Smart Crop Protection Using IOT with Deep Learning

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Abstract: Agriculture plays a major role in the development of a country. Issues concerning agribusiness have been continually prevents the advancement of the nation. Farmers face a huge number of issues. In the course of recent decades innovation has created to give proficient solutions for huge numbers of these issues. In any case, the protection of farm from wild creatures has not been adequately addressed till now. Elephants, monkeys, wild boars etc. causes serious damage to the fields. The productivity is decreased by the wild creatures trampling over harvests and eating them. This project provides a solution for these problems without hurting creatures or setting human life at stake. IOT with deeplearning technology can be used for not only for the crop protection but also for forest protection from Smuggling by detecting the smugglers location in the forest. In this project we use IOT to check whether any animal ,bird or human has entered the field / form we use deep learning algorithms to categorize them into wild animals and birds. Here we use CNN algorithm for classification of images and notify that to the farmer and forest department by sending the SMS that has information about location of wild animal/smuggler. So that the damage occurred to the crop can be reduced efficiently. Also detects the animal/smugglers in the captured image and repels it by playing the respective sounds.

Keywords*: *Image Classification, Convolutional Neural Network, Raspberry Pi, PIR Sensors, Pi Camera.

INTRODUCTION

Agriculture is the most important sector of Indian Economy but the issue of damage to crops by wild creatures has turned into a noteworthy social issue in current occasions. So far there is no effective solution to this problem and therefore requires earnest consideration. Existing methods include building wire fences and electric fences which are not so effective. Electric fences are equipped with batteries that are charged by solar panels to inflict shock on animals that makes contact with it and also there is a possibility of fire hazard if plants or shrubs grow too close to fence. If the fence is not maintained properly, it creates electromagnetic interferences which affect telephone and radio transmissions. Electric fencing is lethal to both animal and human life though it is the most commonly used farm protection technique. Thorn fencing which is likewise a pervasive strategy followed has a similar impact as the previous. This project provides a smart solution to resolve this problem. In this framework, image is captured when an animal intrudes and then image is classified as domestic or wild animal using Convolution Neural Network (CNN) and deep learning technique. This classification helps in alerting the farmer by sending SMS in case of intrusion of wild animal. The smart farm protection system gives reliable security and safety to crops. This system guarantees the wellbeing of creatures while warding them off. It likewise diminishes the exertion made by man in securing the field.

METHODS FOR CROP PROTECTION

A. Design and Implementation of an Intelligent Security System for Farm Protection from Wild Animals

Prof. A.V. Deshpande in this paper has proposed a system to detect motion on animal intrusion in a farmland and ward it away with light. The author portrays the proposed strategy to shield farmlands from wild creatures by means of ubiquitous wired system gadgets, which is used alongside conventional strategies to improve the protection. Operational amplifier circuits are used basically for the discovery of creature intruding from the outside of fields. The checking plan is to give an early cautioning about the possible intrusion and harm by wild creatures. In their proposed work, fencing wire is used as a sensor. When there is interaction of animals with the open link an input signal is generated initially that shows that an animal is detected at fencing. For getting the resistance of fencing a microcontroller block is used. Entire procedure is constrained by microcontroller. The

GSM module is utilized for sending SMS to the owner thereby cautioning that there is an intrusion.

B. Intelligent Surveillance System for the Crop Protection from Intruders(Animals)

In this paper the authors M. Gogoi and S.R. Philip provide a detailed research on designing a system using image processing techniques like SIFT algorithm to recognize an animal. Proposed algorithm in this paper is:

•Input video is got and it is cut it into frames.
•Then background subtraction technique is applied for detecting motion of objects.
•Morphological operations are applied.
•Objects are separated from original frame by cropping.
•For feature extraction objects are given to SIFT algorithm.
○Main key points are found using Harris corner point locations by the use of multistate filter bank.
○Orientation points are found using gradient values.
•Using SIFT algorithm feature extraction has to be done for data set images.
•Features are matched using Euclidean Distance.
•Match points are sorted and object is classified.
•SMS is sent using GSM

C. Prevention of Intrusion of Wild Animals in the Crop Fields

Dilipkumar M D et al depicts that the protection of farm fields has been a principle content and a mind boggling issue. The creatures from the ensured region are ceaselessly assaulting the harvest fields throughout the years and the security of this farm fields has turned into a fundamental concern. The strategies that previously being utilized is insufficient, in this article we are exhibiting a down to earth technique to ward them off, by making a framework which thinks about the behavior of the animals, identifies the animal and makes the distinctive sound that bothers the creature and furthermore cautions the approved individual by sending sms. They additionally give a multi-class classification by showing zero false alert rate and accurately identifying the species. The purpose of this proposed framework is to distinguish the elephant utilizing image processing on Raspberry Pi board and send a caution sms to the owner by means of GSM module. Images captured are utilized for distinguishing or comparing the images in the database. The picture taken by the raspberry pi it is compared with images in the database. Subsequent to comparing pictures positive/negative output is generated then it offers directions to GSM module. GSM module is accustomed to sending a message to the concerned individual after examination yield is negative or positive.

D. Smart Crop Protection System

P. Prasher et al. has proposed a system to detect the intrusion of animals in the farms and sound an ultrasonic buzzer on detection. The camera and the different other components that are associated with the microcomputer which is turned on 24×7 for the entire day. The camera constantly screens the fields and gives the video feed to the microcomputer. Going about as the brain of the framework, the microcomputer ceaselessly checks for the movement in the field or plantation. In the event that any sort of movement is recognized in the field, the microcomputer checks for the presence of creatures in the picture. If any creature is discovered, buzzers are turned on. The framework guarantees that the buzzers aren‟t activated by the detection of a human in the field, or by means of any random movement. The framework additionally gives ongoing pictures of the field over the web, which can be seen by utilizing an internet browser on gadgets like PC and portable, and the buzzers can be turned on physically if the need emerges. Real time monitoring is provided by this system.

E. Tensor flow Tutorial 2: image classifier using convolutional neural network

Ankit in this tutorial has trained a convolutional neural network to classify the images of cats and dogs from a dataset. In this tutorial, a neural network with six layers is built that will identify and separate pictures of cats from that of dogs. This network can be run on CPU too because it is an extremely small network. Traditional neural networks take a lot of time whenever prepared on CPU as they have a lot more parameters to take into consideration.

F. Image net classification with deep convolutional neural networks

In this paper A. Krizhevsky, I. Sutskever and G. E. Hinton have classified high resolution images into thousand different classes by training a large CNN network. They concluded that the accuracy of the network is affected by 2% on removal of even a single convolutional layer. They trained the models

using stochastic gradient descent. Models had a batch size of 128 examples, 0.0005 was the weight decay and 0.9 momentum. They found out the importance of this small amount of weight decay for the model to learn.

A lot of interesting has been shown to object detection, recognition, and classification, etc. Visual monitoring in scenes, for animal, is currently one of the most active research topics in computer vision (CV).

To bridge this gap using AL and introduce a new criterion called Transfer Sampling (TS). TS uses Optimal Transport (OT) to find corresponding regions between the source and the target data sets in the space of CNN activations. The CNN scores in the source data set are used to rank the samples according to their likelihood of being animals, and this ranking is transferred to the target data set.

Interference of wildlife into habitat without prior knowledge is known to be destructive for both human beings and animals. Forest fire is an important hazard that occurs periodically due to the natural phenomena /human activities. The aim is to bring out this system based on IOT & wireless network with cloud updation. The motion of wild animals are captured by using sensors before entering into human range and alerted using cloud periodic notification. A network based wireless sensor is used to detect forest fire to achieve high verdict accuracy for the early detection without serious outcome. Alarming system is imposed to warn and notify nearby people.

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.

OBJECTIVE OF THE PROJECT

1. proposed a deep learning method for animal detection and unknown person.
2. In this project we will be developing a system to detect the wild animals trespassing agricultural fields.
3. Animal detection and classification can help to prevent farmer land damage, trace animals and prevent loss of crop by producing sound
4. If Any Animal or stranger arrive in the field it will inform to former and forest department via SMS.

CONCLUSION

This project is used to identify animals or illengal tress passers entering into agriculture fields. This also help in providing efficient protection in a most cheap way and eventually reduce losses incurred by farmers due to loss of crop. At present it is done manually which consumes more time and also In the coming future, we review the application of the animal detection technology in the agriculture field and it can promote for detecting tress passers andanimals entering into agriculture fields with good accuracy. In the field of agriculturethere are more chance to develop or convert this project in many ways. Thus, this projecthas an efficient scope in coming future where manual predicting can be converted tocomputerized production in a cheap way.

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