Observation and Classification of Fauna for Forest Survey

Skanda V Jois
Department of Electronics and Communication Engineering
Vidyavardhaka College of Engineering
Mysuru, India

Vimal Naveen
Department of Electronics and Communication Engineering
Vidyavardhaka College of Engineering
Mysuru, India

Sagar B S
Department of Electronics and Communication Engineering
Vidyavardhaka College of Engineering
Mysuru, India

S L Nishanth Kumar
Department of Electronics and Communication Engineering
Vidyavardhaka College of Engineering
Mysuru, India

Geetha M N
Department of Electronics and Communication Engineering
Vidyavardhaka College of Engineering
Mysuru, India

***Abstract*— Human-animal conflict has become a serious issue in agriculture and forestry, threatening human lives and squandering resources. As human risks to the natural environment increase, so does the necessity to track the evolution of diverse invertebrates. Conservation initiatives should be well-directed, yet the labour required to obtain information is frequently time-constrained. Estimates of the number of mammals give vital insights into conservation measures, but only a few systematic human studies and yearly census efforts have contributed in any way to this endeavour. Even despite these efforts, established techniques of measuring numbers vary greatly and are frequently overlooked in efforts to authenticate the data produced. To address this issue, wildlife monitoring can provide researchers with as much information as wildlife species, quantity, habits, quality of life, and habitat conditions, assisting researchers in understanding the nature and potential of wildlife resources, and providing the foundation for effective protection, sustainable use, and scientific management of wildlife resources. We demonstrate how this tool works in a number of contexts, including animal behaviour, population monitoring, and animal interaction.**

Keywords—Forest survey; animal-based tracking; Face recognition; line transect

I. INTRODUCTION

The survival and expansion of animals supports the environment's entire balance and sustainability. Making educated management decisions requires reliable wildlife knowledge. Effective management and monitoring of both big and small terrestrial animals is critical for biodiversity monitoring and protection. Wildlife is threatened during their habitat with people due to their variety, extinction, and the influence of natural science on their natural environments. Understanding the need of limiting the number of species, particularly commercial species, contributes to meeting the issue of protecting the planet's biodiversity. Regular observation and monitoring of animal species offers a foundation for researchers to examine animal behaviour and quality of life, as well as to monitor animal natural circumstances. Global practice illustrates the feasibility of merging old and new technology, as well as specialized equipment, environmental management planning, and management procedures, into practice. Wide terrestrial animals require all monitoring strategies due to their low population density and large habitat. Examples include leopards, elephants, and deer.

The protection and management of wildlife species is dependent on our understanding of their worth. In India, the sole source of human estimates for species is census work done at specific times of the year, year, or year. The country has a lengthy history of wildlife management in many regions of the world, but with the exception of a few studies, wildlife professionals have undertaken no long-term study on any species. The information gathered during census activities is retained at the department's offices. Attempts to employ them in administrative procedures are uncertain, and only a small number of them have been examined to ensure their trustworthiness. Scientific research, if it exists, concentrates on the interests of people or groups and, in many circumstances, does not appear to match the demands of the forestry department, and it is frequently inaccessible to check census numbers.

Many animal species in India have a lengthy history of counting; nevertheless, vigorous and systematic census efforts for species such as elephants began only in 2002. When it comes to human values, institutions may perform good science. A census can be carried out for scientific objectives. For a long period, the impacts of all environments and species may be unreachable. Courses are only offered for a limited time, and interests are distributed owing to a lack of funding or other factors.

Comparisons produced using various approaches may have additional restrictions; for example, census work can only be done once a year and is not designed to cover the whole research region. Long-term studies can be undertaken at various periods of the year, but only cover a portion of the research region. The two ways may complement each other since the calculating method covers the whole region while long-term research cover smaller regions over time. The territory covered,

as well as the number of persons listed in such categories, may have an impact on the findings. Elephants occur only in a few areas across the block due to their low density and dispersal strategy, and trained forest workers can see and count them all. Their numbers are underestimated due to their high density, high-density dispersal, and difficulties in spotting the animals.

Even if it was done a long time ago, verification of census performance findings and long-term study has a specific message for the 'Elephant Project,' the Government of India, and its coordinated effort for elephant employment. read. The blockchain calculating approach has received much criticism since it does not allow for any checking of outcomes using current options. Based on these experiences and findings (comparisons of census performance and long-term study), it is said that, rather than criticizing blockchain statistics and advocating that they be removed from the elephant census operating system, it is vital to assure census, the outcomes are accessible throughout time. It can be observed by studying the outcomes or observations of elephant sightings in locations like Bandipur, Nagarhole (Karnataka), and Mudumalai (Tamil Nadu) that volunteers only see elephants when they are known to be sighted in these regions. Because of the increased interest in animal counting and the requirement for data validation, it was anticipated that this study would be of some help to certain users. It can also be useful in identifying limits and encouraging others to do both part-time censuses and long-term research using comparable approaches to compare findings and assess the dependability of estimates.

II. METHODOLOGY

A camera module is connected to the Raspberry Pi module. Python programming language is used to develop a code for the process. A code is developed to identify and store the animals which appear in front of the camera module. The pictures of the animals are stored before in order to process and match the data during the survey.

The control flow is shown in Fig 1. Python IDLE is used to run script to get the pre-loaded tensor flow modules. The camera module waits for an animal to appear in front of it. When an animal is sighted in front of the camera, the image is taken, along with the date and time. The image acquired by the camera is digitally processed and compared to one in the database. If the newly found species is already in the database, the image is added to it; otherwise, a new folder is created and the image is preserved for future investigation. During the survey, a list of animal species can be obtained from a database that contains images of animals that have been detected.

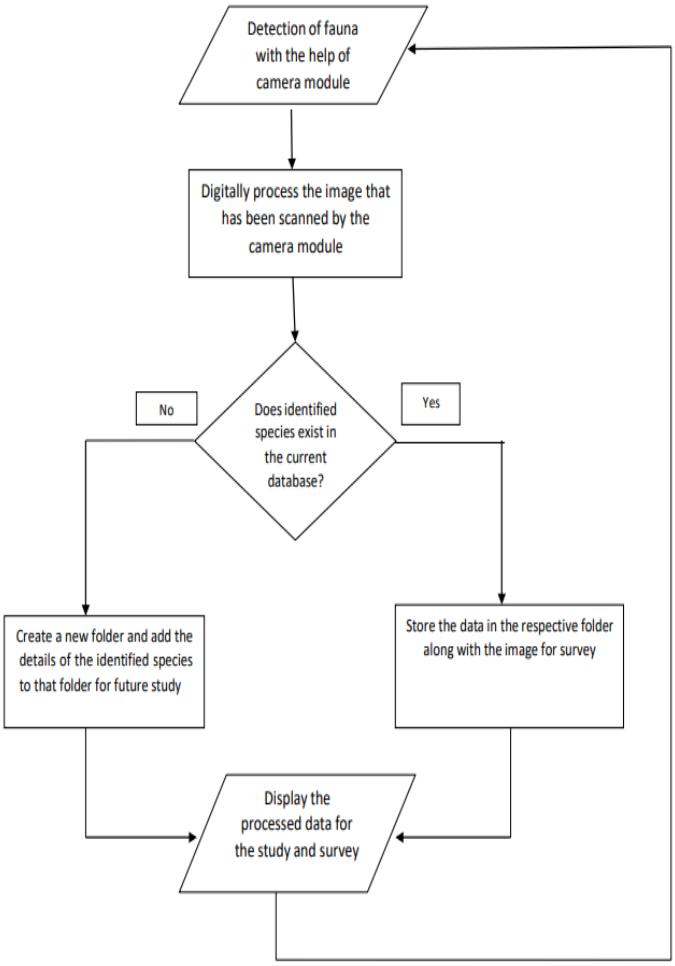

Fig 1: Flowchart for proposed diagram

Each animal's folder may be opened to learn more about it. It provides the image as well as its qualifications for the survey. Animal information may be accessed and used at any time.

III. LITERATURE REVIEW

Species Monitoring Methods (July 2020) [1] by Alexander Prosekov, Alexander Kuznetsov, Artem Rada, and Svetlana Ivanova explored how successful control and monitoring of both big and small wildlife are connected to monitoring and protection. The world's biodiversity. Monitoring is a natural strategy that is integrated into animal observation, exploration, and human prediction. Global practice indicates the viability of merging existing old and new technologies, as well as specialized equipment, environmental management planning, and management procedures. Large terrestrial animals require all monitoring strategies due to their tiny population and extensive range. A range of instruments and equipment (e.g., cameras, GPS sensors, and unmanned aerial vehicles) can be utilized, depending on the geographical, climatic, and economic characteristics of each place, with flexibility that allows researchers to establish a gold standard among the abilities they want.

Monitoring the diversity of large herbivorous species on different scales: comparisons of direct and indirect methods by Joris PGM Cromsigt, Susan J. van Rensburg, and Rampal S published on October 23, 2008 [2] demonstrates that large numbers of herbivores are key indicators of diversity, which

can affect the balance. of the richness of mammalian species. When examining the monitoring system, the monitoring approach assisted in determining how the number of herbivores influenced the ratings of different types of animals and how this differed based on a given decision.

Department of Mathematics Sciences, Montana State University, Bozeman, Bright Owusu, A Basic Overview of Line Transect Sampling and Its Applications April 16th, 2019 [3]. The publication introduces the transect sampling method, a distance sampling approach commonly used in ecology. The perpendicular distance between the recognized items is utilized to calculate the density and quantity of the objects. The study entails randomly putting one or more transect lines in the study region, as well as adding the discovery function to locate noteworthy objects gathered through the acquisition function.

Animal-Based Animal Tracking Using a Free Walking Camera was given by Lars Haalck, Michael Mangan, Barbara Webb, and Benjamin Risse. According to Epub 16 Nov 2019 [4], image-based surveillance of individual animals might give rich data to enable advances in biological and medical research, but few, if any, known processes lead to unrestrained wildlife behaviour in the wild.

Machine learning to identify animal species in camera trap images: Ecological applications by Michael A, Tabak Mohammad S, Norouzzadeh David W, Wolfson, Steven J, Sweeney, Kurt C. Vercauteren, Nathan P. Snow, Joseph M. Halseth, Paul A. Di Salvo1, Jesse S. Lewis, Michael D. White, Ben Teton, James C. Beasle, Peter E. Schlichtin, Raoul K. Boughton, Bethany Wight, Eric S. Newkirk, Jacob S. Ivan, Eric A. Odell, Ryan K. Brook, Paul M. Lukacs1, Anna K. Moeller, Elizabeth G. Mandeville, Jeff Clune, Ryan S. Miller published on 7 September 2018 [5]. The study demonstrates how cameras function in motion ("camera traps"), which are among the most potent instruments for wildlife research and are extensively employed in nature and management studies to view animals from a distance. The reference alludes to how photos may be used to automatically identify wildlife species based on camera photographs obtained during forest exploration.

Attendance System using Face Recognition published on 7 December 2017 by Azmath Moosa [6]. This is a commuting programme based on an educational institution study using facial recognition. The camera is used in this application to take employee photographs for face recognition and identification. If the result is found on a face-to-face website, the photograph is taken one by one to examine the employee's face on a face-to-face website, and attendees are recorded.

Khwaja, H.; Buchan, C.; Wearn, O.R.; Bahaa-el-din, L.; Bantlin, D.; Bernard, H.; Bitariho, R.; Bohm, T.; Borah, J.; Brodie, J.; et al. Pangolins in global camera trap data: Implications for ecological monitoring. Glob. Ecol. Conserv. 2019, 20, 1–14 [7]. Due to its non-discriminatory character, camera configuration gives a unique chance to monitor wide-scale interoperability by producing significant volumes of data through a number of forms. This has the ability to give information on the nature of uncommon, hidden, and underserved species, as well as the repercussions of conservation actions.

Jesso Jose, Ernakulam, Kerala, implements the Forest Monitoring System project on December 3, 2015. The initiative's purpose is to monitor the forest [8]. This network allows for remote monitoring of many sites, as well as links between each sensor and control channel. PIC microcontroller, LCD, fire sensor, smoke sensor, RF / ZIGBEE, ultrasonic detector, and camera are all part of the project. We may use this capability to study animals and the forest floor in order to monitor deforestation, wildfires, and other issues.

Mohammad Abu-Lebdeh, Fatna Belqasmi, and Roch Glitho were awarded a patent on June 10, 2016 for An Architecture for QoS-Enabled Mobile Video Surveillance Applications in a 4G EPC and M2M Environment [9]. According to research, mobile video surveillance programs are extensively used in homes, workplaces, warehouses, airports, and other areas to provide real-time video surveillance as well as live pre-recorded video search.

IV. CONCLUSION

In order to make an influence and eventually contribute to conservation and management, research must be addressed. Unlike many other research methods, which necessitate some analysis to reveal natural processes and patterns before data can be processed, our proposed design has the advantage that raw materials, such as images, can generate powerful information and are an important tool for public awareness / representation. Pictures, in addition to sophisticated data or graphs, provide immediate access to scientific studies to the general audience. As a result, published results in the field in the form of media releases or popular presentations can help raise awareness of crucial management concerns and wildlife research.

ACKNOWLEDGMENT

This paper would not have been possible without the exceptional support of Head of the Department of Electronics and Communication Dr. C M Patil and Assistant Professor Geetha M N who have been supportive of our career goals and who worked actively to provide us with the protected academic time to pursue our goals.

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