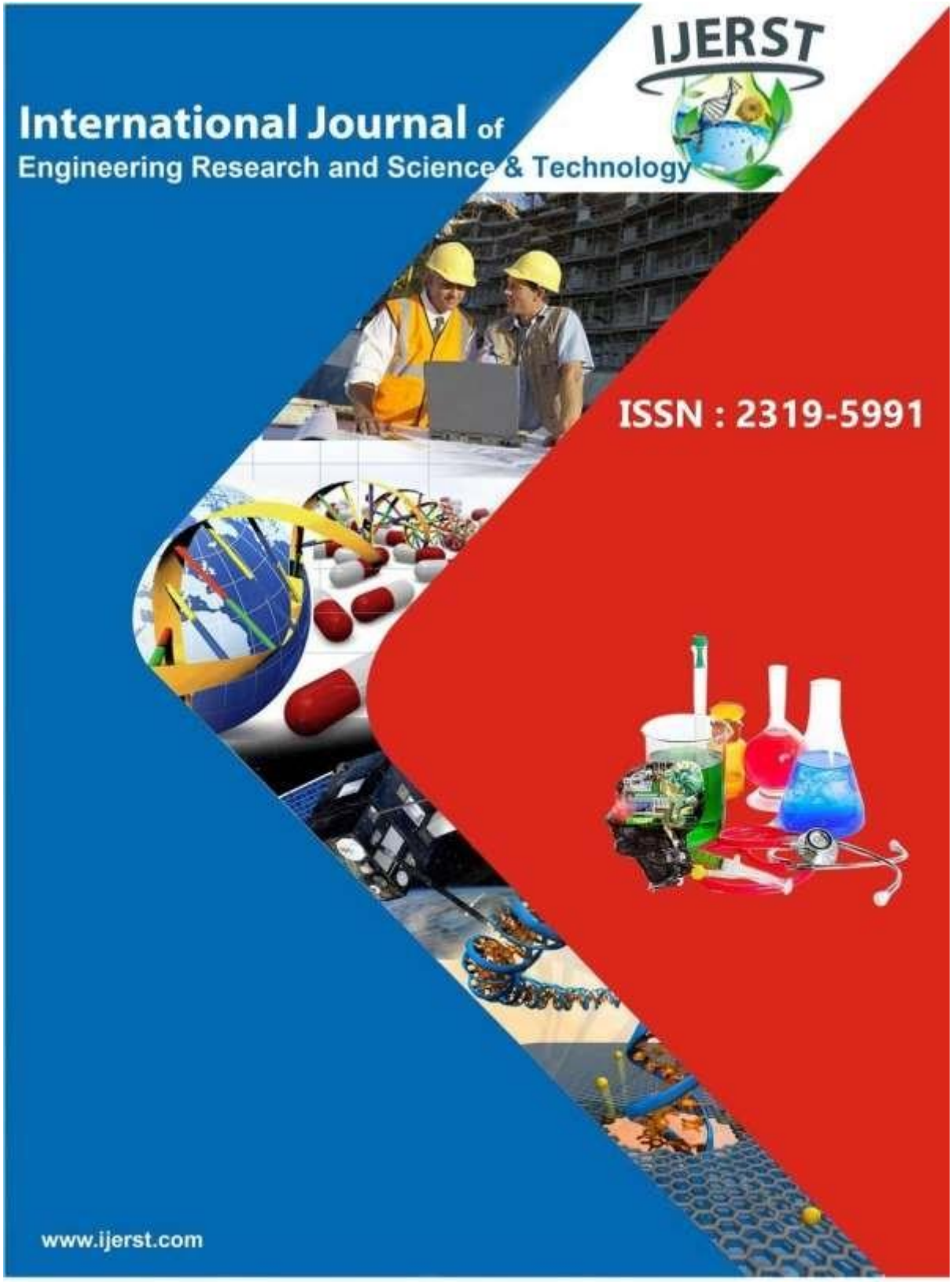


Email: editor@ijerst.com or editor.ijerst@gmail.com

International Journal of Engineering Research and Science & Technology

ISSN :2319-5991
www.ijerst.com
Vol. 19, Issuse.3,July 2023

ANIMAL DETECTION USING DEEP LEARNING ALGORITHM

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ABSTRACT: Efficient and reliable monitoring of wild animals in their natural habitat is essential. This project develops an algorithm to detect the animals in wild life. Since there are large number of different animals manually identifying them can be a difficult task. This algorithm classifies animals based on their images so we can monitor them more efficiently. Animal detection and classification can help to prevent animal-vehicle accidents, trace animals and prevent theft. This can be achieved by applying effective deep learning algorithms.

Keywords: Animal Detection and Classification, Deep Learning Algorithms.

INTRODUCTION

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly. Deep learning is a subset of machine learning.

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Deep artificial neural networks are a set of algorithms that have set new records in accuracy for many important problems, such as image recognition, sound recognition, etc., In deep learning, a convolutional neural network (CNN) is a class of deep neural networks, most commonly applied to analyzing visual imagery.CNNs use relatively little pre-processing compared to other image classification algorithms. This means that the network learns the filters that in traditional algorithms were hand-engineered. This independence from prior knowledge and human effort in feature design is a major advantage. They have applications in image and video recognition, recommender systems, image classification, medical image analysis, and natural language processing. One of the applications of the deep learning technique called Convolutional Neural Network is animal detection. Observing wild animals in their natural environments is a central task in ecology. The fast growth of human population and the endless pursuit of economic development are making over-exploitation of natural resources, causing rapid, novel and substantial changes to Earth's ecosystems. An increasing area of land surface has been transformed by human action, altering wildlife population, habitat and behaviour. More seriously, many wild species on Earth have been driven to extinction, and many species are introduced into new areas where they can disrupt both natural and human systems. Monitoring wild animals, therefore, is essential as it provides researchers evidences to inform conservation and management decisions to maintain diverse, balanced and sustainable ecosystems in the face of those changes.

LITERATURE SURVEY The purpose of animal detection is to prevent or reduce the number of animal-vehicle collisions. These systems are specifically aimed at the wild animals that can cause human death, injury and property damage. This system detects the wild animals before they enter the road. Historically animal-vehicle collisions have been addressed by putting up signs that warn peoples of potential animal crossings. In other cases, wildlife warning reflectors or wildlife fences have been installed to keep animals away from the road. In some selected areas wildlife fencing has been combined with a series of wildlife crossing structures. In most cases however, such crossing structures are limited in number and width, mostly because of their relatively high costs.

A. Animal Detection Using Template Matching Algorithm Animal detection is useful in prevention of animal vehicle accidents and will increase human and wildlife safety, it will detect large animals before they enter the road and warn the driver through audio and visual signals. This also helps in saving crops in farm from animals. In this project there is survey of different object detection techniques and for object identification as animal techniques such as object matching, edge-based matching, skeleton extraction. After survey the most appropriate method is selected for animal detection and efficiency is measured. Proposed system has low false positive rate and false negative rate.

Template Matching Template matching is a technique in digital image processing for finding small parts of an image which match a template image. To perform template matching the concept of normalized cross co relation can be used. In signal processing, cross-correlation is a measure of similarity of two waveforms as a function of a time-lag applied to one of them. This is also known as a sliding dot product or sliding inner-product. It is commonly used for searching a longduration signal for shorter, known feature. For imageprocessing applications in which the brightness of the image and template can vary due to lighting and exposure conditions, the images can be first normalized. This is typically done at every step by subtracting the mean and dividing by the standard deviation. Here

we have used feature based template matching mechanism using NCC

B. Automatically Identifying, Counting, and Describing Wild Animals in Camera-Trap Images with Deep Learning Having accurate, detailed, and up-to-date information about the location and behaviour of animals in the wild would revolutionize our ability to study and conserve ecosystems. This paper investigates the ability to automatically, accurately, and inexpensively collect such data, which could transform many fields of biology, ecology, and zoology into "big data" sciences. Motion sensor "camera traps" enable collecting wildlife pictures inexpensively, unobtrusively, and frequently. However, extracting information from these pictures remains an expensive, time-consuming, manual task. We demonstrate that such information can be automatically extracted by deep learning, a cutting-edge type of artificial intelligence. We train deep convolutional neural networks to identify, count, and describe the behaviours of 48 species in the 3.2-million-image Snapshot Serengeti dataset. Our deep neural networks automatically identify animals with over 93.8% accuracy, and we expect that number to improve rapidly in years to come. More importantly, if our system classifies only images it is confident about, our system can automate animal identification for 99.3% of the data while still performing at the same 96.6% accuracy as that of crowd sourced teams of human volunteers, saving more than 8.4 years (at 40 hours per week) of human labelling effort (i.e. over 17,000 hours) on this 3.2-million-image dataset. Those efficiency gains immediately highlight the importance of using deep neural networks to automate data extraction from camera-trap images. Our results suggest that this technology could enable the inexpensive, unobtrusive, high-volume, and even realtime collection of a wealth of information about vast numbers of animals in the wild.

EXISTING SYSTEM:

- In existing System we detect the objects by using ultrasonic sensors, IR sensors, and etc.
- This gives a false alert even another vehicle is present there.

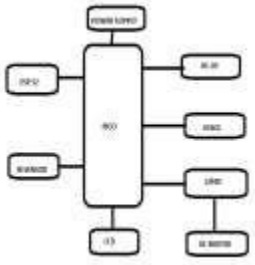
DRAWBACKS:

- Not Accurate.
- To overcome the disadvantages of this system we are moving to proposed system.

PROPOSED SYSTEM:

We have followed a low-cost approach to identify the animal identification. With the help of Python Development tool, the system will identify the animal (cat, dog, elephant and sheep) and the same will be transmitted to Arduino system. Once the data received, voice will be played to alert the driver along with it, the motor which is connected at the output of Arduino will slows down.

BLOCK DIAGRAM:



CONVOLUTIONAL NEURAL NETWORK A convolutional neural network (CNN) is a specific type of artificial neural network that uses perceptron's, a machine learning unit algorithm, for supervised learning, to analyze data. CNNs apply to image processing, natural language processing and other kinds of cognitive tasks. A convolutional neural network has an input layer, an output layer and various hidden layers. Some of these layers are convolutional, using a mathematical model to pass on results to successive layers.

• Input will hold the raw pixel values of the image and with three colour channels R, G, B.

• CONV layer will compute the output of neurons that are connected to local regions in the input, each computing a dot product between their weights and a small region they are connected to in the input volume.
• RELU layer will apply an element wise activation function. This leaves the size of the volume unchanged.
• POOL layer will perform a down sampling operation along the spatial dimensions (width, height), resulting in volume such as [16x16x12]. FC (i.e. fully-connected) layer will compute the class scores, resulting in volume of size. As with ordinary Neural Networks and as the name implies, each neuron in this layer will be connected to all the numbers in the previous volume.

POWER SUPPLY Power supply is a hardware device that helps our system to operate. Basically, all computing device need power to execute and operate. So here power supply comes in picture. With the help of power supply our systems gets the power to operate. There are various types of power supply available in our market. Like AC to DC power supply, DC to AC power supply, and there are some advance power supplies that helps to protect from sudden short circuit. There are many powers supply that are attached with fuse and that fuse helps to adjust the electricity based on the available power volts. The power delivery of power supply is not that much high but enough to run our system. Nowadays there are lots of available power supply at lower cost and some are based on solar system as well. However, the power supply that we use in our system are totally different from other power supply system. Like power banks are also one type of power supply for smart devices like mobile phones, and so on. The size of this types of power supply are not so big and these are really so portable. These power supplies are only DC. With the help of these types of power supply we can supply certain amount of electricity in forest and other non-developed areas

IR SENSOR IR sensor stands for Infrared Sensor. It is an electrical device that is used for detecting objects in our surrounding by reflecting a infrared light. When that light hits some object then based on the reflection, it identifies the object. It is used in many components like controlling AC cooler, TV, etc. And the application of this device is also in IOT field for example we are using in our project to open our camera after detecting the animals around the device. This sensor ranges from 1m to around 10m of area. This makes really easy to optimize the detection process in many devices and area.



Fig: IR sensor

CONCLUSION: In conclusion, monitoring the movements of wild animals and implementing an alert system using deep learning algorithms offers significant benefits for wildlife conservation and human-animal conflict mitigation. The integration of deep learning algorithms with camera traps and other sensor devices allows for accurate and automated detection of animal movements, behavior, and potential threats. By employing deep learning models such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), it becomes possible to analyze large volumes of image and sensor data in real-time. This enables the identification of specific animal species, tracking their movements, and detecting unusual behavior patterns that may indicate potential threats or conflicts. The alert system based on deep learning algorithms can generate real-time alerts to notify wildlife managers, rangers, or local communities about the presence of animals

in sensitive areas or the occurrence of abnormal behavior. This proactive approach helps in taking timely measures to prevent conflicts, protect wildlife, and ensure the safety of both animals and humans. Additionally, the implementation of such a system reduces the need for manual monitoring, which can be labor-intensive, time-consuming, and prone to human error. It also provides valuable data for scientific research and conservation planning, aiding in understanding animal behavior, migration patterns, and habitat preferences.

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