Result Paper Detecting Water Quality and Find Plant Disease Using GLCM

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Abstract - Agriculture is the backbone and has the huge scope for automations in countries like India. Today out of available water sources on earth only 2.5% water is available for drinking and farming purpose and this percentage continues to be dominant in water consumption because of worldwide population growth. Which creates the huge scope in, efficient water management which is the major need in many cropping system in arid and semi-arid areas .An automated irrigation system is needed to optimize water use for agricultural crops. The need of automated irrigation system is to overcome over irrigation and under irrigation. In The proposed system, we are developing an automated irrigation system which will measure the moisture, PH Value, temperature of soil in the farm and according to the soil moisture it take decision to turn on/off the water pump through Ardunio. In addition to that system will identify the water quality using turbidity sensor and based on the image processing we will identify the crop diseases, in our propose system we are also plant disease detection using image processing here we are extracting.

Keywords: Smart Irrigation, Water Management, Turbidity, Ardunio, PH value, Moisture, image processing, feature extraction.

I. INTRODUCTION

In IOT-based smart farming, a system is built for monitoring the crop field with the help of sensors humidity, temperature, soil moisture, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. IOT-based smart farming is highly efficient when compared with the conventional approach IOT is a shared Network of objects where these objects interact through Internet. One of the important applications of IOT is Smart Agriculture. Smart Agriculture reduces wastage of water, fertilizers and increases the crop yield. Here a system is proposed to monitor crop field using sensors for soil moisture, humidity and temperature. By monitoring these parameters the irrigation system can be automated if soil moisture is low. , the application of technology like IOT in agriculture could have the greatest impact. The Internet of Things (IOT) has the capability to transform the world we live in. Smart Water Quality Monitoring System will measure the following water parameters for analysis; Potential Hydrogen (pH), Oxidation and Reduction Potential (ORP), Conductivity and Temperature. Disease is identified through image processing. [5]

In developing and most populated country like India where there are limited water resources and farming is totally dependent on rain, it creates huge scope in, efficient water Management which is the major need and motivation for an automated irrigation system which is needed to optimize water use for agricultural crops. The need of automated irrigation system is to overcome over irrigation and under irrigation and proper water management for crop. propose and experimentally evaluate an automated system called, "Smart Irrigation System" is to make it more innovative, user friendly, time saving and more efficient than the existing system. Measuring four parameters such as soil moisture, temperature, humidity and pH values and the system also includes water quality measurement and crop disease detection based on image processing.

In image process, pictures convey the data wherever the input image is processed to induce output additionally a picture. In today's world, the photographs used area unit in digital format. In recent times, the introduction of data technology and also the e-healthcare system within the medical field helps clinical specialists to supply higher health look after patients. This study reveals the matter segmentation of abnormal and traditional tissues from magnetic resonance imaging pictures victimization the gray-level co-occurrence matrix (GLCM) feature extraction classifier.

II. LITRATURE SURVEY

Lee, M., Hwang, J., & Yoe, [1] The aim / objective of this paper is to propose a Novel Smart IOT based Agriculture Stick assisting farmers in getting Live Data (Temperature,

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Soil Moisture) for efficient environment monitoring which will enable them to do smart farming and increase their overall yield and quality of products. The Agriculture stick being proposed via this paper is integrated with Ardunio Technology, Breadboard mixed with various sensors and live data feed can be obtained online from Thingsspeak.com. The product being proposed is tested on Live Agriculture Fields giving high accuracy over 98% in data feeds.

S. R. Nandurkar ; V. R. Thool ; R C. Thool [2],Crop farming in India is labour intensive and obsolete. Farming is still dependent on techniques which were evolved hundreds of years ago and doesn't take care of conservation of resources. The newer scenario of decreasing water tables, drying up of rivers and tanks, unpredictable environment present an urgent need of proper utilization of water. We have the technology to bridge the gap between water usage and water wastage. Technology used in some developed countries is too expensive and complicated for a common farmer to understand. Our project is to give cheap, reliable, cost efficient and easy to use technology which would help in conservation of resources such as water and also in automatizing farms.

Burns BP. [3]- Significant advances have been made in recent years in technologies to monitor drinking water quality for source water protection, treatment operations, and distribution system management, in the event of accidental (or deliberate) contamination. Reports prepared through the Global Water Research Coalition (GWRC) and United States Environment Protection Agency (USEPA) agree that while many emerging technologies show promise, they are still some years from being deployed on a large scale. Further underpinning their viability is a need to interpret data in real time and implement a management strategy in response. This review presents the findings of an international study into the state of the art in this field. These results are based on visits to leading water utilities, research organisations and technology providers throughout Europe, the United States and Singapore involved in the development and deployment of on-line monitoring technology for the detection of contaminants in water.

J.Ramprabu [4] - An innovative solution for monitoring and contamination detection in drinking water distribution system. Contaminated water is a severe vexation in many developing countries with serious health effects particularly for children. Current methods for supervising waterborne microorganisms are much time taking, costly, and effortful, making them not suitable for these regions. Our access is to

Wenijiang Huang [5] -The vegetation indices from hyper spectral data have been shown to be effective for indirect monitoring of plant disease.A limitation of these indices is that they cannot distinguish different on crops we aimed to develop new spectral indices that would be useful for identifying different disease on crop three different paste in winter.

K. Thangadurai [6] - Enhanced images have high quality and clarity than original captured images. Computer vision image enhancement (Color conversion and Histogram equalization) is used in different real time applications such as remote sensing, medical image analysis and plant leaves disease detection. Original captured images are RGB images. RGB images are combination of primary colors (Red, Green and Blue). It is difficult to implement the applications because of the range of this color is 0 to 255. Grayscale images have only the range between 0 and 1. So it is easy to implement many applications. Histogram equalization is used to increase the images clarity. Grayscale conversion and histogram equalization is used in plant leaves disease detection.

Monika Jhuria [7] - Due to the increasing demand in the agricultural industry, the need to effectively grow a plant and increase its yield is very important. In order to do so, it is important to monitor the plant during its growth period, as well as, at the time of harvest. In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. For this purpose artificial neural network concept is used. Three diseases of grapes and two of apple have been selected. The system uses two image databases, one for training of already stored disease images and the other for implementation of query images. Back propagation concept is used for weight adjustment of training database.

Zulkifi Bin Husin [8] - Producing chili is a daunting task as the plant is exposed to the attacks from various micro-organisms and bacterial diseases and pests. The symptoms of the attacks are usually distinguished through the leaves, stems or fruit inspection. This paper discusses the effective way used in performing early detection of chili disease through leaf features inspection. Leaf image is captured and processed to determine the health status of each plant. Currently the chemicals are applied to the plants periodically without considering the requirement of each plant. This technique will ensure that the chemicals only applied when the plants are detected to be effected with the diseases.

Mrunalini R. Badnakhe [9] - Identifying the plant leaf images will play a key role in preventing great loss in the yield and quantity of production in farm. Study of leaf disease means the scientific study of disease in plant leaves which is caused by infectious organisms and physiological conditions. Keeping track of health and identifying of disease of plant leaves in early stage is very crucial in agriculture. Identifying plant leaf disease manually is very difficult as it needs lot of work, only the expertise will be able to identify the plant disease. So we mainly prefer image processing so as to detect leaf disease. Detection of disease will include several steps such as image-acquisition,

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image-pre-processing, image-segmentation, feature-extraction and also categorization.

H. A1-Hiary [11] - The proposed solution is an improvement to the solution proposed in as it provides faster and more accurate solution. The developed processing scheme consists of four main phases as in. The following two steps are added successively after the segmentation phase. In the first step we identify the mostly green colored pixels. Next, these pixels are masked based on specific threshold values that are computed using Otsu's method, then those mostly green pixels are masked. The other additional step is that the pixels with zeros red, green and blue values and the pixels on the boundaries of the infected cluster (object) were completely removed. The experimental results demonstrate that the proposed technique is a robust technique for the detection of plant leaves diseases. The developed algorithm's efficiency can successfully detect and classify the examined diseases with a precision between 83% and 94%, and can achieve 20% speedup over the approach proposed.

III. PROPOSED SYSTEM

In our proposed system, we are implementing irrigation and agriculture system, in this system we are using sensors, circuits, arduino boards and mobile application, also implementing cloud connection with sensors and application.

Arduino is like minicomputer this is connected with sensors .in our system we are using PH sensor Turbidity sensor moisture.

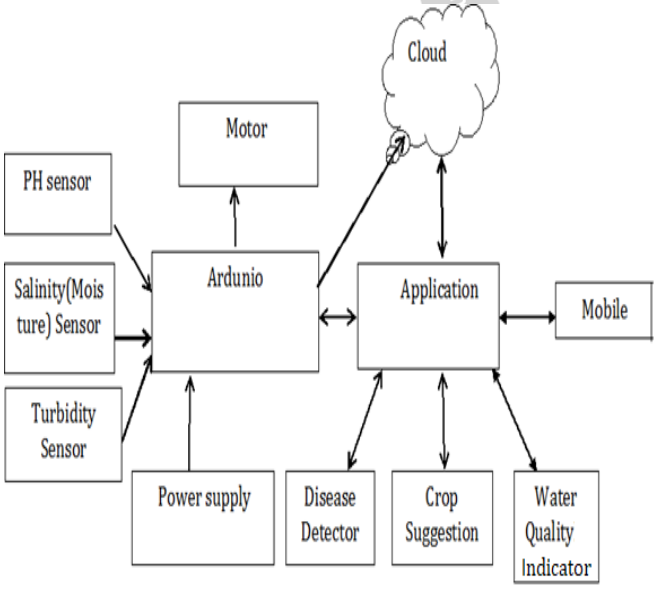

Fig 1. Architecture Diagram

In this system we are also implementing plant disease detection this will help to farmer, farmer can find disease on plant with help of camera. Send plant image to server and server can match images with train images and find disease.

Module:

Admin:

First admin can login to system and train images with help of GLCM.Images is uploaded into the system. In GLCM we are extracting image features.

View Train Data:

In this module Admin can view train data.

Smart Irrigation system:

In automatic irrigation system we will measure soil parameters like soil moisture, PH Value, temperature of soil in the farm and according to the soil moisture it take decision to turn on/off the water pump through Ardunio and it will give notification on user mobile phone.

Disease Detection

In disease detection we used GLCM algorithm and will identify disease through image processing. Following are the steps of disease detection using image processing.

Crop Suggestion

In crop suggestion, soil parameters are stored on cloud through Ardiuno and according to stored value on cloud application will suggest to user which crop should be taken.

Water Quality Indicator

In water quality detection, we detect the water quality through turbidity sensor it will measure the water parameter like potential Hydrogen (PH), oxidation and reduction potential [ORP], temperature.

IV. TECHNIQUE

In this paper we applying different technique

IOT

The Internet of things is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware, these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled.

Arduino

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices.

Ph sensor

A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solutions, indicating its acidity or alkalinity expressed as pH

Turbidity sensors

Measure the amount of light that is scattered by the suspended solids in water. Turbidity sensors are used in river and stream gaging, wastewater and effluent measurements, control instrumentation for settling ponds, sediment transport research, and laboratory measurements.

Image Processing

Image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital

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image processing has many advantages over analog image processing.

GLCM

The **GLCM** is a tabulation of how often different combinations of pixel brightness values (grey levels) occur in an image.

GLCM texture considers the relation between two pixels at a time, called the reference and the neighbour pixel. In the illustration below, the neighbour pixel is chosen to be the one to the east (right) of each reference pixel

Feature Extraction

Various features are extracted using feature extraction techniques. This precisely describes the diseased region based on color, shape and textural features. Various feature extraction method such as colour, co-occurrence, skewness, contrast, correlation etc are used to extract the desired set of features.

V. ALGORITHM

Begin

Step 1 call the algorithm computing GLCM matrix in four direction (0, 45, 90,135) with distance d=1

Step 2 Call the algorithm of normalizing each GLCM matrix

Step 3 for each GLCM matrix in certain angle

I. Calculate Image Features according to their equations.

II. Store computed features in vector.

End.

VI. RESULT

In Our System Result will be

Train System

Here System will be Train means here expert can add plant disease infected Images to system means system can build Dataset of Diseases infected images.

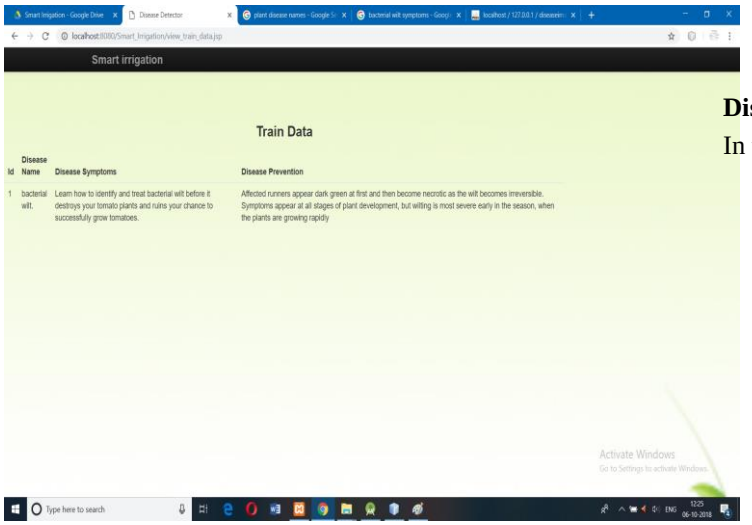

Fig 2. Training Module

IOT Module

Detection of water Ph Level, Turbidity, Temperature and Water Level.

Fig 3.Water Parameter

Crop Suggestion

In This module System on basis of Ph level and Turbidity suggest crop to the farmer.

Fig 4.Crop Suggestion

Disease Detection

In this module plant disease is detected.

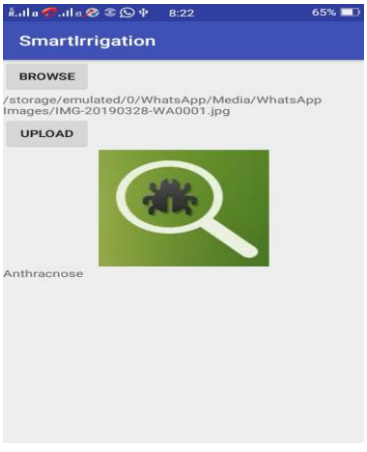

Fig 5.Disease Detection

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Analysis

GLCM Algorithm

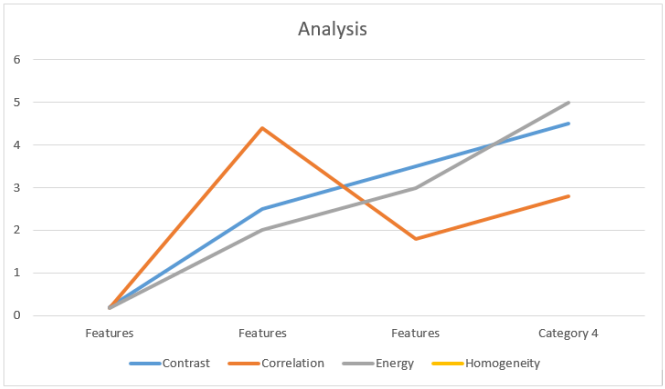

Fig 6. Analysis

Features of GLCM explain below

Angular Second Moment

Angular Second Moment is also known as Uniformity or Energy. It is the sum of squares of entries in the GLCM Angular Second Moment measures the image homogeneity. Angular Second Moment is high when image has very good homogeneity or when pixels are very similar

$$ASM = \sum_{i=0}^{Ng-1} \sum_{j=0}^{Ng-1} P_{ij}^2$$

Equation 1

Where i, j are the spatial coordinates of the function p (i, j), Ng is gray tone.

Inverse Difference Moment

Inverse Difference Moment (IDM) is the local homogeneity. It is high when local gray level is uniform and inverse GLCM is high.

$$IDM = \frac{\sum_{i=0}^{Ng-1} \sum_{j=0}^{Ng-1} P_{ij}}{1 + (i-j)^2}$$

Equation 2

IDM weight value is the inverse of the Contrast weight.

Entropy

Entropy shows the amount of information of the image that is needed for the image compression. Entropy measures the loss of information or message in a transmitted signal and also measures the image information.

$$ENTROPY = \sum_{i=0}^{Ng-1} \sum_{j=0}^{Ng-1} -P_{ij} * logP_{ij} \quad ...3$$

Equation 3

Correlation

Correlation measures the linear dependency of grey levels of neighboring pixels. Digital Image Correlation is an optical method that employs tracking & image registration techniques for accurate 2D and 3D measurements of changes in images. This is often used to measure deformation, displacement, strain and optical flow, but it is widely applied in many areas of science and engineering. One very common application is for measuring the motion of an optical mouse.

$$Correlation = \frac{\sum_{i=0}^{Ng-1} \sum_{j=0}^{Ng-1} (i,j)p(i,j) - \mu_x \mu_y}{\sigma_x \sigma_y}$$

Equation 4

Water Analysis

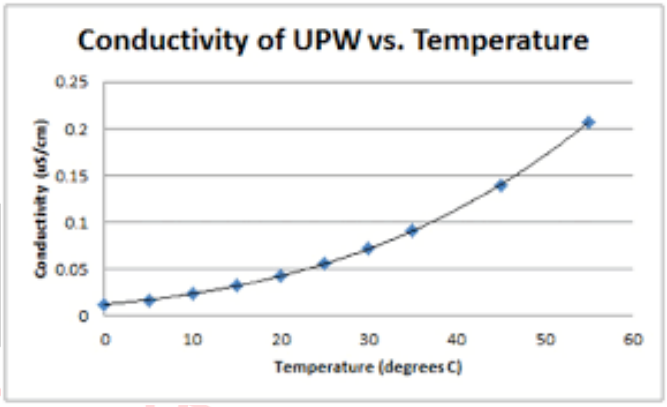

Fig 6 Water Analysis

In water analysis we are using many sensors for detecting quality of water such as Ph level, Turbidity, Moisture and conductivity.

VII. CONCLUSION

Finally based on above discussion and literature survey we can make a conclusion that The smart irrigation System is expected to do proper water management which will save the water in large extend due to automatic water pump on/off and will also save the huge time and efforts of the farmer will also help the farmer to identify the crop disease ,from this farmer can know the disease and it will take the precautions on that crops and it will also help the farmer to know the quality of water and we also expected to give the crop suggestion to the farmer from this farmer know that which crop will be take on the land.

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