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Preventive Diseases Detection for Farming

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Abstract: In India around more than fifty percent of the population depend on the resources from the agricultural sector. Crop production quality and quantity can be enhanced using accuracy in agriculture. One of the major products in India is Grape production has economic importance.Grapes has big production in our Maharashtra specially in Nashik. But from last some years the quality of grapes has been degraded because of diseases on grapes. To overcome the diseases farmers spray huge amount of pesticides, chemicals, etc. because of that production cost get increased automatically. Also farmers are unable to identify the diseases.In Existing System, the diseases are detected by the Image processing method only after grapes affected by disease. But it is more time consuming and has adverse affect on vineyard.For increasing productivity and quality of crops, Farmers requires real time automatic disease monitoring system for Plants.So our proposed work is to develop a Real time monitoring System using HMM with the help of small sensor devices embedded with wireless technology.It is possible to remotely monitor parameters which will identify the chances of disease on grapes in its early statge and gives an alert message through android interface or SMS to the Farmer with the Expert suggestions ,schedule of irrigation,spraying pesticides, Fertilizers, etc via an App. This system will be helpful and profitable for farmers to protect the Farm.

Key Words: Wireless sensor network, Vineyard, Hidden Markov model, RDH.

1. Introduction

In India, Grapes production has economic importance. At each Stage of Grapes Development we have observe the different diseases. Many farmers those are doing grape farming,they don't have that much knowledge about each and every disease, hence they can not undersatnd and satisfy the protocols of super market related to the uses of pesticides and fungicides. Because of that grapes are rejected in residue analysis test and the farmers can not get more profit on investment. Many of farmers uses image processing system and also makes inspection for identification and detection of grapes diseases. These type of system requires contineous observation by specialist, which is costly and not much more accurate. Hence Farmers and Experts needs a real time system to contineously observe the vineyard and giving daily updates to the farmers, which is less costly and exact strategy to identify diseases infected on grapes.

In our proposed System, we use small Sensors devices and a web camera is placed in vineyard coupled with wireless technology and it remotely monitors the parameters captured by sensor devices such as temperature, Humidity, Moisture. So our objective is to design and develop a Real time System that can take farm filed parameters and process them, then by using WSN it can be trasmitted to remote place. According to parameters that recevied by end user, decision making can be done. Also Farmers get all required information about the Farm.

We can easily collect the sensor data, manage various cloud services and recommendation about whether forecast data, etc. Now a days the precision agriculture is fast growing area of smart agriculture.this system solution for increasing quality of the vineyard.

2. Literature Survey

In India, Maharashtra ranks first in foods production like grapes clustered apple,mango,orange,etc**.** in existing system, Farmers known the diseases when the symptoms are apper on the farm and then only disease can be detected. To prevent diseases farmers spray huge amount of pesticides, which result in increasing the cost of production. Also there are various system present that used the image processing which is more time consuming and not much more accurate. That's why such type of systems is unable to identify diseases at an

early stage.so we will go to provide for developing proposed system we will look some related papers are as follow.

- In[1] their work has presented is to develop a monitoring system which will identify the chances of grape diseases by using Hidden Markov Model and provide alert to the user.
- In[2] This paper gives thought regarding estimation of diverse climatic parameters of plant and investigation of leaf sickness discovery utilizing picture handling and sends the whole data over web by method for term IoT.
- In[3] their work has been presented, based on image processing for detecting plants leaf diseases.
- In[4] this paper give a weather record of vineyard plot wise and probability of disease infection remotely. They can start spraying application remotely if disease probability is severed. By using this suggested system they can detect and prevent the disease remotely from any location in the world.
- In[5] their work has been presented,with the evolution of miniaturized sensor devices coupled with wireless technologies, it is possible to remotely monitor parameters such as moisture, temperature, humidity and detect the leaf diseases

3. Research Methodology

3.1. HMM

Here we used a methods for the data analysis is Hidden Markov Model. A hidden Morkov Model is the statistical model in which the states are hidden from the user. In basic Markov model states are noticeable to spectator, yet in HMM states are undetectable to client, be that as it may, just the watching states are unmistakable. HMM consists of two stochastic processes. The first stochastic process is states and its transition probabilities called as a Markov chain. And the second stochastic process is emission observation which depends on a probability distribution. With the help of HMM we develop our own model which will fulfil all the necessary conditions for accurate classification of diseases [1].

The algorithms works as follows,

1. Take input from temperature, humidity and moisture sensors.
2. Convert it into digital format using inbuilt analog to digital convertor placed on Arduino board.
3. Transfer data to server using Zig-Bee wireless communication protocol and store in database.
4. Find Euclidean distance at each point.
5. Find the state transition probability at each point. After calculating E.D. we need to calculate the probability of each state.

3.2. RDH Algorithm

Reversible data hiding (RDH) in images is a technique, by which the original cover can be losslessly recovered after the embedded image is extracted and as well as protects the confidentiality of image contents. This important technique is widely used in medical imagery, military imagery and Law forensics, where no distortion of the original cover is allowed. Reversible data hiding (RDH) has the capability to erase the distortion introduced by embedding step after cover restoration. In this framework [9], a content owner encrypts the original image using a standard cipher with an encryption key. After producing the encrypted image, the content owner hands over it to a data hider (e.g., a database manager) and the data hider an embed some auxiliary data into the encrypted image by losslessly vacating some room according to a data hiding key. Then a receiver, maybe the content owner himself or an authorized third party can extract the embedded data with the data hiding key and further recover the original image from the encrypted version according to the encryption key.

4. Proposed System

After study of various literature reviews, there is a need to develop real time system which will accurately detect diseases on grapes.The task of disease detection of plants is very important in field of Farming. In proposed approach temperature, humidity, Soil sensor and moisture sensors are put in vineyard, first all sensors collect data from environment around the crop. All Sensors are connected to the arduino board it contains inbuilt ADC. When the image is Captured by web Camera and is encrypted by using the Reversible Data Hiding Algorithm and The soil is tested by using PH method then pass to further processing. Using that ADC the data collected from sensors is converted into digital format and is used for transmission. We use zig-Bee co-ordinator for establishing the end device collects sensors data. The framework of the proposed approach as shown in Figure.

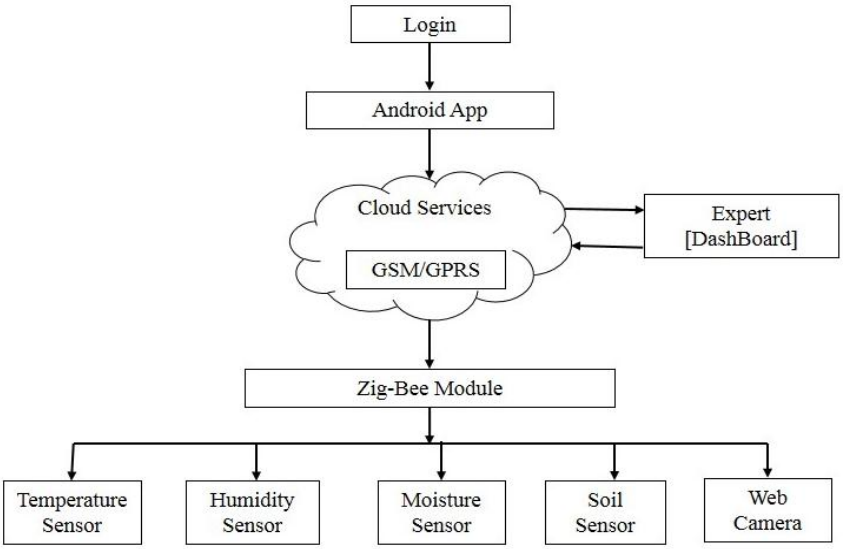

Figure 1: Proposed System Architecture

After this, remotely monitor parameters like as moisture, temperature, Humidity given to Hidden Morkov model algorithm and will detect diseases which will identify the diseases in its upcoming stage. The remote measurement and controlling of different parameters along with disease detection over the cloud can sructured in this system. The end user of proposed approach is Farmer to access the web Application we provide Android Interface. Web Application is connected to central server(cloud) for real time updating of information. Farmers gets all deatail information of his farm plot wise. this system gives alert meassges via SMS and Android Interfacewith Expert suggestions,etc to farmer at contineous interval for that we can use Internet/GSM/GPRS.

5. Conclusions

This is a real time system designed for early and accurate detection of diseases by using machine learning and IOT to suggests pesticides to protect the crop from those diseases and reduce the manual disease detection efforts. Due to this, it helps farmers to improve the quality of farming and increases the production of Farm. Using this system, farmers get the information about a schedule of fertilizers, Schedule of spray, pesticides spraying, irrigation, prediction of diseases, Expert advice,etc. these all are provided on single touch. This will be helpful to farmers to increase their profits, and protect the vineyards from affecting the diseases and for better management. By accurate identification of diseases and providing correct spraying and irrigation schedule, improvement in the quality and quantity of grapes is achieved along with reduction in excessive use of pesticides. For better results, we will use more number of sensors to cover the large area of vineyard.

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