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An Advanced Deep Learning Approach to Wild Animal Detection using Inception-V3

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ABSTRACT

An improved wild animal detection and alarm system based on the You Only Look Once (YOLO) V5 concept. The system uses the you only look once version 5 (YOLO V5) object identification algorithm to identify wild animals and notify users of their presence in real time. The device uses a camera to collect real-time footage, which is then uploaded to a computer running the You Only Look Once (YOLO) V5 algorithm. When the system finds a wild animal, it alerts the animal by producing noises such as guns shooting. The device is predicted to have a substantial influence on human safety in places with large animal populations. This enhanced wild animal detection and alarm system, which uses the you only look once (YOLO V5) paradigm, has the potential to increase people's safety in places with significant wildlife populations. Future work will focus on enhancing the system's accuracy and implementation in real-world circumstances.

1. INTRODUCTION

Enhanced Wild Animal Detection and Alert System the You Only Look Once Version 5 (YOLO V5) Model is a suggested method for analysing photographs and detecting the presence of wild animals. If the system identifies the presence of a wild animal, it alerts the authorities via an alarm or SMS. The suggested method is believed to provide an effective solution for preventing possible damage from wild animals while also helping to preserve nature by minimizing human-animal conflict. The sophisticated Wild Animal Detection and notify System is an application of the you only look once version5 (YOLO v5) system that seeks to identify and notify the presence of wild animals in a given region utilizing sophisticated computer vision capabilities. This technology is intended to provide an effective and efficient method for detecting the presence of wild animals and alerting authorities to take the appropriate safeguards. The system uses the you only look once version 5 (YOLO V5) model, which is one of the most extensively used and popular deep learning models for object recognition, to recognize wild animals.

The suggested system includes enhanced sensors and cameras installed on drones or other surveillance equipment that record data in real time. Images are captured and sent to a central processing unit for detection and analysis. The YOLO V5 model is then used to an object identification algorithm that detects wild animals and notifies humans of their presence in real time. This system detects wild animals by employing a camera to record live video feed from the surrounding area and processing it using the you only look once version5 (YOLO v5) algorithm. Once an animal is detected, an alarm is issued to the user interface, and a notice is sent to the user's mobile device, warning them of the animal's presence. This system is particularly valuable for persons who live in places with high concentrations of wild animals, such as national parks, wildlife reserves, or rural areas, because it can give an early warning system to avoid deadly interactions with wild animals.

2. LITERATURE SURVEY

[1] This paper presents an animal identification and warning system based on the Faster regions and convolutional neural networks (RCNN) model. The device is designed to identify animals on the road and inform drivers in order to avert accidents. The authors initially collected and labelled a dataset of numerous animal types typically seen on Indian highways. The Faster regions were then trained with a convolutional neural network (R-CNN) model via the TensorFlow object detection API. The model was fine-tuned using the acquired dataset and a camera module connected to a Raspberry.

[2] This paper presents a wildlife detection system based on the Mask regions and convolutional neural networks (R-CNN) model. The device is designed to automatically detect wildlife in the wild for conservation reasons. The authors compiled and categorized a dataset of diverse animal species usually seen in China. The Mask areas were then trained with convolutional neural networks (R-CNN) using the PyTorch deep learning model.

[3] This work presents a wildlife identification and monitoring system based on Efficient Model and Transfer Learning methodologies. The authors compiled and categorized a dataset of diverse animal species usually seen in China. They then utilized transfer learning to fine-tune the Efficient model using the obtained dataset. The scientists also presented a data augmentation approach that automatically creates new training data by randomly adjusting the brightness, contrast, and saturation of the pictures.

[4] The authors compiled and labelled a dataset of diverse animal species usually observed in Korea. They subsequently trained the Single Shot Detector (SSD) model with TensorFlow, a deep learning framework. The authors presented a dynamic RoI selection strategy to minimize false positives by focusing on key parts of the input picture. To evaluate the suggested system, the scientists employed a camera trap system, which continually records pictures and delivers them to the trained model for inference. The system successfully detected wildlife in real-time, producing bounding boxes for the discovered creatures.

3. SYSTEM ANALYSIS

A. EXISTING SYSTEM

The current system lacks an adequate mechanism for real-time detection and notification of wild animals. It is based on traditional surveillance methods, which are sometimes labour-intensive and subject to human mistake. Manually monitoring animal presence takes time and may cause delays in responding to possible concerns. Inefficient data processing and low accuracy levels impede the system's capacity to quickly detect and inform users to the presence of wild animals. As a result, it poses a substantial safety risk to people in places with a large animal population. The current system requires an urgent overhaul to improve its capabilities and safeguard the safety of residents in these locations.

DISADVANTAGES OF THE EXISTING SYSTEM

The limitations of the existing wild animal detection system are as follows:

1. Manual Monitoring: The system relies heavily on manual monitoring and visual observation, making it labour-intensive and prone to human error.

2. Limited Coverage: It has a restricted surveillance area, and it is challenging to cover large or remote regions effectively.

3. Lack of Real-time Alert: The system lacks the ability to provide real-time alerts to users when wild animals are detected, leading to delayed responses.

4. Low Accuracy: The system's accuracy is frequently degraded, leading in false alarms or missed detections,

which are both troublesome and inconvenient. Dependence on Human Operators: Human operators must continually monitor the system, which may be tiresome and inefficient for lengthy durations.

5. Cost-Intensive: Maintaining the existing system can be costly due to the need for constant human surveillance and manual data processing.

6. Limited Adaptability: The system may not easily adapt to varying environmental conditions or different wildlife species.

7. Inadequate Data Analysis: Data collected by the system may not be efficiently processed or analyzed, making it challenging to derive meaningful insights.

8. Lack of Remote Access: The system typically does not offer remote access for monitoring, limiting its utility and flexibility.

9. Safety Concerns: Due to the limitations mentioned above, the existing system poses safety concerns for people in areas with a high wildlife population, as it may not provide timely warnings of potential threats.

B. PROPOSED SYSTEM

The proposed system for the Advanced Wild Animal Detection and Alert System employing the You Only Look Once (YOLO V5) concept will consist of the following components:

Data Collection: A varied dataset of wild animals will be collected, encompassing a variety of species and habitats. This dataset will be used to train the YOLO (You Only Look Once) version 5 model.

Model Training: Using the obtained dataset, modern deep learning approaches will be applied to train the You Only Look Once (YOLO V5) model. The algorithm will be updated to improve its capacity to accurately detect wild species.

Object Detection: The You Only Look Once (YOLO V5) model will be used to recognize wild animals in real time utilizing video feeds from cameras positioned in wildlife habitats. When an animal is recognized, the model generates bounding box coordinates around it and the related class names.

Tracking: A tracking algorithm will be used to monitor the movements of any observed wild animals. The program will use the results from the You Only Look Once (YOLO V5) model to monitor the animals and update their positions in real-time.

Alert System: An alarm system will be created to deliver real-time warnings of potential hazard. The alert system will utilize the tracking information to calculate the closeness of the discovered wild animals to populated areas, and if required, issue an alarm to the appropriate authorities.

User Interface: A user-friendly interface will be developed to allow users to view the real-time video feeds, detections, and alerts.

Evaluation: The system's performance will be measured using standard metrics such as recall, accuracy, and precision. The technology will be tested in a real-world setting, and its ability to locate and track wild animals will be examined. The Advanced Wild Animal Detection and Alert System, which employs the you only look once (YOLO V5) concept, will provide a cost-effective solution for detecting and tracking wild animals, increasing the safety and well-being of communities and the environment.

4.SYSTEM DESIGN

SYSTEM ARCHITECTURE

Below diagram depicts the whole system architecture.

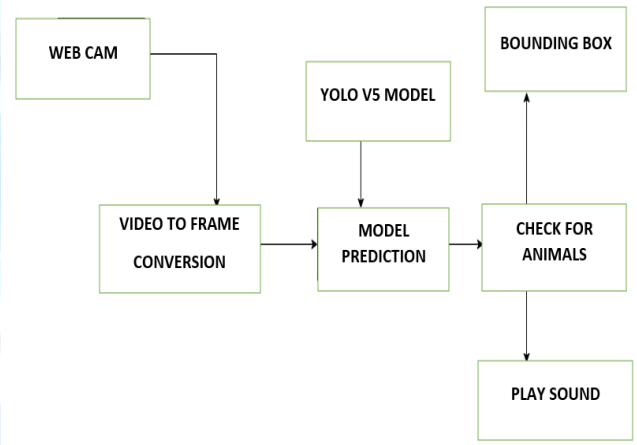


Fig 1. Methodology followed for proposed model

5. SYSTEM IMPLEMENTATION

MODULES

Of course, the following are the five key portions or parts of your project, "Advanced Wild Animal Identification and Alert System Using YOLO V5 Model":

Image Acquisition and Preprocessing: This module entails gathering photos or video feeds from cameras and drones deployed in the field. It also comprises preparing these photographs, such as scaling, noise reduction, and image quality enhancement, to optimize them for the YOLO V5 model.

YOLO V5 Object Detection Model: This is the centre of your project. You will use the YOLO (You Only Look Once) V5 model for object detection. This module focuses on developing and fine-tuning the model to recognize certain wild animal species. You may also investigate alternative YOLO model versions (e.g., YOLOv5s and YOLOv5m) for performance and efficiency.

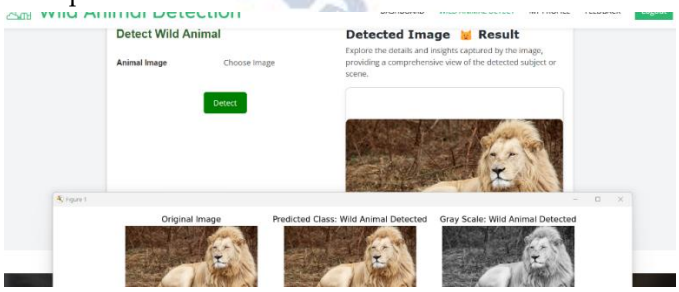
Alert Generation and Communication: When the YOLO model identifies wild animals, this module sends real-time notifications. It includes creating an alert system, such as delivering messages via SMS, emails, or mobile applications. Integrating GPS or mapping systems can assist provide the precise location of the animal sighting.

Data Storage and Logging: A data storage and recording module is required to keep track of any identified wild animal sightings. It saves information about each detection, such as the timing, location, and any photos or video frames associated with the sighting. This data may be useful for further analysis and study.

User Interface and Monitoring: A user-friendly interface is required for monitoring and operating the system. This module entails developing a dashboard or application that allows users to watch real-time camera feeds, get warnings, and retrieve past detection data. An intuitive interface can make the system more accessible for animal conservationists and researchers.

6. RESULTS AND DISCUSSION

The above implementation was completed in a Jupiter notebook using the Python programming language. During the face detection step, pixels for the face and bounding boxes were precisely produced. The figure below displays pixels representing recognized creatures from photos.



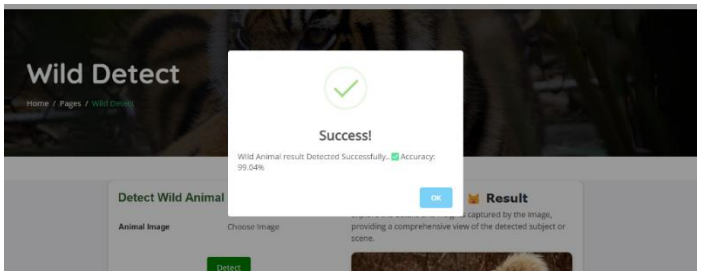


Fig 2. Wild animal detected

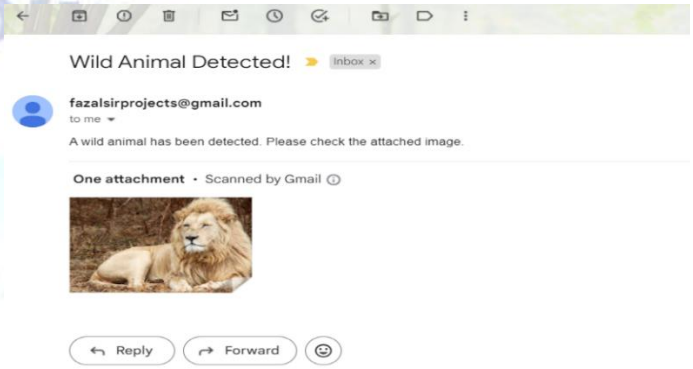


fig 3. Sending mail as an Alert when Wild animal is detected

7. CONCLUSION AD FUTURE WORK

The Advanced Wild Animal Detection and Alert System, which employs the you only look once (YOLO V5) principle, is an affordable method for detecting and tracking wild animals. The system uses the YOLO V5 object detection model and tracking algorithms to deliver real-time notifications in the event of a possible risk. By delivering timely and reliable information on wild animals, the system can improve community safety and well-being while also protecting the ecosystem. The approach has the potential to significantly improve wild animal management and may be used in a variety of places with varied wildlife populations. The system's future development involves enhancing its accuracy, connecting with other systems, including real-time environmental data, building a mobile application, and expanding the system to other regions.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] "Animal Detection and Warning System using Faster regions with convolutional neural networks (R-CNN) " by Rajitha K. and Seema P. (2022)

[2] "Wildlife Detection using Mask regions with convolutional neural networks (R-CNN)" by Yi Jia and Shikun Liu (2021)
[3] "Wildlife Detection and Monitoring using EfficientDet and Transfer Learning" by Diwei Zhu and Tengfei Ma (2021)
[4] Real-time Wildlife Detection using Single Shot Detector with Dynamic Region of Interest Selection" by Gyeongsik Moon and Tae-Sun Choi (2021)
[5] A Hybrid Method for Wildlife Detection using you only look once version3 (YOLO V3) and Support Vector Machines" by Jin-Seok Choi and Min-Kyu Kim (2021)
[6] "Wildlife Detection using Mask regions with convolutional neural networks (R-CNN) and Spatial Transformer Networks" by Chao Yang and Jianjun Qian (2021)
[7] "Deep Learning-based System for Wild Animal Detection and Recognition using ResNet50" by Ki-Hyung Lee and Young-Sup Hwang (2020)
[8] "Animal Detection using Inception-v3 and you only look once version2 (YOLO V2) " by Abdulaziz Alwadani and Abdulrahman Al-Salman (2020)
[9] Kamali, M., & Tahir, M. (2020). You only look once version3 (YOLO V3): A Comprehensive Guide to Object Detection with Deep Learning. arXiv preprint arXiv:2005.10857.
[10] "Real-Time Wild Animal Detection and Alert System using Deep Convolutional Neural Networks and Raspberry Pi" by Ankit Pandey and Ramendra Singh (2019).
[11] Sushil Kumar Paul, Mohammad Sharif Uddin, Saida Bouakaz, " Face Recognition using Eyes, Nostrils, and Mouth Features", Page1-3.