e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:12/December-2022 Impact Factor- 6.752 www.irjmets.com

LITERATURE SURVEY- DOG INTRUSION DETECTION SYSTEM AND ALARM SYSTEM BASED ON THE SIZE OF THE DOG AND BREED DETECTION TO DETECT LOST PET DOGS IN OUR COLLEGE PREMISES

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DOI : https://www.doi.org/10.56726/IRJMETS31854

ABSTRACT

In our project, we implement a dog intrusion detection and breed classifier system to prevent the encounter with dogs in our college and find lost pet dogs in our college . We are planning to implement this by using a camera on a spot where the dogs are most likely to be seen in our college premises. When a dog comes into the Field of View (FOV) of the camera, the device scans the output image using machine learning as well as deep learning algorithms to detect the size and breed of the dog. A notification will be sent to the site mentioning the size of the dog so that students and faculty can avert the dog if it is not a small dog. The system is also implemented in such a way that it can be used to detect lost pet dogs in the college premises. As most of the pet dogs are of a specific breed, we can use the breed detection technology to detect the lost pet dogs. The breed of the lost pet dog must be fed into the system. If the breed of dog detected and the breed of the dog lost is same, the system will send notification to the owner of the lost oet dog with image detected to verify if it's really theirs. We use python programming language and main hardware components used for this project are cameras and the hardware used would be raspberry pi or orange pi.

Keywords: Literature Survey, Abstract, Intrusion, Orange Pi, Raspberry Pi, Field Of View.

I. INTRODUCTION

Detection system is a term that we all have been familiar with for the past few years. Over the years, the hardware and the technology used to develop this system has been constantly upgraded to assist in detecting intrusions with the help of machine learning and Artificial Intelligence. In modern security systems, cameras are used in detection, especially when there is a need to perceive intrusions during circumstantial conditions. Implementation of cameras in security systems leads to a substantial increase of information that is fed to the security system operator. The operator is the person that manages the security systems. Usage of image processing systems help the operator by enhancing the relevant information of the image, which enables to discern important details of the image. In our project, we implement a dog intrusion detection system with the help of cameras and image processing. In our college, there are many areas where students gather in the interval hours like canteen and college store. These places are frequently visited by stray dogs which poses a major threat to our students, faculty and staff members. In this project we are planning to implement by using a camera on a spot where the dogs are most likely to be seen on our college premises. When a dog comes into the Field of View (FOV) of the camera, the device scans the output image using machine learning as well as deep learning algorithms to detect the size and breed of the dog. A notification would be sent to the site mentioning the size of the dog so that students or faculty can avert the dog if it is not a small dog and if the size of the detected is small they can continue on their path. The system is also implemented in such a way that it can be used to detect lost pet dogs in the college premises. As most of the pet dogs are of a specific breed, we can use the breed detection technology to detect the breed of the dogs. If a dog is lost near our college area, the owners must complaint it to the operator, also specifying the breed to which their pet dog belongs to. If the same breed of dog is detected in our college premises, the system will notify the operator and a photo of the specific dog would be sent to its owner to identify if it's really theirs. We use python programming language and main hardware components used for this project are cameras and the hardware used would be orange pi or raspberry pi.

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II. LITERATURE SURVEY

In literature surveys, there are many methods to detect the dogs and their breed.

This paper proposes a Realtime Animal Monitoring over Network (RAMNe)[1]. The goal of RAMNe is to efficiently detect target animals in real time using network cameras. They uses a a determination method for the monitoring interval to guarantee the target value of monitoring accuracy based on a formal theoretical analysis using the Age of Information (AoI). The proposed scheme can minimize the amount of transferred data to enable efficient and stable monitoring even in resource-limited environments. The performance of RAMNe was evaluated with ns-3 simulations to confirm the relationship between monitoring accuracy and interval.

This study presents an enhanced technique for detecting objects and computing their measurements in real time from video streams[2]. This technique comprises of four stages: (1) identifying an object to be measured by using canny edge detection algorithm, (2) using morphological operators includes dilation and erosion algorithm to close gaps between edges, (3) find and sort contours, (4) measuring the dimensions of objects. In the implementation of this technique, they designed a system that used OpenCV software library, Raspberry Pi 3 and Raspberry Camera. The proposed technique was nearly achieved 98% success in determines the size of the objects.

This project implements a dynamic learning method, in which a convolutional neural network is dynamically trained to recognize potential target classes [3]. The AI detection module is then loaded on to the lowest level of edge servers on gateway devices for detection of animals and providing feedback. Experiments showed that this recognition system can perform offline image classification tasks with up to seven times higher accuracy and more than two times faster evaluation time in comparison with general-purpose cloud recognition systems.

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[4]. 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. An animal database is used for testing of the proposed system. The forest officer is alerted by means of a Python server. Prevention of casualties in areas where there is a higher rate of interaction between humans and wild animals is enabled through this system.

At present in the process of image recognition, the recognition effect of the model is not good enough and it is easy to misrecognize[5].This paper proposes an improvement solution for the above problems on the selection and construction of the model structure and the adjustment and optimization methods in the model training process. The final result achieves 96% recognition accuracy on the data composed of 9092 pet dog images. It is proved that the model by choosing deep-level network model and adopts regularization method to adjusting and optimizing the model, which can effectively improve model for image recognition effect.

This paper[6] presents the hardware architecture of our real-time object size measurement method. In the proposed method, the size of the object can be measured using the extracted Sobel edge image and Harris corner image. The distance between the camera and the object is constant. We implemented this object size measurement on the Xilinx Virtex7 XC7V2000T FPGA (field programmable gate array) hardware. The hardware architecture was designed using the Verilog hardware description language (Verilog HDL). The FPGA receives the VGA (640×480) image from the camera (STCMC33CL) and transmits the corresponding size measurement result image to the monitor using the HDMI interface in realtime.

A smart animal tracking system based on deep learning technique is proposed in this [7]paper. The proposed system is mainly implemented by using image recognition and tracking techniques, Arduino development board and image processor, thus it can achieve the purpose of allowing the users to observe animals which they want to look for much more conveniently and quickly.

In this work[8], they apply Deep Learning (DL) methods to detect and recognize wildlife in digital images and report the experimental results conducted in a commodity workstation. Specifically, YOLOv3 and YOLOv3 - Tiny are used to detect and classify several classes of animals based on 9051 digital images and they achieve 75.2% and 68.4% mean average precision, respectively.

This [9] paper presents the classification methods for dog breed classification using two image processing approaches 1) conventional based approaches by Local Binary Pattern (LBP) and Histogram of Oriented Gradient (HOG) 2) the deep learning based approach by using convolutional neural networks (CNN) with transfer learning. The result shows that our retrained CNN model performs better in classifying a dog breeds. It achieves 96.75% accuracy compared with 79.25% using the HOG descriptor.

This paper [10]deals with the breed classification of dogs. To classify dog breed is a challenging part under a deep convolutional neural network. A set of sample images of a breed of dogs and humans are used to classify and learn the features of the breed. The images are converted to a single label of dimension with image processing. The images of human beings and dogs are considered for breed classification to find the existing percentage of features in humans of dogs and dogs of human. This research work has used principal component analysis to shorten the most similar features into one group to make an easy study of the features into the deep neural networks. And, the facial features are stored in a vector form.

This paper [11] presents a fine-grained image recognition problem, one of multi-class classification, namely determining the breed of a dog in a given image. The presented system employs innovative methods in deep learning, including convolutional neural networks. Two different networks are trained and evaluated on the Stanford Dogs dataset. The usage/evaluation of convolutional neural networks is presented through a software system. It contains a central server and a mobile client, which includes components and libraries for evaluating on a neural network in both online and offline environments.

In the case of "person with object"[12] classification, a study of different CNN architectures was carried out and analysis correspond ding to that is presented. In case of human crawl vs animal movement, performance results corresponding to only the best architecture model is provided among the many tried models. Further on, additional insights are provided about the classification using the attention heat maps and t-SNE plots.

They have implemented this project[13] by using a camera on a spot further away from the property. When an animal comes into the Fieldof View (FOV) of the camera, the device scans the output image using machine learning as well as deep learning algorithms to detect the characteristics of the animal. If the device recognizes the animal as an elephant or a boar, an alarm will be issued across the area, and thus the farmers can avert the animal with or without minimal loss. The device can also be implemented in such a way that it can be used to prevent human casualties during the event of wild animal trespassing by warning the farmersof where the animal is present. We use python programming language and main hardware components used for this project are cameras and the hardware used is Raspberry Pi 4.

III. CONCLUSION

In this paper, we surveyed the list of existing systems for size measurement, animal detection and breed classification of dogs. We also presented a study on the intrusion detection systems. In the forthcoming paper, we pursue the development of an advanced system of dog detection and breed classification which would benefit our college and our society.

IV. REFERENCES

[1] Yu Nakayama , Yoshiaki Inoue , and Marie Katsurai "RAMNe: Realtime Animal Monitoring over Network with Age of Information" IEEE International Conference on Communications Workshops, ICC 2020

[2] Nashwan Adnan Othman, Mehmet Umut Salur, Mehmet Karakose, Ilhan Aydin "An Embedded Real-Time Object Detection and Measurement of its Size" International Conference on Artificial Intelligence and Data Processing (IDAP)

[3] Nitis Monburinon, Salahuddin Muhammad Salim Zabir, Natthasak Vechprasit, Satoshi Utsumi, Norio Shiratori "A Novel Hierarchical Edge Computing Solution Based on Deep Learning for Distributed Image Recognition in IoT Systems" 2019 4th International Conference on Information Technology (InCIT), Bangkok, THAILAND

[4] Muneera Begum H, Janeera.D.A, Aneesh Kumar.A.G "Internet of Things based Wild Animal Infringement Identification, Diversion and Alert System" Proceedings of the Fifth International Conference on Inventive Computation Technologies (ICICT-2020).

[5] Yanmei Liu , Yuda Chen "Research on Pet Dog Species Identification Based on Convolution Neural Network" 2020 13th International Symposium on Computational Intelligence and Design (ISCID).

[6] Dong Wan Roh , Jae Wook Jeon "Real-Time Object Size Measurement" 2019 International SoC Design Conference (ISOCC)

[7] Wei-Tse Peng, Cheng-Yuan Chang "Implementation of Smart Animal Tracking System Based on Artificial Intelligence Technique" 2020 IEEE International Conference on Consumer Electronics - Taiwan (ICCE-Taiwan).

[8] Mina Gabriel, Sangwhan Cha, Nushwan Yousif B. Al-Nakash, and Daqing Yun "Wildlife Detection and Recognition in Digital Images Using YOLOv3" 2020 IEEE Cloud Summit.

[9] Punyanuch Borwarnginn, Kittikhun Thonganchorn, Sarattha Kanchanapreechakorn, Worapan Kusakunniran," Breakthrough Conventional Based Approach for Dog Breed Classification Using CNN with Transfer Learning" 2019 11th conference on information technology and electrical engineering.

[10] Bickey Kumar shah, Aman Kumar, Amrit Kumar "Dog Breed Classifier for Facial Recognition using Convolutional Neural Networks" Proceedings of the Third International Conference on Intelligent Sustainable Systems [ICISS 2020].

[11] Zalan R ´ aduly, Csaba Sulyok, Zsolt Vadaszi, Attila Zolde "Dog Breed Identification Using Deep Learning" IEEE 16th International Symposium on Intelligent Systems and Informatics • September 13-15, 2018, Subotica, Serbia.

[12] Tarun Choubisa, Mohan Kashyap, Kodur Krishna Chaitanya "Human Crawl vs Animal Movement and Person with Object Classifications Using CNN for Side-view Images from Camera" 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI)

[13] Anand Rakesh, Anand Vinod, Mridhul Madhu, Roshan Daniel, Jisha Jose, Robin Joseph "Animal Trespassing Detection System" International Journal of Engineering Research & Technology (IJERT) ISSN 2022 Conference Proceedings.