



# A Novel DL Approach for Animal Detection in Farms

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**Abstract--** India's economy is primarily centered on agriculture. Agricultural farm security is critical in order to safeguard agricultural products. A person or any animal who aims to rob or destroy the property, might damage valuable investments, either purposefully or unintentionally. As a result of the introduction of contemporary technology into agriculture, it is now possible to consider constructing security systems for farmlands. Animal encroachment in farms results in significant agricultural revenue losses that a farmer cannot afford. Computer Vision is being used more and more in agriculture to increase production by automating chores. We propose an AI-based system that uses cameras to monitor the field for any animal trespass and warns the farmer or can even take specific measures on its own.

**Keywords—** Computer Vision, Animal detection, Deep Learning, Artificial Intelligence.

## I. INTRODUCTION

Our country's backbone is agriculture. A major section of the Indian population relies on agriculture for food, raw resources, and employment. It is critical to the country's economic development. [1]

Crop productivity is in high demand in agriculture. Agriculture has been linked to the development of farming technology for decades. Emerging technologies such as Vision Based Systems can make significant contributions to making agriculture smart in this aspect.

Many industries, including medicine, robotics, remote sensing, machine vision, and content-based

image retrieval, use computer vision. Computer vision is used to solve a wide range of problems in a variety of fields. In the security field, computer vision is used to do automatic surveillance, access control, and attendance monitoring. In agriculture, computer vision techniques can be used to provide security against wild animals. Wild animals, which attack farms on a regular basis, pose a serious threat to agriculture crops in wooded areas. Farmers suffer considerable financial losses as a result of these attacks, which cause massive damage to agricultural crops.

Farmers have taken certain measures, such as erecting electric fences around their crops and putting large flood lights. Some people even hire security guards. Installing an electrical fence is significantly more expensive for large farms to equip, and it kills a lot of animals, which is even banned in some locations and has an impact on biodiversity. Other existing procedures are ineffective for a variety of reasons, one of which being expense.

We provided an innovative and cost-effective method for animal security in agriculture in this project. It is a proactive solution that notifies farmers when animals approach their crops. When any animals are spotted, it also plays a specific siren that is focused at the animal in an attempt to scare it away. Here, we're putting in place a system that recognizes animals when they're taken on camera.

## II. RELATED WORKS

An IoT-based animal infiltration detection system is suggested. The PIR (passive infrared sensor) detects movement and triggers the camera to take an image



of the animal. Once the animal is recognised by the sensor, the signal is transmitted to the camera through the Arduino Uno microcontroller. The image is categorised using the sample photos stored in the database. If the wild animal is identified as an elephant, a bright light is emitted to distract it; if the wild animal is identified as a leopard, a loud noise is made to distract it. As a result, using the GSM module, alarm SMS is issued to forest officials and landowners.[2]

A suggested IoT-based early warning system for hazardous animals. Initially, the database of hazardous animals was saved in a computer system or cloud that was already connected to an IoT model with various sensors. Images are recorded with a web camera only if there is any movement of an animal in the school area; the computer system compares the moving image to the database image and initiates the programming process with the Arduino Uno. After the animal is spotted, it sounds the alarm and sends an SMS to the user's phone.[3]

A suggested low-cost alarm system that uses IoT devices to monitor animals. The PIR sensor tower is made up of a Raspberry Pi module attached to a USB camera that captures photos when motion is detected and sends them to a web server through the internet. On the Raspberry Pi, Open CV is installed for image processing. To lower the cost of electric lines, as well as in this study Each sensor tower has solar power installed. The solar panel charges the battery from the sun and supplies electricity to the sensor tower. This reduces power usage and allows battery power to be stored even at night. [4]

### III. METHODOLOGY

In this project, we implement a neural network based system for animal detection. Convolutional Neural Networks (CNN) were used in the form of a pretrained model. The model used for this project is MobileNetSSD. Although the model is not as accurate as many of the top end models including RCNN, MobileNet is still suitable as it uses way less computing power which increases efficiency, decreases costs and even the accuracy is close to the top end models if not the same.

CNN:

A convolutional neural network (CNN) is a type of

deep neural network used to evaluate visuals in deep learning. . It employs a technique known as Convolution. Convolution is a mathematical operation on two functions that yields a third function that explains how the shape of one is changed by the other. The specific form of CNN that we will use here will be in the form of a pretrained network known as MobileNetSSD.

MobileNet SSD:

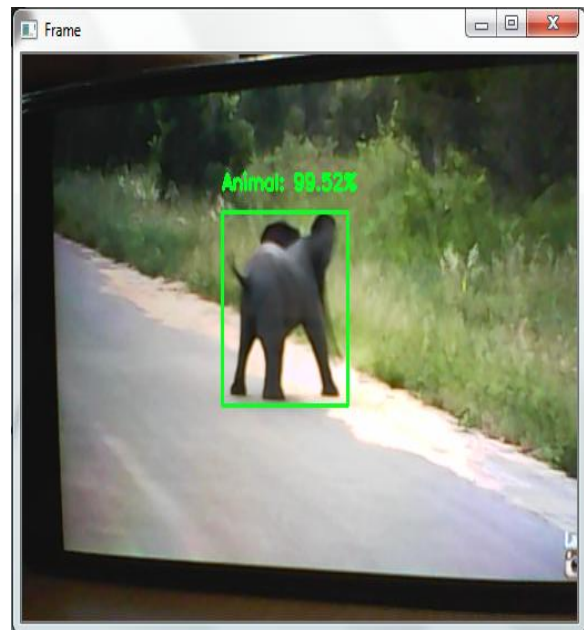
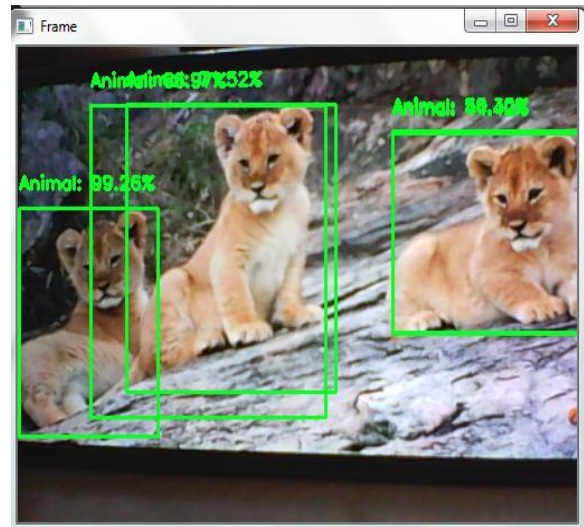
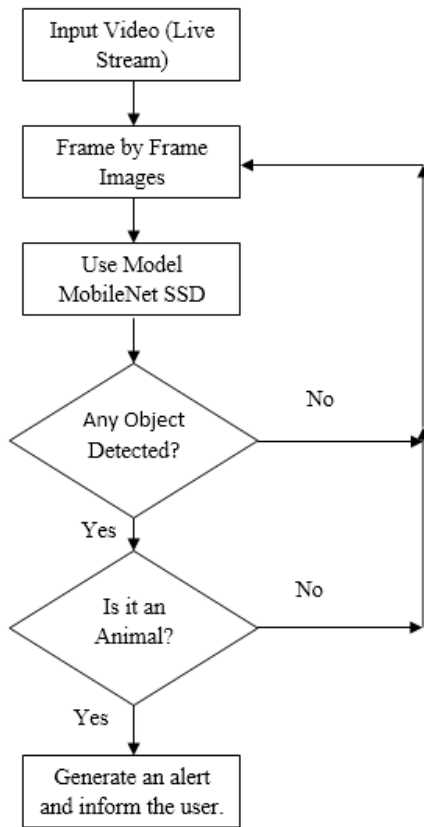
MobileNet is a mobile and embedded vision object detector that was released in 2017 as an efficient CNN architecture. To develop lightweight deep neural networks, this architecture employs proven depth-wise separable convolutions. MobileNet is a mobile optimized and embedded vision-focused deep neural network architecture. Many real-world applications, such as object detection, necessitate the completion of recognition tasks in a timely manner on a computationally restricted device. MobileNet was created in 2017 to meet this needs. [5]

Computer Vision:

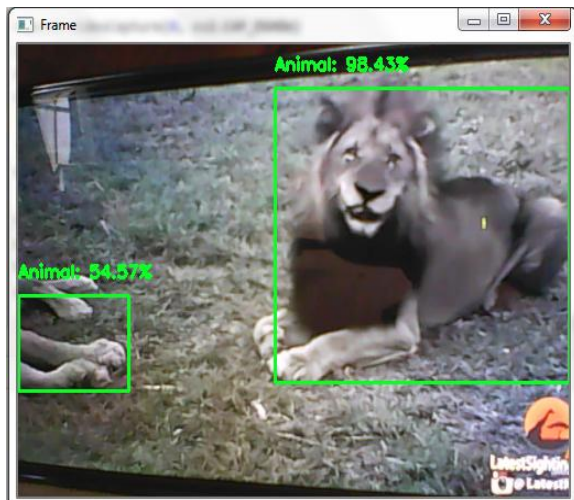
Computer vision is a branch of artificial intelligence (AI) that allows computers and systems to extract useful information from digital photos, videos, and other visual inputs, as well as to conduct actions or make recommendations based on that data. If artificial intelligence allows computers to think, computer vision allows them to see, watch, and comprehend.

Human vision is similar to computer vision, with the exception that people have a head start. Human vision benefits from lifetimes of context to teach it how to distinguish objects apart, how far away they are, whether they are moving, and whether something is incorrect with an image. OpenCV short for Open Source Computer Vision consists of various tools and technologies required for computer vision applications. [6]

Block Diagram:



#### IV. RESULTS AND DISCUSSION



#### V. CONCLUSION

The problem of damaging crops by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. The proposed method allows us to detect any animal presence or intrusion in farms using video from any camera device placed in the farms. The object detection model worked almost consistently at 18 frames per second which might differ, depending on the hardware.

It is a cheap and robust system. The siren scares the intruders away as well as it can alert the farmer to take action. Thus, this application can be used to



protect crops in the farm. It might be very useful for agricultural purposes instead of traditional methods used today.

## VI. REFERENCES

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