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Animals Counting and Poaching Detection System

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Abstract: *The system which can identify and track animals and also poachers. Identifying and tracking of animals has got plenty of applications like, avoiding dangerous animal intrusion into residential areas, and behavioral study of animals and so on. The detection algorithm is based on a human face detection method, utilizing haar-like features. The detection of particular animal species, the information generated by the tracker can be used to boost the priors in the probabilistic semantic classification of wildlife videos. Therefore, there is a need of system which detects the animal and gives warning if any one enter carrying gun while hunting time.*

Key Word: *haar cascade; Machine learning; image-processing;*

I.INTRODUCTION

Continuous hunting as driven a lot of animal species to extinction and the government has brought about little change apart from introducing a few laws and conducting a few surveys. But conducting surveys is an exceptionally difficult task, especially without the help of technology. To remedy this, we are going to make a prototype animal counting and poaching detection system using image processing and machine learning. Our system uses a python-based code that consists of pre-trained Tensor Flow models. The pre-trained tensor models help us in matching and mapping the image in frame with the model's trained data to detect the image in the frame. The detected animal will be counted and used for daily tracking for food and water management and also for census. If any poacher enters carrying gun for hunting animal, then it will be detected and siren will be played.

II.MATERIAL AND METHODS

The main objective is keeps track the animal and the detected animal will be counted and used for daily tracking for food and water management and also for census. If any poacher enters carrying gun, then it will be detected and siren will be played.

Hardware Requirements:

Raspberry Pi 3
Buzzer
Power Adapter 5V
HDMI to VGA Converter
Monitor

Software requirements:

Language: Python
libraries: OpenCV

Raspberry pi 3:

A Raspberry pi is a hardware device that works like computer which is tiny computer about the size of a deck of cards is shown in Fig 1. It uses what's called a system on a chip, which integrates the CPU and GPU in a single integrated circuit, with the RAM, USB ports, and other components soldered onto the board for an all-in-one package. Raspberry pi 3 is more powerful, it consists of faster processor, power management is improved which allow to connect USB devices. It can be used as a processer.

The full specs for the Raspberry Pi 3 include:

- CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz
- GPU: 400MHz video core IV multimedia

- Memory: 1GB LPDDR2-900 SDRAM (i.e. 900MHz)
- USB ports: 4
- Video outputs: HDMI, composite video (PAL and NTSC) via 3.5 mm jack
- Network: 10/100Mbps Ethernet and 802.11n Wireless LAN
- Peripherals: 17 GPIO plus specific functions, and HAT ID bus
- Bluetooth: 4.1
- Power source: 5 V via MicroUSB or GPIO header
- Size: 85.60mm × 56.5mm
- Weight: 45g

Fig 1: Raspberry pi 3

Buzzer: Buzzer is an audio signaling device, which is used to produce siren when an gun detected.
Power Adapter 5V**:**4thD Innovation 14 Raspberry Pi power supply adapter 5V 2A micro USB charger for Raspi. 5 Volt 2 Amp Power Adapter Charger for Raspberry Pi 2 High-quality IC version, Short-circuit protection and Overload protection, input: 100V-240V AC 50/60Hz 0.3A, output : DC 5V 2A / 2000mA 10W, Input plug type : EU, Output adaptor jack size : micro USB.
Monitor: An LCD is a flat-panel that displays counting of animals.

Software requirements:

Language: Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Libraries**: OpenCV** is a huge open-source library for computer vision, machine learning, and image processing. OpenCV supports a wide variety of programming languages like Python, C++, Java, etc. It can process images and videos to identify objects, faces, or even the handwriting of a human. When it is integrated with various libraries, such as Numpy which is a highly optimized library for numerical operations, then the number of weapons increases in your Arsenal i.e. whatever operations one can do in Numpy can be combined with OpenCV.

Procedure methodology

The system consists of raspberry pi as main computing unit , all the processes are done in raspberry pi is shown in Fig 2. The video is then analyzed using image processing and machine learning to identify the animal if present in that frame. If animal identified, then the count value of that animal in database will be increased. Similarly, whenever an animal detected its count will be increased. Also the video is analyzed for guns, if any poacher tries to carry gun while hunting animal it will be detected and a loud siren will be played alerting purpose.

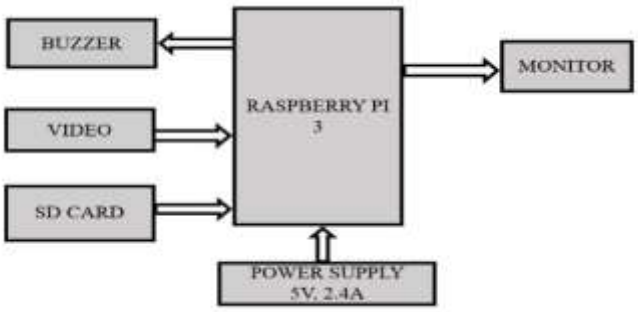


Fig 2: Block Diagram

Algorithm:
Step 1: Image/video acquisition.
Step 2: Convert video to frames.
Step 3: Store images of each animal as database which is used as training set for our program

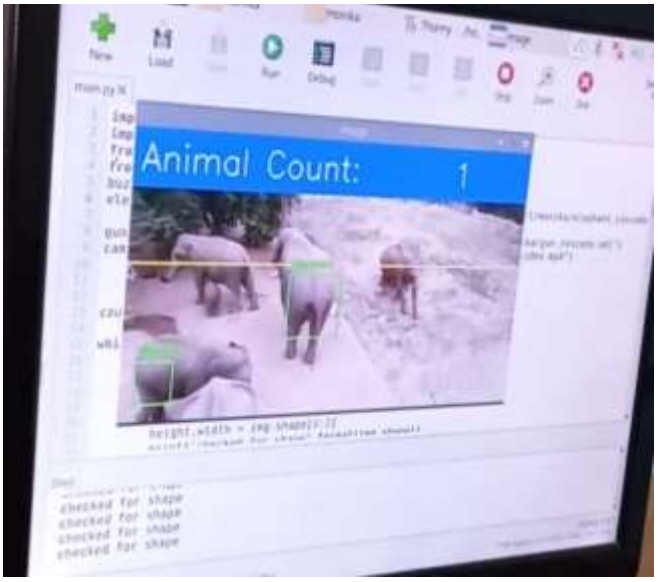
Step 4: Compare camera captured frames with the database.
Step 5: Use imread function to read the image and preprocessing is done on that image. Perform Blob detection on the frame and blobs are matched with images from training database images.
Step 6: And check if it is matching or not.
Step 7: To identification of that animal is desired or not. An array is created and program is written for each animal to be identified.
Step 8: To obtain the count- we use if statements to increment count when identified.
Step 9: We obtain the results of identification and counting of animals and detection of gun.

Statistical analysis

Data was analyzed using image processing and machine learning. OpenCV-python makes use of a Numpy, which is a library for numerical operation. All the OpenCV array structures are converted to and from the Numpy arrays. This also makes it easier to integrate with other libraries that use Numpy. Haar-cascade technology is used for animal and gun detection.

III.RESULT

On successful implementation of our project will we be able to keep track on number of animals in each region of reserve, which helps in food and water management. It also helps in tourism since safari authorities will be knowing the regions where maximum animals are found. If gun is detected loud siren will be played It also reduces poaching and protects animals.



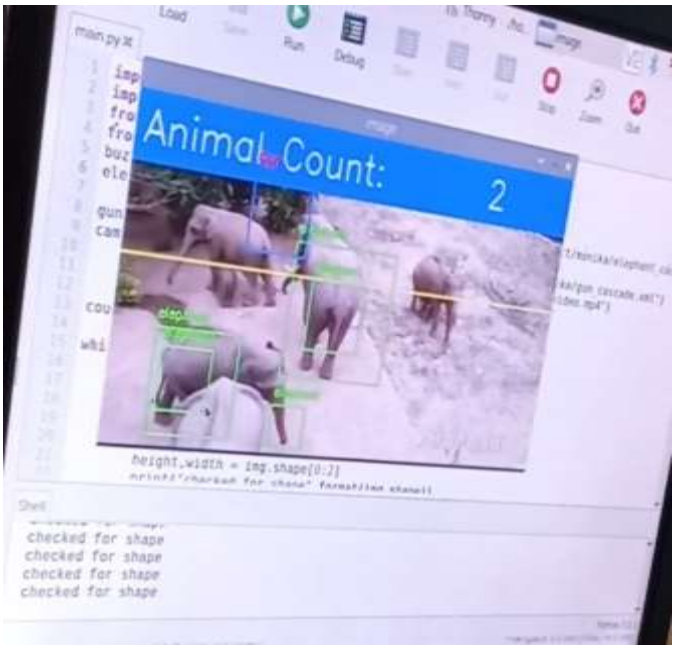


Fig 3: Elephant counting

Table no 1: *Shows counting of animals*

Name	Count
Elephant	3

Fig 4: Gun detection

IV.DISCUSSION

The system consists of raspberry pi as main computing unit , all the processes are done in raspberry pi. Raspberry pi 3 is more powerful, it consists of faster processor, power management is improved which allow to connect USB devices. It can be used as a processer. On successful implementation of our project will we be able to keep track on number of animals in each region of reserve, which helps in food and water management. It also helps in tourism since safari authorities will be knowing the regions where maximum animals are found. It also reduces poaching and protects animals.

V.CONCLUSION

Protecting wild life should be a major concern and there should be research done in this particular field as well. On successful implementation of our project will we be able to keep track on number of animals in each region of reserve, which helps in food and water management. It also helps in tourism since safari authorities will be knowing the regions where maximum animals are found. It also reduces poaching and protects animals. Our project contribute protection, tracking and counting of wild life with cost effective solution.

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