

Vision Based Animal Detection and Alerting For Crop Protection

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ABSTRACT

An efficient and accurate object detection has been an important topic in the advancement of computer vision systems. With the arrival of deep learning techniques, the accuracy for object and animal detection has increased extremely. The project aims to include state-of-the-art technique for animal detection and alerting for crop protection with the goal of achieving high precision with a real-time performance. A major challenge in many of the object detection systems is the addiction of other computer vision techniques for helping the deep learning basedmethod, which results in slow and non-optimal performance. In this project, we use a completely deep learning basedmethod to solve the problem of object and animal detection in an end-to-end way. The network is qualified on the most challenging publicly available dataset (PASCAL VOC), on which a object detection challenge is conducted yearly. The resulting system is fast and accurate, thus aiding those applications which require animal detection.

Keywords-Animal Detection; Image processing; optical character recognition; Character Recognition

I. INTRODUCTION

Agriculture is the main source of economy for many countries. For the moment due to deforestation wild animals[1] are entering the agricultural land and destroy the crops. So, it's very important to protect the crops. There are many old-style methods that have been useful for crop protection[2]. Traditional methods have been commonly applied depending on the kinds of produce and risking animals. One such method electric fence is actuality used in our country to protect the crops in farm land from wild animals[3]. Electric fence is expensive for bigger farm land, so farmers cannot afford. Fire risks are more with electric fence. Due to which there will be loss of animal life and very dangerous to human being also. In order to overcome the disadvantages of electric fence, an effective method has to be developed.

Many problems in computer vision were saturating on their accuracy before a period. However, with the rise of deep learning techniques, the accuracy of these problems radically improved. One of the major problem was that of image classification, which is defined as guessing the class of the image. A slightly complicated problem is that of image localization, where the image contains a single object and the system should guess the class of the

location of the object in the image (a bounding box around the object). The more complicated problem of object detection includes both classification and localization[4]. In this case, the input to the system will be a image, and the output will be a bounding box corresponding to all the objects in the image, along with the class of object in each box and alerting to farmers.

In this paper, we design a Vision based animal detection system to protect the crops which solves the various disadvantages of old method. Visual data, if can be captured, is a rich source of information. The system contains the data set of various animals, humans, and other objects and if it is not available it downloads from the internet. Camera is placed in the field which captures the video which is then converted to frames and other image processing like noise removal, resizing and other things are done. In the captured image the object is identified and bounded within a bounded box and it is compared with the data set and the object name will be displayed along with the score and alerting message will be sent to the farmer then buzzer will be activated to scare the animals.

II. RELATED WORK

Year	Author	Proposed work
2016	Andy Rosales Elias Nevena Golubovic Chandra Krintz Rich Wolski	In this paper they explore the design and implementation of Where's The Bear? Automating Wildlife Image Processing using IoT. The images of wild life are captured by the cameras, then it is filtered and classified by the edge cloud using a deep learning system.
2018	Vivek Kishor Bhanse Dr.M.D.Jaybhaye	In this paper they show the analysis how the camera assurance impact the control each second and adequately. In Image processing they using OpenCV for face detection, tracking of face and recognition for automotive application is done.
2017	JMr.MadhavChamle Prof K.G.Gunale Prof(Dr).K.K Warhade	In this proposed system they using video based technology to detect and recognizing falls of elder people in the home. The main inspiration of this work is to provide such a system which automatically detects the fall and intimate the respective persons. They give 79.31% accuracy for fall detection.

Table 1

III. PROPOSED WORK

Working of computer vision:

The setup for the computer vision includes a Computer and a camera as shown in fig.1. OpenCV and TensorFlow is an open source python library of functions mainly aimed at real time computer vision and object

detection. OpenCV is installed on to the computer. The speed of processing is totally dependent on the RAM of the computer.

Useful information in a visible format is conveyed by using an image. An arrangement of tiny elements in a two-dimensional plane is known as an image. Pixels are the tiny elements which are present in an image. An image is formed when a large number of pixels combine together. Certain information about the image, like colour, light intensity and luminance is represented by each pixel. An image is formed when a large number of such pixels are combined together. The basic element used to describe an image is pixel[5].

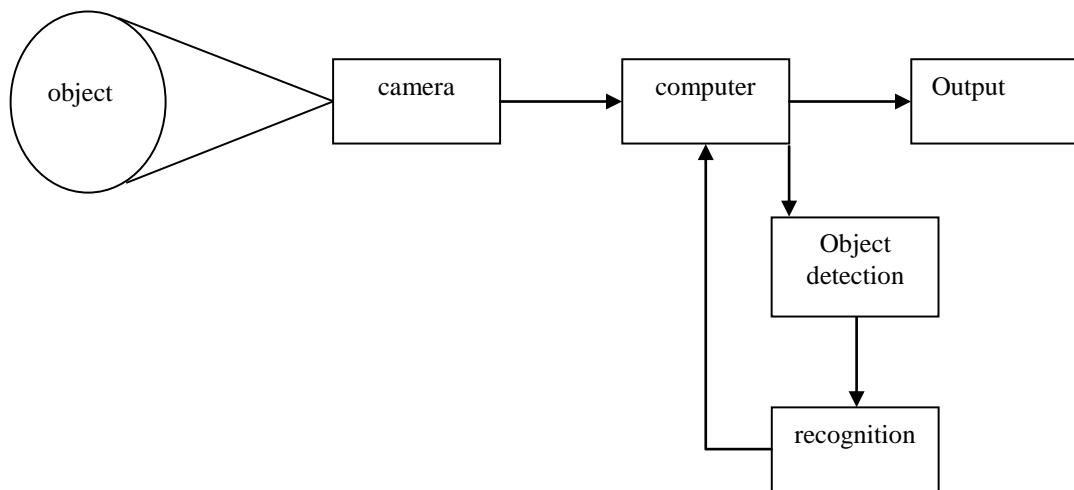


Fig 1. Overview of operation

PYTHON

Here we describe the implementation of Vision Based Animal Detection algorithm using Python. A high-level, interpreted, general purpose programming language is python. Guido van Rossum created Python and was first released in 1991. A dynamic type system and automatic memory management is featured by Python. Multiple programming paradigms, including imperative, object-oriented, functional and procedural is supported by python and it also has a comprehensive standard library. Python's large standard library, commonly cited as one of its greatest strengths, provides tools suited to many tasks.

OpenCV

OpenCV [7][9](Open source computer vision) is the leading open source library for computer vision, machine learning and image processing and now features GPU acceleration for real-time operation.

TensorFlow

TensorFlow is the newest open source library for numerical computation written in Python. Work flux, made by data flow graphs is the peculiarity of TensorFlow[6]. Mathematical operations are represented by nodes, the multidimensional data arrays communicated between them are represented by edges.

Bounding Box:

The bounding box is a rectangle drawn on the image which tightly fits the object in the image. A bounding box

exists for every instance of every object in the image.

Classification + Regression:

The bounding box is predicted using regression and the class within the bounding box is predicted using classification.

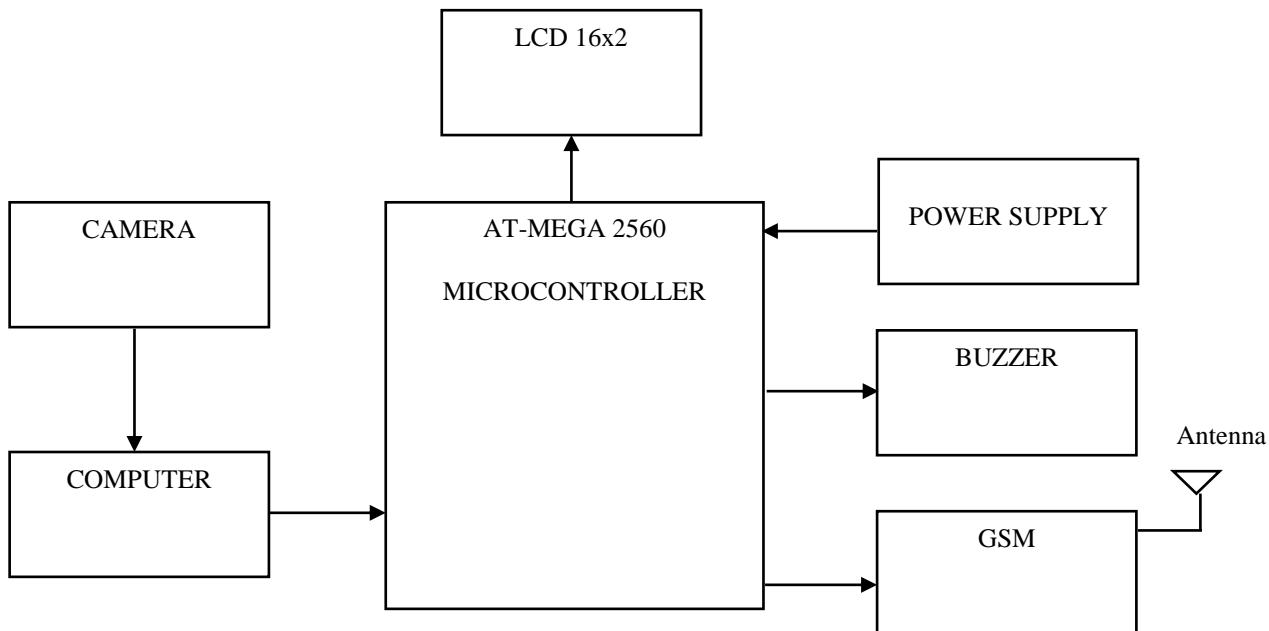


Fig 2. Block diagram

As shown in the figure below, camera captures the video and it is then converted to frames and image processing [2] is done in the computer using particular software. The object in the video is located and bounded using the bounding box, then it is compared with the available data or the downloaded data and the result score is displayed with the name of the object. If any harmful animal or intruder is detected, messages are sent using the GSM and buzzer is also used for alerting.

Flowchart:

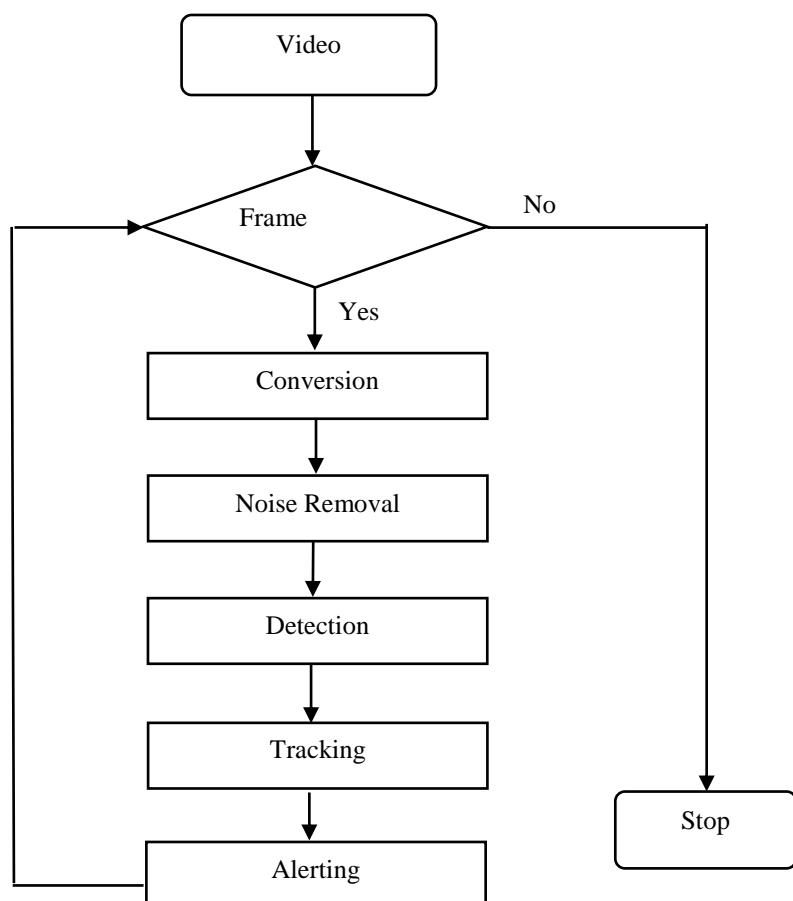


Fig 3. Flowchart

IV. RESULT AND DISCUSSION

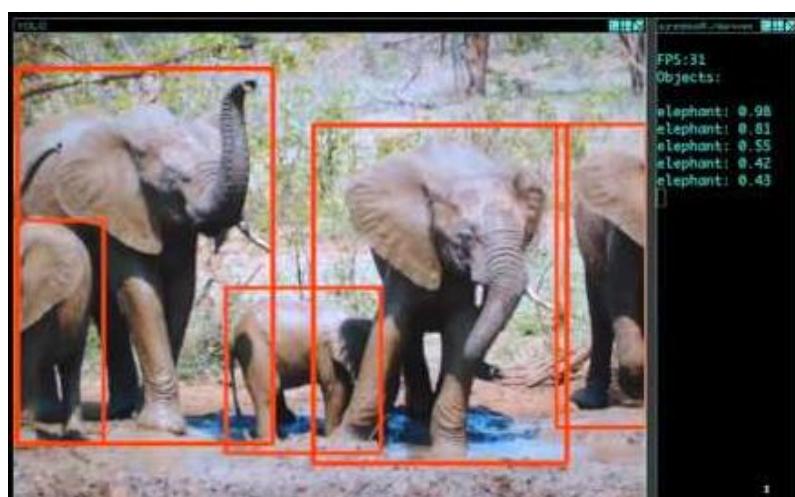


Fig 4. Animal Detection

V. CONCLUSION

An accurate and efficient animal detection system for crop protection has been developed to achieve comparable metrics with the existing state-of-the-art system. This project uses recent techniques in the field of computer vision and deep learning. Custom dataset was created using labelling and the evaluation was consistent. This can be used in real-time applications which require animal detection for pre-processing. An important scope is to train the system on a video sequence for usage in tracking applications. Smooth detection and more optimal than per-frame detection is enabled by addition of a temporally consistent network.

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