AUTOMATIC IRRIGATION SYSTEM AND DETECTION OF DISEASES ON COTTON LEAVES

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***Abstract*-Indian economy is based on agriculture. The most important parameter for the agriculture is timely and sufficient supply of water. Even today farmers are using the less efficient traditional ways of irrigation and wasting lots of resources and time. This has lowered the efficiency and has led to the helplessness of the farmer to give up agriculture and move to urban areas in search of better prospects. Since conservation of water is a topic of major concern, this project also aims at precise and adequate use of water in irrigation. A model is designed for controlling irrigation facilities to help millions of people. This model uses sensors with microcontroller to make a smart switching device and shows the basic switching mechanism of water motor. It is extremely useful at places where we have to control the ON and OFF switching of the devices.**

This paper present survey on technique that can be used for plant leaf disease detection. A technique deals with classifying each pattern in one of the distinct classes. A classification is a technique where leaf is classified based on its different morphological features. There are so many classification techniques such as k-Nearest Neighbor Classifier, Probabilistic Neural Network, Genetic Algorithm, Support Vector Machine, and Principal Component Analysis, Artificial neural network, Fuzzy logic. Selecting a classification method is always a difficult task because the quality of result can vary for different input data. Plant leaf disease classifications and detection have wide applications in various fields such as in biological research, in Agriculture etc

I. INTRODUCTION

Irrigation may be defined as the application of water to the soil and it is an agricultural practice that goes back to thousands of years in the human history. Farming is of utmost importance to the survival of the inhabitants of an area. Considering the rate of population growth, there arises the need to intensify the rate of food crop production so as to compensate for the increasing food demand. A method to reduce the problems associated with farming and increase food crop production is the implementation of a controlled technique to meet the soil moisture requirement for crops grown.

Nearly 1/3cultivated land with irrigating facility supplies water insufficiently, the wasting phenomenon of irrigating water resources is very serious, the utilization ratio of irrigating water resources is about 40%.Also a large percentage of our farmers are uneducated and don't have the proper scientific knowledge about certain parameters like Temperature, Humidity, Soil Moisture content, etc. We aim at providing precise information regarding the above parameter which serves as an important part for controlling the irrigation on field and the result as coded signals indirectly controls the entire farm irrigation system. The processor or the controller works as a central core for functioning of the automated process after it has been initiated by the moisture sensor and finally presents the output to the device. Also this project is designed keeping the financial conditions of the Indian farmers in mind.

India is one of the major producers of the cotton in the world. It is one of the important cash crops of India accounting for 38% of export value. In Vidarbha (Maharashtra) region, cotton is the most important cash crop grown on an area of 13.00 lacks hectors with production of 27 lack bales of cotton (2008-09). Disease on the cotton is the main problem that decreases the productivity of the cotton. The main source for the disease is the leaf of the cotton plant. About 80 to 90 % of disease on the cotton plant is on its leaves. cotton leaf is mainly suffered from diseases like fungus, foliar leaf spot, alternaria leaf spot.

The purpose of Agriculture is not only to feed ever growing population but it's an important source of energy and a solution to solve the problem of global warming. Plant diseases are extremely significant, as that can adversely affect both quality and quantity of crops in agriculture production. Plant disease diagnosis is very essential in earlier stage in order to cure and control them. Generally the naked eye method is used to identify the diseases. In this method experts are involved who have the ability to detect the changes in leaf color. This method involves lots of efforts, takes long time and also not practical for the large fields. Many times different experts identify the same

disease as the different disease. This method is expensive as it requires continuous monitoring of experts.

Depending on the applications, many systems have been proposed to solve or at least to reduce the problems, by making use of image processing, pattern recognition and some automatic classification tools. In the next section this paper tries to present those proposed systems in meaningful way.

KNN Technique:

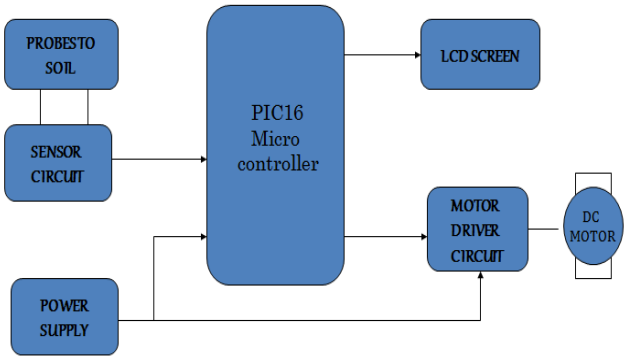
In plant leaf classification leaf is classified based on its different morphological features.

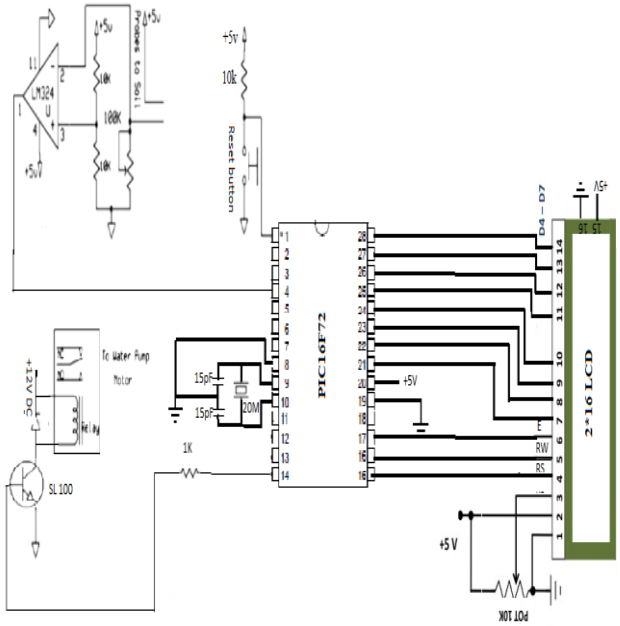
k-Nearest Neighbor is a simple classifier in the machine learning techniques where the classification is achieved by identifying the nearest neighbors to a query examples and then make use of those neighbors for determination of the class of the query. In KNN the classification i. e. to which class the given point is belongs is based on the calculation of the minimum distance between the given point and other points. As a classifier the nearest neighbor does not include any training process .It is not applicable in case of large number of training examples as it is not robust to noisy data. For the plant leaf classification the Euclidean distance between the test samples and training samples is calculated. In this way it finds out similar measures and accordingly the class for test samples. A sample is classified based on the highest number of votes from the k neighbors, with the sample being assigned to the class most common amongst its k nearest neighbors. k is a positive integer, typically small. If k = 1, then the sample is simply assigned to the class of its nearest neighbor. In binary (two class) classification problems, it is helpful to choose k to be an odd number as this avoids tied votes [19][20].

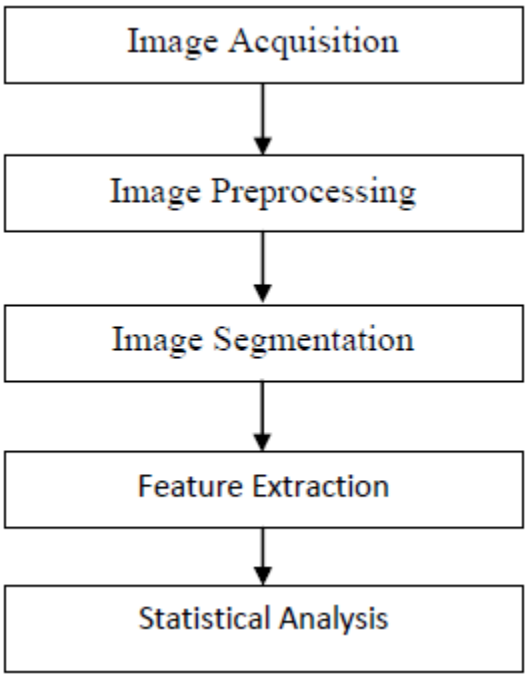
Nearest neighbor method is easy to implement also quite good results if the features are chosen carefully. The K-Nearest Neighbor (KNN) Classifier is works well on basic recognition problems.

The main disadvantage of the KNN algorithm is that it is a slow learner, i.e. it does not learn anything from the training data and simply make use the training data itself for classification. Another disadvantage is this method is also rather slow if there are a large number of training examples as the algorithm must have to compute the distance and sort all the training data at each prediction. Also it is not robust to noisy data in case of large number of training examples. The most serious disadvantage of nearest neighbor methods is that they are very sensitive to the presence of irrelevant parameters.

I. ARCHITECTURE







II. WORKING

The microcontroller is programmed in such a way that it receives the input signal from the sensing device which consists of a comparator to know the varying conditions of the moisture in the soil. The sensing arrangement is done with the help of two stiff metallic rods that are inserted into the agricultural field at some distance.

The comparator acts as an interface between the sensing device and the microcontroller for transferring the moisture conditions of the soil, like wetness, dryness, etc. When the soil condition is less than the reference voltage, i.e., 5v, then the soil is dry and opamp sends the logic 1 to the microcontroller which turns on the motor driver circuit and prompts the motor to pump water to the plants. When the soil condition is greater than 5V, the soil is wet. Then opamp sends the logic 0 to the microcontroller, this turns off the motor driver circuit and prompts motor to stop. The input data signals from the moisture sensor are sent to the microcontroller and based on that it activates the DC Motor and switches the motor on with the help of a motor driver circuit.

When the water content in the soil increases, the soil resistance decreases and the transmission of the probes starts to make the opamp stop triggering the relay. The status of the agricultural fields can be known from the indication of the LCD.

The developed processing scheme consists of four main steps, first a color transformation structure for the input RGB image is created, this RGB is converted to HSI because RGB is for color generation and his for color descriptor. Then green pixels are masked and removed using specific threshold value, then the image is segmented and the useful segments are extracted, finally the texture statistics is computed. from SGDM matrices. Finally the presence of diseases on the plant leaf is evaluated.

The step-by-step procedure of the proposed system:

1. RGB image acquisition
2. Convert the input image from RGB to HSV format.
3. Masking the green-pixels
4. Removal of masked green pixels
5. Segment the components
6. Obtain the useful segments
7. Computing the features using color-co-occurrence methodology
8. Evaluation of texture statistics

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