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Crop Protection by an alert Based System using Deep Learning Concept

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Abstract-A trespass recognition system for notifying a recipient of a possible trespass at a remote location is divulged. The system embraces a low bandwidth sensors network and comprising a satellite transceiver for communicating with the low bandwidth wireless network, and an sound sensor located proximate to the base station for receiving the sound in response to an alarm elicit, the ultra sonic sensor further comprising a processor for analyzing the received sound to identify a predetermined type of object and on identifying at least one of the predetermined type of object in the received signals, generating a contour image of the identified object using Machine Learning algorithm.

Keywords-*trespass, vicinity, deterring gadgets, machine learning, intrusion detection, deep learning, wireless sensor network.*

I. INTRODUCTION

Crop damage by animal intrusion is one of the major threats in lessening crop yield. The farm areas near the forest boundaries are prominently affected by the wild animal attacks. This paper presents the improvement of a Wireless Sensor Network application(Zigbee) for Crop Protection to divert animal intrusions in the crop field. The nodes in the crop field are equipped with object sensors, sound generating devices,and arduino module. For early detection of the animal at the perimeter of the farm intrusion detection system is installed. Animal entry at the farm barrier is detected by the nodes fixed at the boundary and is communicated to the central base station. The sequence of the node renewing is location based, time based and proximity based. On receiving this information the nodes in the vicinity of the animal activates the deterring gadgets and diverts the animal away from the field. A Graphical User Interface has also been made to indicate the degree of the field conditions. The system comprises zigbee application capable of communicating with a profusion of co-located sensors, each of the sensors for detecting one of a plurality of different alarm predicaments. When one of the sensors detects a respective one of the alarm conditions, a notification is transmitted to the recipient. Hence this approach is helpful to the farmers in protecting fields and save them from financial losses.

II. LITERATURE SURVEY

The potentiality of state-of-the-art computer vision methods called deep neural networks to automatically distillate information from images in the SS dataset, the major existing labeled dataset of wild animals. They first showed that deep neural networks can achieve well on the SS dataset, although performance is worse for occasional classes. Perhaps most importantly, their results show that employing deep learning technology can save a incredible amount of time for biology researchers and the human volunteers that help them by labeling images. In particular, for animal identification, the system can save 99.3% of the manual labor (over 17,000 hours) while accomplishing at the same 96.6% accuracy level of human volunteers[1].

An animal model for nuclear cataract induction, which allowed obtaining different cataract degrees *in-vivo*. Furthermore, the same model allowed for the objective hardness measurement of the lens tissue in the different conditions of cataract severity. New methodologies were also developed and tested for the characterization of hardness in healthy and pathological stages of the nuclear cataract formation, as an important biomechanical property of the lens tissue[2]. This system provides an accuracy of 95.5%.

A case study on available Animal dataset, were different local and textural topographies were extracted from the images. These features included descriptors such as the height and area of the bounding box, the surface area of the animals, inclusive of number of colors. Three different classification techniques were tested with different numbers of classes. From the classification results one can conclude that sometimes, simple local features for datasets like the one under study can be the best solution, and even a simple classifier like the KNN can produce very high accuracies. Another conclusion is that SVM is superior to the other two for this classification task and in some cases had the ability to perfectly classify the test data, though this success was tempered by its extremely long training times. A final conclusion is that KNN and SVM are both very sensitive to highly variant feature scales, and normalization is crucial for such cases in order to get good performance results[3].

Local feature extractors, appearance-based methods, two famous CNN architectures and several score-level fusion pairs of these methods are used in the experiments to show the superiority of the proposed method on LHI-Animal-Face database. Additionally, the proposed method is compared with a number of state-of-the-art systems that use the same dataset. It is demonstrated that the proposed method using score-level fusion on appearance-based KFA method and learned features of VGG-16 outperform the state-of-the-art systems for animal face classification[4].

An proficient segmentation improvement by normalizing image size, taking the minimum difference value between each pair of frames in the sequence to construct the background, object size thresholding, and verifying object using SHL. Authors constructed the background in our MFD model from the entire given sequence and used this background for later foreground detection. The optimized DCNN was capable to reduce the classification time by 14 times and maintain high accuracy[5].

An algorithm to detect animals in a given image. W-CoHOG is a Histogram oriented inclination based feature vector with better accuracy. It is an development of Co-occurrence Histograms of Oriented Gradients (CoHOG).In this paper LIBLINEAR classifier is used in order to get surpassing accuracy for high dimensional data. The experiments were accompanied on two benchmark datasets called Wild-Animal and CamaraTrap dataset. Experimental results prove that W-CoHOG performs better than existing state of the art methods[6].

III. PROBLEM STATEMENT

Policing of activity in rural or remote locations such as deserts, large forests, mountainous regions and tundra is typically difficult and expensive, requiring a huge number of personal, expensive equipment such as a helicopters and global communications such as satellites.

The prior art releases systems which provide surveillance of such remote areas using live video and the like. One drawback of such systems is that they are supported by high speed data networks and video feeds which are typically not available in remote areas, thereby requiring installation, or consume large amounts of exclusive satellite communications.

IV. PROPOSED SYSTEM

This section describes the security analysis that was performed before designing and implementing the protocols presented herein. The design of any secure architecture requires exact knowledge of what the architecture in question has to be able to defend against. Often, this is done intuitively or implicitly; however, this approach is error-prone and complicates debugging and maintenance work unnecessarily. Due to the need to include security considerations in every step of the development process, and to enable a validation of security-related properties of the protocols, both general and application-specific goals of an attacker are captured in an attacker model.

Attacker Model:

An attacker model defines the goals as well as the means an attacker has at their disposal to achieve those goals. It is therefore necessary to analyse both in detail since the design of the whole security system is based upon the assumptions made about the attacker that is present in the network. The word attacker in the ambience of network security often implicitly refers to a specific attacker – the so-called Many Object attacker. which means that they may act at any location in the network and that all malicious instances.

Preventing the network from reporting trespassers:

If a trespasser crosses the area monitored by the WSN, the network has to communicate and process the sensor events triggered by the trespasser and raise an alarm when indicated. The attacker therefore might want to hinder the communication or processing of sensor events. Given the attacker has compromised a sufficient amount of nodes in the network, they can achieve this by not relaying messages concerning the detection of the trespasser at critical points. This attack will be referred to as Silence Attack in the following. Redundant sensor coverage of the area and redundant routing paths through the network complicate this attack. Another venue the attacker might choose consists in destroying the nodes on the trespasser's path. This also motivates the deployment of a node failure monitoring protocol to ensure that missing nodes are reported to the gateway.

ROC curve (Receiver Operating Characteristics): (Deep Learning)

ROC curve is used for chromatic comparison of classification models which shows the trade-off between the true positive rate and the false positive rate. The area under the ROC curve is a measure of the accuracy of the model. When a model is closer to the diagonal, it is less accurate and the model with perfect validity will have an area of 1.0 acres.

V. SYSTEM ARCHITECTURE

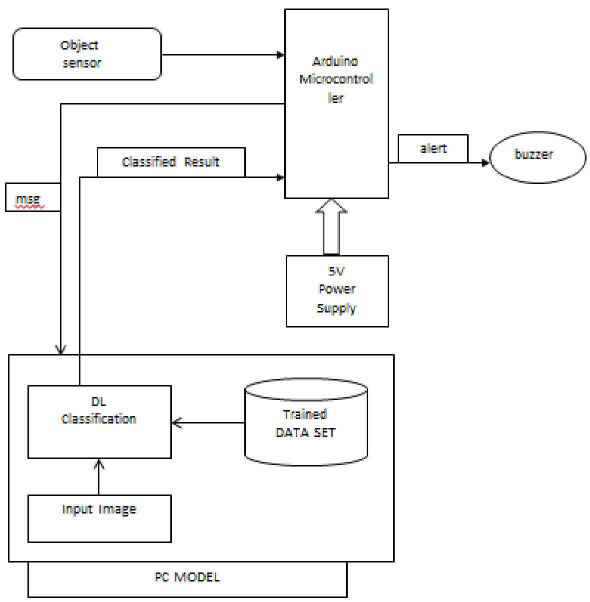

Figure.1

In our system architecture the object sensor will be fixed in the farmland that will cover some particular area. When any object enters into the farmland, the object sensor detects and sends signal to the arduino microcontroller. This controller then sends a message to the user interface saying that some object has entered into the farmland. The user interface we have used is a MATLab software where we have a trained data set. In trained data set we will be storing upto four images, when we upload an input image the image undergoes deep learning classification and that classified image will be compared with the trained data set. If it matches, the classified result will be sent to microcontroller then it will alert through buzzer sound so that animals get scare and they will move from the farmland thus we can reduce crop loss. In case, if the classified image does not matches with the trained data set it will send a message as unclassified result and it also alerts through buzzer sound.

VI. CONCLUSION

The problem of crop destruction by wild animals has become a serious problem for the farmer. Effective solution and urgent attention is needed to solve this serious problem. To solve the problem of farmer we have designed a smart earlier detection and protection system with the help of IOT. The main aim is to prevent the loss of corps and protect agricultural forming area from wild animals which causes major damage to the agricultural area. As the detection of presence of animals near the forest boarder its very helpful to take early precautions. So our technical approach will be helpful to the farmers in protecting fields and save them from financial losses and also saves them from unproductive efforts that they endure for the protection of their fields. future,we can enhance to a wide range areas with additional effective sensors. The proposed system is only limited for a village surrounded area that is near to the forest area. In future can enhance the to a wide range areas also with additional effective sensors.

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