the proposed system is shown in Fig 6.

Fig-6: Prototype model

Thus with this system, we can largely avoid the human errors which are the major cause wrong fertilization. The system is implemented effectively.

6. CONCLUSION AND FUTURE ENHANCEMENT

The project is about identifying the disease in the leaf and make automated monitoring of the crops. The leaf images are captured and provided to the database. First the pre-processing of the image is done for further enhancement of the image. Later the image threshold is compared and the extracted features are also compared with the database and provide the details.

For the future enhancements in this prototype model we have shown the disease detection in the paddy leafs. It can be improvised for the detection of the all kind of leafs and also by increasing the level of sensors.

7. REFERENCES

[1] Al-Hiary. H, Bani-Ahmad. S, Reyalat. M, Braik. M and ALRahamneh. Z, 'Fast and Accurate Detection and Classification of Plant Diseases', IJCA, March 2011.

[2] Chaudhary. P, Chaudhari. A. K, Dr. A. N. Cheeran and Godara. S, 'Color Transform Based Approach for Disease Spot', International Journal of Computer Science and Telecommunications, June 2012

[3] Patil. J. K and Kumar. R, 'Advances in image processing for detection of plant diseases', Journal of Advanced Bioinformatics Applications and Research, June-2011.

[4] Sannakki. S. S, Rajpurohit. V. S, Nargund.V. B, and Kulkarni. P, 'Diagnosis and Classification of Grape Leaf Diseases using Neural Networks', IEEE 4th ICCCNT, 2013.