IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 13, Issue 4, April 2024

DOI: 10.17148/IJARCCE.2024.13457

Wild Animal Intrusion Detection

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Abstract: Animal Vehicle Collision, commonly called as roadkill, is an emerging threat to humans and wild animals with increasing fatalities every year. Amid Vehicular crashes, animal actions (i.e. deer) are unpredictable and erratic on roadways. This paper unveils a newer dimension for wild animals' auto- detection during active nocturnal hours using thermal image processing over camera car mount in the vehicle. To implement effective hot spot and moving object detection, obtained radiometric images are transformed and processed by an intelligent system. As human populations expand and encroach upon natural habitats, conflicts between humans and wildlife become increasingly common. To mitigate the risks associated with wild animal intrusions into human settlements, an intelligent and proactive intrusion detection system is essential. This study proposes a novel approach to wild animal intrusion detection using deep learning techniques. The proposed system leverages Convolutional Neural Networks (CNNs) to analyze images captured by surveillance cameras placed in strategic locations. The deep learning model is trained on a diverse dataset of wildlife images to enable accurate identification and classification of different species.

Keywords: Wild Animal Intrusion Detection System, Smart Protecting, Animal Detection , Precision Farms from Animals , Protection of Animals.

I. INTRODUCTION

Instances of wild animals intruding into human settlements pose significant risks to both human safety and the well-being of the animals involved. Traditional methods of addressing such issues often fall short in providing timely and accurate detection of these intrusions. In this context, the integration of advanced technologies, specifically deep learning, presents a promising solution for the development of an efficient Wild Animal Intrusion Detection System..The primary objective of this research is to harness the capabilities of deep learning, specifically Convolutional Neural Networks (CNNs), to create an intelligent and proactive system capable of identifying and classifying wild animals in surveillance imagery. By leveraging the power of deep learning, the system aims to overcome the limitations of traditional methods, offering a more accurate and adaptive approach to wildlife intrusion detection.

II. REVIEW OF LITERATURE SURVEY

1.Paper Name:- Distributed Relay Pairing for Bandwidth Exchange Based Cooperative Forwarding.
Author Name:- Sang Hyun Lee.
Abstract:- This letter develops a distributed algorithm for relay pairing in bandwidth exchange (BE) based cooperative forwarding scenarios, where each node can delegate a fraction of its allocated resources to a neighboring node as an incentive for relaying. Determining the relay pairs that maximize the overall network utility yields a non-bipartite matching problem, which incurs a considerable computational load when implemented in a centralized way. To resolve this challenge, we use a message-passing framework to develop an efficient distributed solution. Simulation results verify that the proposed algorithm outperforms existing approaches

2.Paper Name:- Internet of Things based Wild Animal Infringement Identification, Diversion and Alert System.
Author Name:- Muneera Begum H, Janeera.D.A.
Abstract:- In places with high population and human mobility, intrusion of wildlife is lethal for humans as well as the animals. Due to the diverse nature of movement and physical sizes of wild animals, it is a challenging talk to track these animals or perform surveillance. As a solution to this issue, this paper proposes a system that can help in identification of intrusion of wild animals at agricultural farms by means of Internet of things and a Wi-Fi based wireless microcontroller unit. Prototyping is performed using Energia IDE for transmission of information to the forest officer from the transmitter node. Pillars consisting of an electronic unit with buzzer, vibration sensor, laser detector, laser diode, RF transceiver and ultra low power microcontrollers are placed at the corners of the field. On infringement, an alert message is transmitted by the Wi-Fi module.

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3.Paper Name:- Intelligent System for Detection of Wild Animals Using HOG and CNN in Automobile Applications**.**

Author Name:- Yuvaraj Munian

Abstract:- Animal Vehicle Collision, commonly called as roadkill, is an emerging threat to humans and wild animals with increasing fatalities every year. Amid Vehicular crashes, animal actions (i.e. deer) are unpredictable and erratic on roadways. This paper unveils a newer dimension for wild animals' auto-detection during active nocturnal hours using thermal image processing over camera car mount in the vehicle. To implement effective hot spot and moving object detection, obtained radiometric images are transformed and processed by an intelligent system. This intelligent system extracts the features of the image and subsequently detects the existence of an object of interest (i.e. deer). The main technique to extract the features of wild animals is the Histogram of Oriented Gradient (HOG) transform. The features are detected by normalizing the radiometric image and then processed by finding the magnitude and gradient of a pixel.

4.Paper Name:- Animal Web: A Large-Scale Hierarchical Dataset of Annotated Animal Faces

Author Name:- Muhammad Haris Khan1, John McDonagh2, Salman Khan1

Abstract:- Several studies show that animal needs are often expressed through their faces. Though remarkable progress has been made towards the automatic understanding of human faces, this has not been the case with animal faces. There exists significant room for algorithmic advances that could realize automatic systems for interpreting animal Besides scientific value, resulting technology will foster better and cheaper animal care. We believe the underlying research progress is mainly obstructed by the lack of an adequately annotated dataset of animal faces, covering a wide spectrum of animal species.

5.Paper Name:- Estimating the Population of Large Animals in the Wild Using Satellite Imagery: A Case Study of Hippos in Zambia's Luangwa River..

Author Name:- John M. Irvine1 , Joshua Nolan1 , Nathaniel Hofmann1 , Dale Lewis2

Abstract:- Degradation of natural ecosystems as influenced by increasing human activity and climate change is threatening many animal populations in the wild. Zambia's hippo population in Luangwa Valley is one example where declining forest cover from increased farming pressures has the potential of limiting hippo range and numbers by reducing water flow in this population's critical habitat, the Luangwa River. COMACO applies economic incentives through a farmerbased business model to mitigate threats of watershed loss and has identified hippos as a key indicator species for assessing its work and the health of Luangwa's watershed. The goal of this effort is to develop automated machine learning tools that can process fine resolution commercial satellite imagery to estimate the hippo population and associated characteristics of the habitat.

III. PROPOSED SYSTEM

Multiple Detection Scales: YOLOv3 divides the input image into a grid and performs object detection at three different scales. This allows it to detect objects of various sizes effectively. Darknet-53 Architecture: YOLOv3 uses a neural network architecture called Darknet-53 as its backbone.

This architecture is a deep convolutional neural network that helps in feature extraction. Anchor Boxes: YOLOv3 utilizes anchor boxes to improve localization accuracy. Anchor boxes are predefined bounding boxes of different sizes and aspect ratios, which helps the model predict the dimensions and positions of objects more accurately.

Feature Pyramids: YOLOv3 incorporates feature pyramids to handle objects at different scales. This helps in detecting small and large objects within the same image.

Improved Training: YOLOv3 benefits from improved training techniques, which makes it more accurate and reliable in object detection tasks

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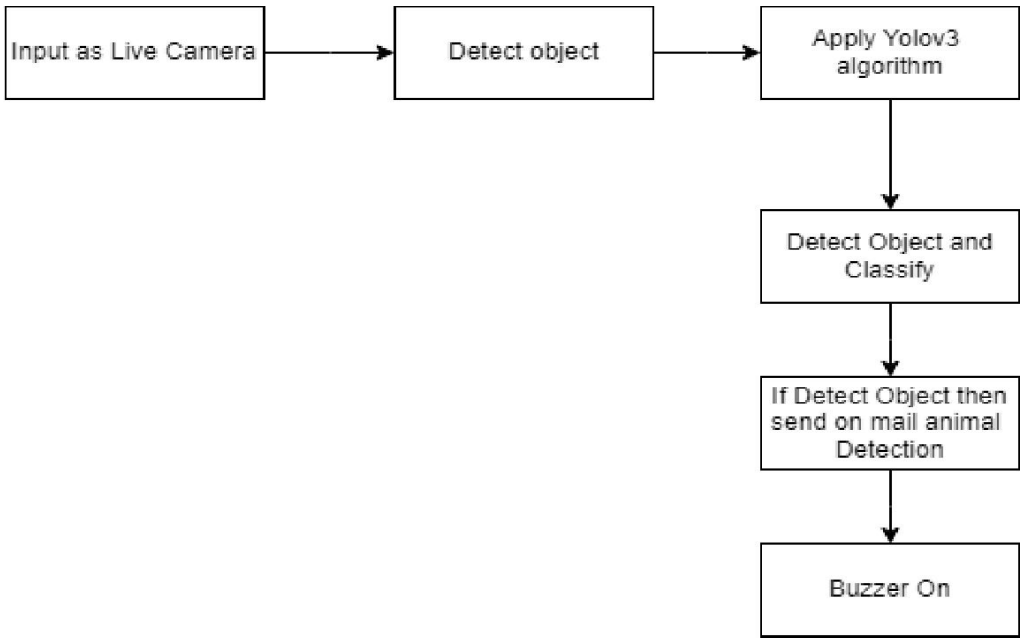

Fig. Wild Animal Intrusion Detection

IV. METHODOLOGY

OpenCV (Open Source Computer Vision Library) offers various methodologies for implementing face recognition-based attendance software. Here's a basic outline of the process:

1. *Face Detection*: Utilize pre-trained models such as more modern deep learning-based models like You Only Look Once (YOLO) to detect faces in images or video streams.
2. *Face Recognition*: Once faces are detected, use algorithms like Convolutional Neural Networks (CNNs) to recognize and identify faces.
3. *Data Collection*: Gather a dataset of images containing faces of individuals all type of animals.
4. *Data Preprocessing*: Preprocess the images to improve the quality of facial features. Common preprocessing techniques include resizing, normalization, and histogram equalization.

V. DATASET

Image dataset is used to this model. We use 8 classes, they are elephant, dog, sheep, zebra, bear, cat, giraffe and hors. These animals are some of the main intruders of the agriculture area and they are also threat to human life.

Fig. Sample dataset collection of 8 classes.

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VI. RESULTS

Fig. Output Prediction

VII. CONCLUSION

We introduce a large-scale, hierarchical dataset, named AnimalWeb, of annotated animal faces. It features faces from diverse animal species while exploring different orders. Each face is consistently annotated with landmarks around key facial features. Benchmarking AnimalWeb under two novel settings for face alignment, employing current method, reveals its challenging nature.

We observe that methods for human face alignment relatively underperform for animal faces. This highlights the need for specialized and robust algorithms to analyze animal faces. We also show the applications of the dataset for face detection and fine-grained recognition. Our results show that it is a promising experimental base for algorithmic advances.

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