

# CNN Based Wildlife Intrusion Detection and Alert System

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**Abstract:** Wildlife intrusion detection and alert systems are designed to detect and alert wildlife intrusion events, such as animals crossing highways, entering farms or protected areas, and approaching human settlements. This system often uses advanced technologies, such as cameras, sensors and machine learning algorithms, to detect and identify animal species and behaviors. Convolutional neural networks (CNNs) are a type of deep learning algorithm commonly used for image and video analysis tasks, including object detection and classification. CNNs can learn to extract features from images and videos automatically and accurately, making them well-suited for detecting animals in wildlife intrusion detection systems.

**Keywords:** CNN, Deep learning, Image -processing, Live capturing.

## 1. Introduction

The intrusion of wildlife into human habitats can pose a significant threat to both animals and people. To mitigate this problem, an efficient detection and alert system is necessary. In this regard, Convolutional Neural Networks (CNNs) and You Only Look Once (YOLO) object detection algorithms can be used to develop an automated system that can detect and alert wildlife intrusion in real time [1].

### Article History

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This system typically uses cameras to monitor a specific area and then employs deep learning algorithms to analyze the images or data collected from these sensors. The CNN-based approach to this system involves the use of convolutional neural networks (CNNs), which are a class of deep-learning neural networks that are highly effective at image recognition and analysis. By training these networks on large datasets of images, the system can learn to identify specific types of wildlife, such as elephants or tigers, and distinguish them from other objects or backgrounds [2]. One of the key advantages of a CNN-based wildlife intrusion detection and alert system is its ability to operate in real-time, continuously analyzing incoming data and generating alerts when necessary [3]. This can help to mitigate potential conflicts between humans and wildlife, by enabling early detection of intrusions and allowing relevant authorities to take appropriate action.

## 2. Proposed system

The images captured are fed as input to the system and pass through the different layers of the convolution neural network. The animals will be detected by the webcam through live capturing if any animal is detected then it will identify the animal and gives an alert if it crosses or is near the borderline [4-5]. Each layer filters a possible outcome when it is compared with the images provided in the dataset finally the animal is identified.

### 3. Methodology

The CNN - based wildlife intrusion system comprises the following steps:

#### Step 1: Data collection

The first step in developing a CNN -based wildlife intrusion system is to collect a large amount of data. This data should include images of the local wildlife in different lighting conditions, angles, and backgrounds. The images should be labeled to indicate whether or not they contain wildlife. This labeled dataset will be used to train the CNN model.

#### Step 2: Data Preprocessing

The next step is to preprocess the data to improve its quality and consistency. This includes cropping the images to remove any unwanted background, resizing the images to a standard size, and converting the images to grayscale or RGB format. The data should also be split into training, validation, and testing sets.

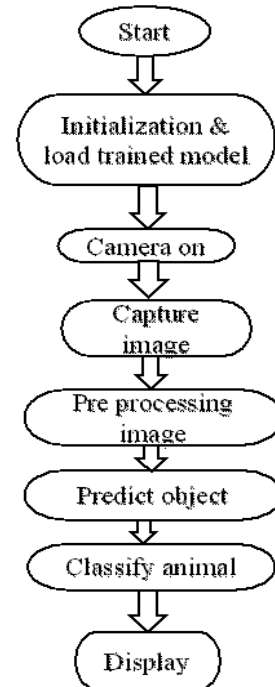


Fig.1: Flow chart of the proposed method

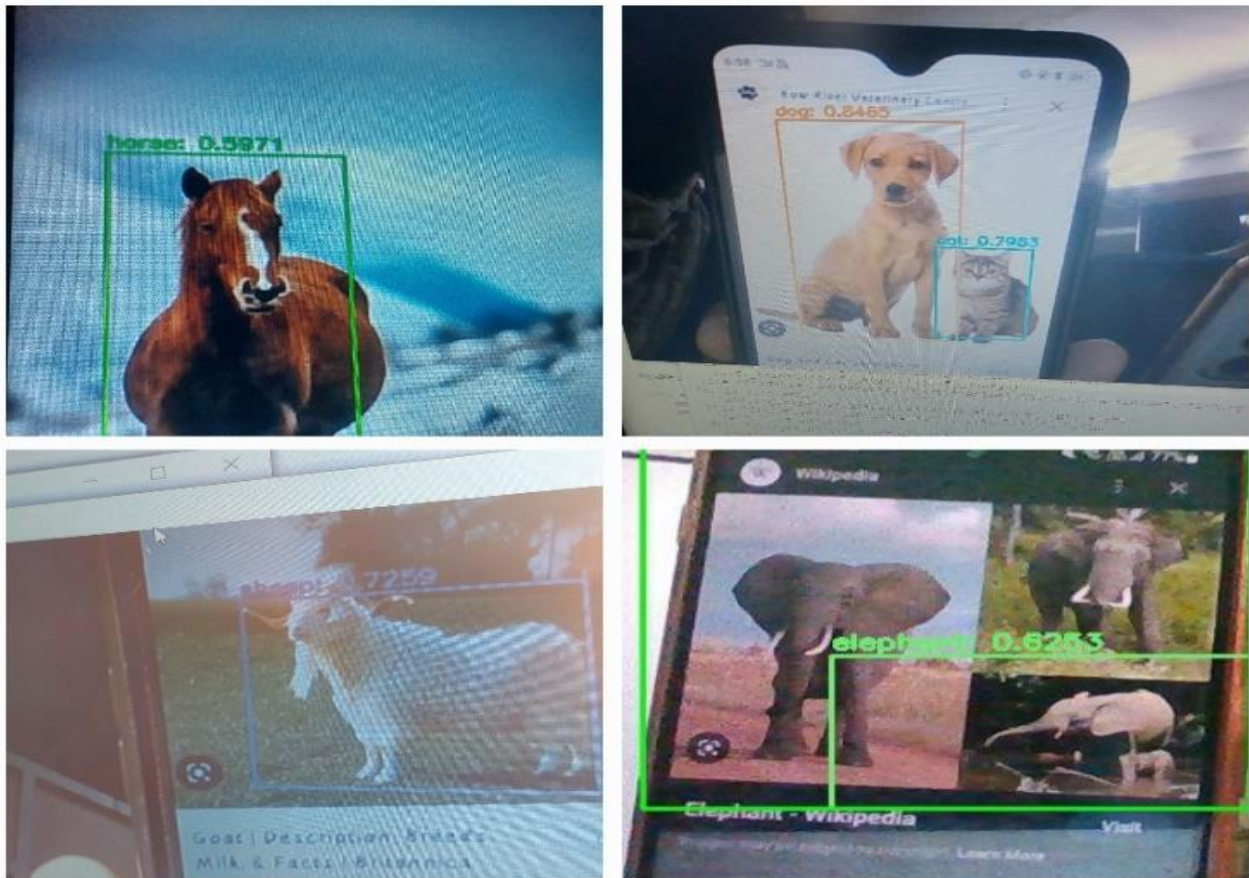


Fig.2: Domestic animal detection

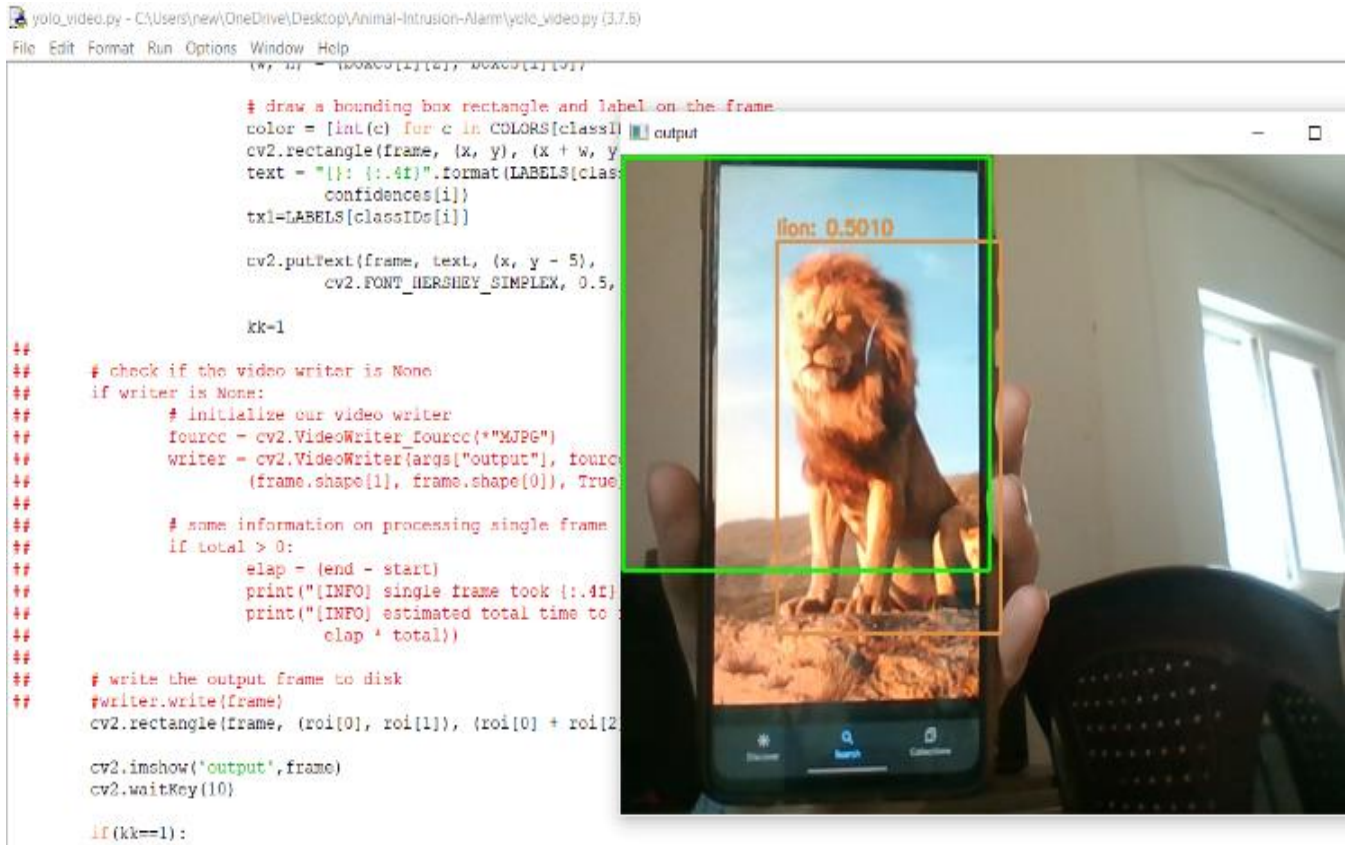


Fig.3: Lion

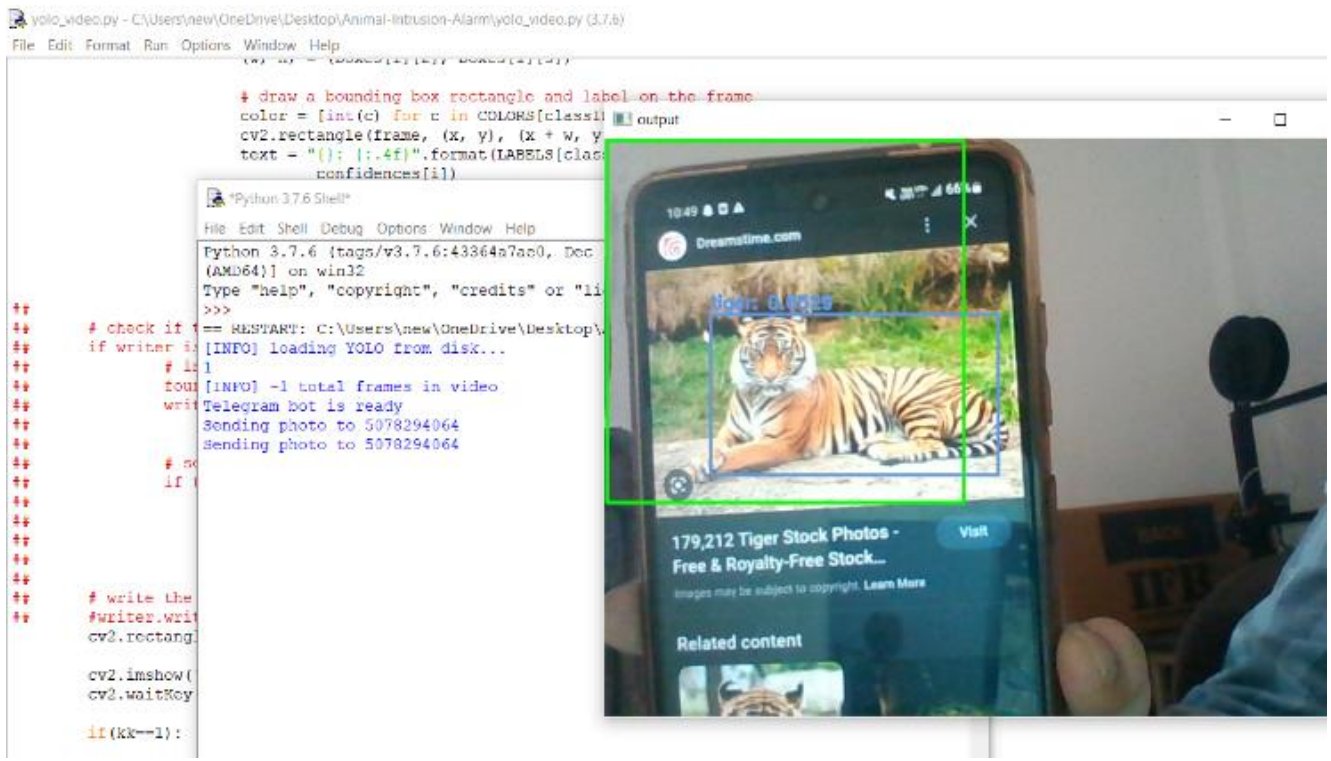


Fig.4: Tiger

### Step 3: CNN Model Training

The third step is to train the CNN model using the preprocessed dataset [6]. The model architecture should include convolutional layers, pooling layers, and fully connected layers. The number of layers and neurons in each layer can be varied depending on the size and complexity of the dataset.

### Step 4: Model Evaluation

Once the model is trained, it should be evaluated using the testing set. If the model's performance is not satisfactory, it can be fine-tuned by adjusting the model architecture or hyperparameters [7].

### Step 5: Deployment

Once the model is trained and evaluated, it can be deployed to detect wildlife intrusion. When the system detects wildlife, it can alert the concerned authorities, who can take appropriate action.

## 4. Results and Discussion

CNN-based wildlife intrusion detection and alert systems have shown promising results and have the potential to be an effective tools for wildlife conservation and protection. It can be an effective tool to detect wildlife intrusion in rural and natural environments. By following the steps mentioned above, a reliable and accurate model can be developed which can help mitigate the problem of wildlife intrusion.

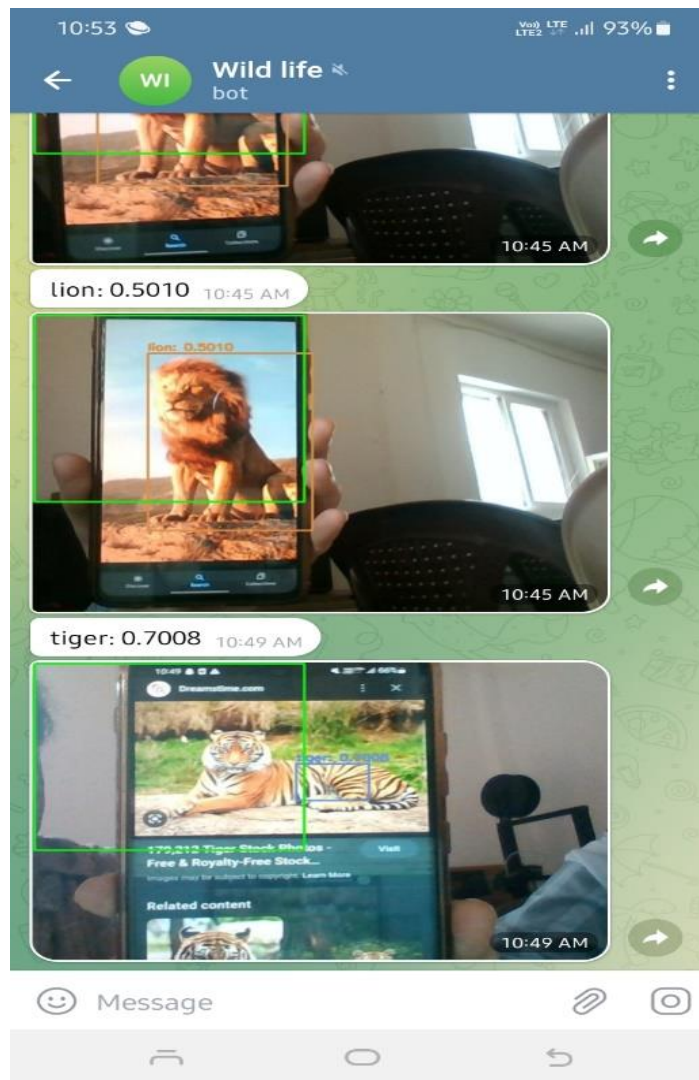


Fig.5: Alert message to telegram app

#### 4.1 Wild animal detection

Animals are detected through live capturing, either an image or video is displayed in front of a webcam it detects the wild animal's name with accuracy and checks whether the wild animal is within the border, if the wild animal reaches out then an alert message is sent to the telegram app.

#### 4.2 Notification

A Telegram Bot API is created in, order to send a notification to the users to make them alert about wild animals if they cross the border. The outputs are randomly taken and sent with the labels of the animal along with the confidence score.

### 5. Conclusion

A CNN-based wildlife intrusion detection and alert system can be an effective solution for monitoring and protecting wildlife habitats. By analyzing real-time footage using deep learning techniques, the system can accurately detect and classify potential threats, such as human intrusions or predator animals. With timely alerts, conservationists can take appropriate action to mitigate the risks and ensure the safety of wildlife. However, the success of such a system depends on several factors, including the quality of the data, the accuracy of the model, and the effectiveness of the alert mechanism. Additionally, ethical considerations must be taken into account, such as the potential impact on privacy and human rights.

#### Conflict of Interest

The authors declare no conflict of interest

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