Smart Farming and Irrigation System

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Abstract: Agriculture is the primary occupation in our country for ages. But now due to migration of people from rural to urban there is hindrance in agriculture. So, to overcome this problem we go for smart agriculture techniques using IoT. This project includes various features like remote controlled monitoring, moisture and temperature sensing, security, leaf wetness and water management facilities. It makes use of wireless sensor networks for noting the water level and environmental factors continuously. Various sensor nodes are deployed at different locations in the farm. Controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensors, Wi-Fi, camera with microcontroller. This concept is created as a product and given to the farmer’s welfare.

Keywords: Smart Agriculture, IoT (Internet of Things), water management, sensors, remote device, internet services.

I. INTRODUCTION

India being an agricultural country is still using traditional ways of recommendations for agriculture. Currently recommendations for farmers are based on mere one to one interaction between farmers and experts and different experts have different recommendations. Recommendation can be provided to farmers using past agricultural activities with help of data mining concepts and the market trend can be merged with it to provide optimized results from recommended. The paper proposes the use of data mining to provide recommendations to farmers for crops, crop rotation and identification of appropriate fertilizer. Intelligent farm surveillance system is for viewing the remote farm. In traditional video surveillance model the basic disadvantage is manual detection of the event. Many developed and developing country are using intelligent farm surveillance system for viewing the farm remotely. In this paper there is a brief survey of different object detection techniques, frontal and profile face. Our system is being proposed in order to make the data set more accurate, labeled and efficient enough to provide it as an input to the machine learning algorithm. The need of supervised data in today’s world is increasing rapidly. As the organizations cannot always afford for domain experts, lots of processing time and manual effort is required. Manual intervention may also lead to errors in the dataset.

Hence the need emerged to provide a automatically labeled dataset. We proposed a system in order to overcome all these issues and convert the unlabeled dataset into labeled dataset automatically by creating probabilistic labels for the input data. The main aim of this paper is to propose a state of art wireless sensor technology in agriculture, which can show the path to the rural farming community to replace some of the traditional techniques. In this project, the sensor motes have several external sensors namely leaf wetness, soil moisture, soil pH, atmospheric pressure sensors attached to it. To also recommend the farmers about the crop to be grown based on farmer and agricultural database stored on cloud. Intelligent video surveillance systems deal with the real-time monitoring of persistent and transient objects within a specific environment. The primary aim of this system is to provide an automatic interpretation of scenes and to understand and predict the actions and interactions of the observed objects based on the information acquired by video camera.

Fig 1.1 flow control diagram
II. LITERATURE SURVEY

Table 2.1 Overview of Literature Survey

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Author</th>
<th>Objective</th>
<th>Contribution</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligent Agriculture &amp; its key technologies</td>
<td>2019</td>
<td>Jinyu Chen &amp; Ao Yang</td>
<td>Development of Agriculture by functions of sensing, analyzing</td>
<td>Fetching Data From Sensors &amp; sending to Local Database</td>
<td>Dynamic Monitoring of Agricultural resources.</td>
</tr>
<tr>
<td>Application of Non-orthogonal multiple access in WSN.</td>
<td>2019</td>
<td>Zeng Hu, Lo Ngqin</td>
<td>Precise control of irrigation, fertilizers, wireless sensor networks.</td>
<td>Control over the Water level of Soil</td>
<td>Helps to reduce wastage of water &amp; improve soil health</td>
</tr>
<tr>
<td>IOT monitoring System of modern Eco-Agricultural based on cloud computing</td>
<td>2019</td>
<td>Shubo Liu &amp; Xiao Ya</td>
<td>It focuses on Quality of Agricultural Activities &amp; problem should be solved.</td>
<td>Analysis of crops from time to time based on image processing</td>
<td>Crops Monitoring.</td>
</tr>
<tr>
<td>Smart Agriculture &amp; Monitoring System</td>
<td>2018</td>
<td>Saurav Sarkar</td>
<td>Use of IOT &amp; different sensors for implementing Smart Agriculture &amp; monitoring system</td>
<td>Storage of water in tanks equipped with level sensors to analyse &amp; effective use of water sending to soil</td>
<td>Reduce the traditional way of farming &amp; encouraging the use Smart Techniques.</td>
</tr>
</tbody>
</table>

In this paper, we attempt to overcome the limitations witnessed in the methodologies suggested above. For instance, principal component analysis gives us accuracy of only 68% which is not sufficient for real world application. The PIE and extended Yale datasets are not efficient for all the faces as they do not use CNN due to which the accuracy of detecting the image is not up to mark. The low-resolution face recognition system cannot handle some of the face attributes like gender, age and makeup. The high-resolution face recognition system method is only capable of recognizing datasets having High resolution images. Other than that, it cannot compute low resolution images. Low-Power Scalable 3-D Face Formalization Processor for CNN-based Face Recognition can only be used in mobile devices and sometimes the low-level images are not recognized. Face Detection with Different Scales Based on Faster R-CNN has low efficiency in parallel type CNN. Deep Aging Face Verification with Large Gaps has only front face pose present in the database and no different pose are available. Exploring Priors of Sparse Face Recognition on Smartphones can be used only in mobile devices. Sensor-assisted Multi-view Face Recognition System on Smart Glass gives low accuracy for different poses of images. Single Sample Face Recognition via Learning Deep Supervised Auto encoders has image size is restricted to 32x32 and only 20 images are chosen from CMY-PIE datasets for training. So, considering above limitations, we propose to implement a deep learning-based face recognition module, which makes use of OpenCV and Convolutional Neural Networks. We are using encoding database of over 3 million human face images. The HOG algorithm is being used for encoding new images to the database.

II. PROPOSED SYSTEM

Various sensors are deployed in the field like temperature sensor, moisture sensor and PIR sensor. The data collected from these sensors are connected to the microcontroller through RS232. In control section, the received data is verified with the threshold values. If the data exceeds the threshold value this alarm is sent as a message to the farmer and automatically the power is switched OFF after sensing. The values are generated in the web page and the farmer gets the detailed description of the values. In manual mode, the user has to switch ON and OFF the microcontroller by pressing the button in the Android Application developed. This is done with the help of GSM Module. In automatic mode, the microcontroller gets switched ON and OFF automatically if the value exceeds the threshold point. Soon after the microcontroller is started, automatically an alert must be sent to the user. This is achieved by sending a message to the user through the GSM.
III. ALGORITHM

**AREA**
- Rectangle: \( A, \text{ft}^2 = L \times W \)
- Circle: \( A, \text{ft}^2 = 0.785 \times D^2 \)

**VOLUME**
- Rectangular Tank: \( V, \text{ft}^3 = L \times W \times H \)

**FLUORIDATION**
- \( AFI = \frac{\text{Molecular Weight of Fluoride}}{\text{Total Molecular Weight of Chemical}} \times (100) \)

Feed Dose, mg/L =
Desired Dose, mg/L – Actual Concentration, mg/L

Mixture Strength, % =
\[
\frac{(\text{Tank, gal})(\text{Tank, }\%)+ (\text{Vendor, gal})(\text{Vendor, }\%)}{\text{Tank, gal} + \text{Vendor, gal}}
\]

Module. Other parameters like the temperature, humidity, moisture and the PIR sensors shows the threshold value and the water level sensor is used just to indicate the level of water inside a tank or the water resource.

For Saturator
- Feed Rate, gpd = \(\frac{\text{Capacity, gpd} \times \text{dose, mg/L}}{18,000 \text{mg/L}}\)

**PUMPS AND MOTORS**
- Water, whp = \(\frac{(\text{Flow, gpm})(\text{Total Water Head, ft})}{3,960}\)
- Brake, bhp = \(\frac{(\text{Flow, gpm})(\text{Head, ft.})}{(3,960)(\text{Decimal Pump Efficiency})}\)
- Motor, mhp = \(\frac{(\text{Flow, gpm})(\text{Head, ft.})}{(3,960)(\text{Decimal Pump Efficiency})(\text{Decimal Motor Efficiency})}\)
Total Dynamic Head, ft = Static Head, ft. + Friction Loss, ft.
Cost = Motor, hp * .746 kW * Cost * Hrs. * Days

IV. RESULTS

The Results from the Table-4.1 represents the algorithms having different accuracies for helmet detection.

OpenCV and C++ together show a accuracy of 74% with is not good for helmet detection purpose. Local Binary Patterns shows accuracy of 94% which is not efficient for detection purpose. Scale-invariant feature transform method gives accuracy of 93%. But this cannot be used for datasets having unclear images. Image Descriptors is famous algorithm and gives a accuracy of 91.37%. For license plate recognition OpenCV has been used earlier but the accuracy is 84%. However these images were not captured in realtime. The proposed system will be able to recognise the helmet and license plate with an accuracy of approximately 97% to 98% with the help of improved data set quality and more number of images.

The system is desired to show correct results in low light conditions, in cases where target face is at a certain angle to the mounted camera and also in video frames with low pixel density. Even when the images are slightly blur it will show good accuracy.

Table 4.1 Confusion Matrix

<table>
<thead>
<tr>
<th>Algorithms</th>
<th>True Positive</th>
<th>False Positive</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBPH[28]</td>
<td>76</td>
<td>34</td>
<td>77.55%</td>
</tr>
<tr>
<td>Eigenfaces[29]</td>
<td>85</td>
<td>15</td>
<td>85%</td>
</tr>
<tr>
<td>PCA [30]</td>
<td>78</td>
<td>22</td>
<td>80%</td>
</tr>
<tr>
<td>Haar Cascade [31]</td>
<td>87</td>
<td>23</td>
<td>92.9%</td>
</tr>
<tr>
<td>Proposed System</td>
<td>89</td>
<td>11</td>
<td>95%</td>
</tr>
</tbody>
</table>

V. CONCLUSION

The system being proposed here can help farmers in sowing the right seed based on soil requirements to increase productivity and acquire profit out of such a technique. We also proposed the use of data mining techniques to provide recommendations to farmers for crops, crop rotation and identification of appropriate fertilizer. Thus the farmers can plant the right crop increasing his yield and also increasing the overall productivity of the nation. Intelligent farm surveillance system refers to the video level processing techniques for identification of specific objects, in recorded videos of the farm. In our work, we have assumed video, to be a series of images and have extended the concept to identify birds from videos of the farm

REFERENCES