SMART AGRICULTURE USING IOT(INTERNET OF THINGS) AND IMAGE PROCESSING

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Abstract-Internet of Things and Image processing have been so far been applied for various applications independently. This paper describes an approach to combine IoT and image processing in order to determine the environmental factor or pesticides/fertilizers which is specifically hindering the growth of the plant. Using an IoT sensing network which takes the readings of the crucial environmental factors like temperature, humidity, soil moisture of the soil and using camera module image of the leaf lattice will be taken and it is processed under MATLAB software by the help of histogram analysis and these information will be send to a farmer using GSM module.

Keywords:-Internet of Things (IoT),Image Processing, Sensing Network, MATLAB, GSM.

INTRODUCTION

Agriculture is the mile stone in the history of human civilization. Agriculture is one of the oldest and prime activities of the human being. In spite of growing industrialization and urbanization in the world, nearly fifty percent working population still engaged in agriculture. In developing Countries agriculture sector has been a major source of employment and it has contributed to the national economy. The basic aim of agriculture is to raise stronger and more fruitful crops and plants and to help them for their growth by improving the soil and supplying the water. Agriculture is a backbone of Indian economy. In India about sixty four percent of the total population is dependent on agriculture for their live food.

Internet of Things (IOT) is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the categorical examples where IoT is strongly established.

Image Processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too.

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. Digital image processing techniques help in manipulation of the digital images by using computers. The three general phases that all types of data have to undergo while using digital technique are pre-processing, enhancement, and display, information extraction.

LITERATURE SURVEY

[1] In "MULTIPLE NUTRIENT DEFICIENCY DETECTION IN PADDY LEAF IMAGES USING COLOR AND PATTERN ANALYSIS" by Jagadeesh D Pujari And Wang Li Shu

Paddy being the staple food of India is majorly affected by deficiency of primary nutrient elements like nitrogen, phosphorus and potassium.

Leaves can be deficient with multiple nutrient elements at a same time. This can alter natural color of paddy leaves. Such leaves are considered as defective. Pattern analysis RGB color features are extracted to identify defective paddy leaves. Firstly the database of healthy, nitrogen, phosphorus and potassium defected paddy leaves are created. For any test image effective comparison at different levels are employed. Multiple color comparison, multiple pattern comparison and combination of color and patterns comparison are done. So that defectiveness is accurately identified for combination of deficiency such as nitrogen-phosphorus(NP), nitrogen-potassium(NK) and phosphorous- potassium (KP).

[2] In "IDENTIFICATION OF NITROGEN, PHOSPHORUS, AND POTASSIUM DEFICIENCIES BASED ON TEMPORALDYNAMICS OF LEAF MORPHOLOGY AND COLOR " proposed by Yuanyuan Sun 1, Cheng Tong, Shan He 1Ke Wangand Lisu Chen.

Capture of rice leaf by scanning is used to research the changing regulation of leaf characteristics under nutrition stress. Leaf characteristics were extracted by mean value and region props functions in MATLAB, and the leaf dynamics were quantified by calculating the relative growth rate Stepwise discriminant analysis and leave one out cross validation was applied to identify NPK deficiencies. The results indicated that leaves with N deficiency presented the lowest extension rate and the fastest wilt rate, followed by P and K deficiencies. Both morphological and colour indices of the first incomplete leaf were effective indices for identification.

The third fully expanded leaf, they were mainly colour indices and the first incomplete leaf had comparative advantage in early diagnosis (training accuracy 73.7%, validation accuracy 71.4% at the 26th day after transplantation), and the third fully expanded leaf generated higher accuracy at later stage. Dynamic analysis expanded the application of leaf characteristics

indentification, which contributes to improving the diagnostic indentification, which contributes to improving the diagnostic.

[3] In "GSM BASED SOLAR AUTOMATIC IRRIGATION SYSTEM USING MOISTURE TEMPERATURE AND HUMIDITY SENSORS" proposed by Ateeq Ur Rehman.

This paper presents the assistance of soil moisture sensors. In the project, apart from soil moisture sensor. Humidity and temperature sensors are also used to make the process more advance. The proposed design also has the feature of GSM which makes this system wireless. The water content is constantly judged and whenever moisture level of soil gets low, the system sends a signal to motors asking them to turn on. The motors automatically stop after soil reaches its maximum upper threshold value which is decided by user. The major advantages of the project include avoidance from water wastage, growth of plants to their maximum potential, less chances of error due to less labor and uninterrupted supply of water.

EXPERIMENT

We are basicallly using IOT and image processing technologies in our project. We are mainly concentrating on single plant that is tomato plant. The various parameters like humidity, temperature, soil moisture and light intensity are considered. Histogram analysis of tomato plant is carried out under three major conditions such as excess heat, normal condition and extreme cold for checking the NPK content in tomato plant. The predefined values like humidity, temperature and soil moisture of healthy tomato

METHODOLOGY

We know that temperature, humidity, soil moisture and light intensity are the parameters that play a major role in the growth of the plant. This is the reason we are using DHT11 sensor, soil moisture sensor and JPEG camera module for reading these data along with arduino UNO. The predefined values of humidity, temperature, and soil moisture of the healthy plant are stored in the SD card. The data of the test image obtained from these sensors are also stored in the SD card. The comparison is made between predefined values and test image to check whether the plant is healthy or not. In order to check whether the test plant is having deficiency of NPK content we make use of histogram analysis using MATLAB software. In histogram analysis we are predefining four set of graphs

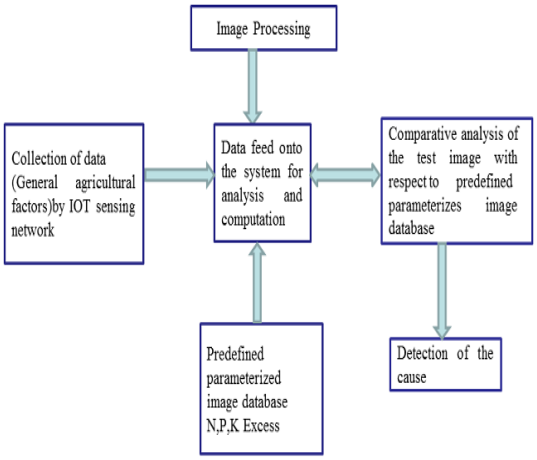
1.set1 of graph is obtained by keeping the plant under healthy condition

2.set2 of graph is obtained by keeping the plant under extreme sunlight.

3.set3 of graph is obtained by keeping the plant under moderate sunlight.

4.set4 of graph is treated with excess of NPK under normal condition. The histogram of test image is compared with four sets and NPK contents are determine and message will be send to farmers.

BLOCK DIAGRAM



plant are stored in SD card and are compared with the values of tomato plant which is under test. The histogram analysis of predefined healthy tomato plant is also compared with the test plant. The GSM module is also used in our project for sending information to the farmers in further process. SushilaShidnal, International conference on communication and signal processing, pp 1007-1010, IEEE, 2016.

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ACHIEVEMENTS-1.Secured best leader and sergeant rank in NCC.

2. Got 3rd place in college level technical competition and selected for national level which was held by IITB.

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