Early Warning System for Detection of Harmful Animals using IOT

Sahane Pradnya Sambhaji[1], Salunke Nikita Sanjiv[2], Shirsath Vitthal Somnath[3] , Shukla Shreyas Sanjay[4] , Prof. A. R. Panhalkar

UG Student[1-4], Department of Computer Engineering, Amrutvahini College of Engineering, Sangamner, Ahmednagar, Maharashtra, India

Abstract

Due to deforestation, animals entering in human located areas. Humans are cutting the forest areas because of this, wild animals decreased in forest area and come into the human populated areas. When wild animals enter in cities, it creates the great amount of property loss and human life loss. We use harmful animals detection system to provide alert system for security purpose of human life. Internet of Things(IOT) connect the network devices with sensors or software system for data collection. In this system, we use low cost hardware system i.e. Arduino Uno kit to detect the harmful animals and provide alarm system which makes the loud voice to distract the harmful animals without any harm. IOT connect the sensors and organized communication and provide the security and services. This system is to protect the human life from harmful animals.

Keywords: alarm system, Arduino Uno, Internet of Things

1. Introduction

food, water and shelter are the important needs of human life. due to high population, human cutting forest areas for shelter purpose and it create the deforestation.so, harmful animals interference in human residential areas which causes the human life loss and property loss.

There are many sensitive places in the human populated areas like school, hospital, home, etc. because of harmful animals involvement in the sensitive places of human located areas, it can cause the damage to the human life. It can also cause the death of the human. Human-animals collision become resulting the serious issue. So to avoid this issue, we proposed a harmful animal detection system which detect the harmful animals using hardware components and gives alarm and mobile notification system to the human. We are using Arduino Uno kit which has low cost and gives better efficiency for the harmful animals detection system. We use this system to avoid the human-animal collision and provide the security to human located sensitive areas.

2. Guidelines

A. Literature Survey:

Characterizing Animal Behavior through Audio and Video Signal Processing [1] presents that This systems will allow to give complete phenotypic information of animals in ethologically relevant settings, for the method of analyzing, manipulating, annotating, and storing the resulting data. Combining these phenotypic descriptions with

the corresponding genetic and neural network properties and will produce the connection of these organization levels and lead to a more thorough understanding of brain functioning.

This system presents two instances i.e. multimedia systems and processing, this systems have elucidated animal behavior and have been central in developing quantitative descriptions. These examples demonstrate multimedia systems utility and necessity in developing a complete phenotypic description. This system will spur interest in this subject in the multimedia community, so more advanced processing techniques will enter the field of quantitative neuroethology.

Research on the Architecture of Wildlife Observation and Communication System [2] discusses the architecture for wildlife observation and communication system, this system features the construction component, communication platform and research application. This system also talk about the working process of the observation and communication unit, on the basis of power saving, data storage, and effective communication area indication mechanisms. It develop a G-tracker and perform initial tracking and wildlife behaviour recognition experiments. This system also discuss their considerations on the architecture on on-going research. The proposed architecture and practical system implementation provides examples and guidelines for the wildlife observation and communication research in ecology and zoology field.

A novel system for automatic detection and classification of animal [3] presents ASFAR (Automatic System For Animal Recognition). This system is based on distributed that we called 'watching device' in appointed area. This system used main computing unit (MCU) which acting as server and system manager. Watching devices are placed in wild nature and environment and their task is to detect animal and then send data to MCU to evaluation. This system is to determine migration corridors of wild animals in designated area. For creation of object representation, visual descriptors were chosen and Support Vector Machine (SVM) was used to classify descriptors.
This system collects data from its agents such as watching devices, which are located in wild nature. Watching device detect animals and then send data to MCU. MCU analyze these data and create migration corridors for animals in designated area.

Face Recognition Based Dog Breed Classification Using Coarse-to-Fine Concept and PCA [4] system proposes a method to classify dog breed based on the dog face images. This method is based on the coarse to fine concept, In this system , the template matching technique is applied. template matching technique is for coarsely classifying the images into 5 groups. Then, within each group, the Principle Component Analysis (PCA) is applied. Principle Component Analysis (PCA) is used to classifying the dog breed. In the PCA-based classification, weight vector is used as a face features representation. A set of sample image of each dog breed are used for learning the features of the breed.
700 of dog face images are tested with this proposed classification system comparing with the PCA-based classification system. The system show that the accuracy of the proposed system 93% approximately and it is better than the PCA-based classifier around 16%.

B. Proposed System:

In this section, we have presented a system which detect and predict the presence of harmful animals in the human populated areas.

1) Architecture of Proposed System:

Harmful animals interference in cities and injuring peoples have become very common. In school areas, many students and other peoples come to contact with school area so, we have to restrict all types of animals either pet or harmful. We have to provide security to the school area from the animals. So we propose a harmful animal detection system to produce an alert system for school area. The web cam tower for animal tracking network as shown in fig.1.

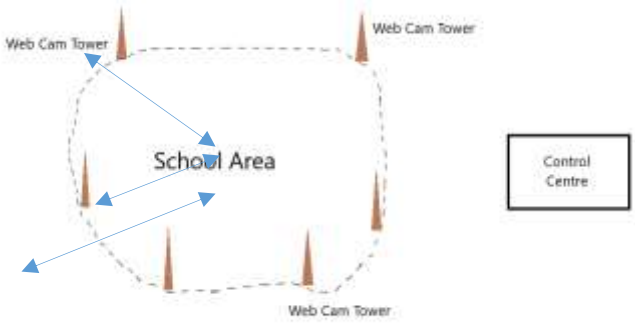


Fig. 1. The school area boundary with web cam towers tracking the animal near boundary

The web cam tower in the Fig 1 is present at the boundary of the school area to track movement of animals and humans near the boundary. A web cam is a compact digital camera which can hook up to our computer system to broadcast images in real time. Web cam use the image sensor chip to catch moving images and convert them into streams of digits then by using USB cable or internet connection, images passed to the computer system.

We use an Arduino Uno kit for processing the harmful animals detection system. Arduino Uno is open source microcontroller board based on microchip ATmega328P microcontroller and developed by Arduino cc. Arduino is connected to sensors or computer system via Arduino takes a few inputs and control a few multiple outputs light, engine and others.

The block diagram of Arduino Uno module is shown in Fig 2. Web cam connected to computer system which take a picture whenever any motion is sensed in school area and send it to HDD computer system. Arduino Uno processed by the computer system and triggered the two notifications when harmful animal detected in school area.

We use C Sharp language for programming of Arduino Uno. C Sharp is a general-purpose and object-oriented programming language. C Sharp is similar to java language and it is easy for user to learn and code. Any other coding language compatible with Arduino Uno can also be used.

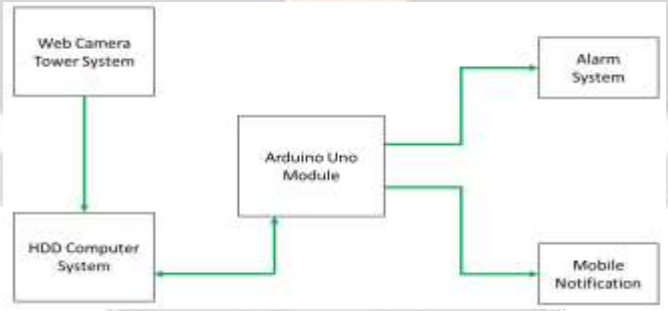


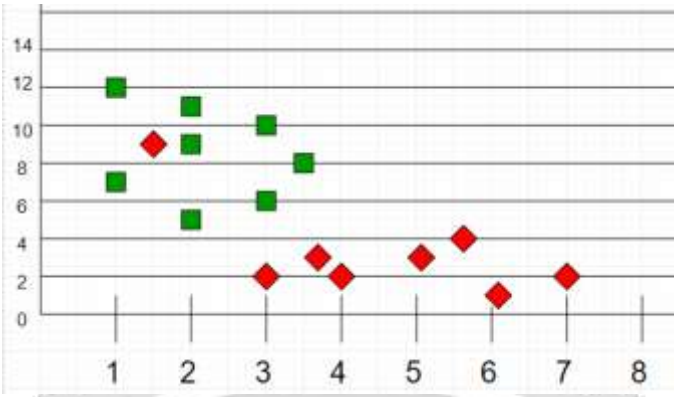
Fig. 2. The block diagram of web cam tower/ Arduino Uno Module used for harmful animals tracking

C. Methodology:

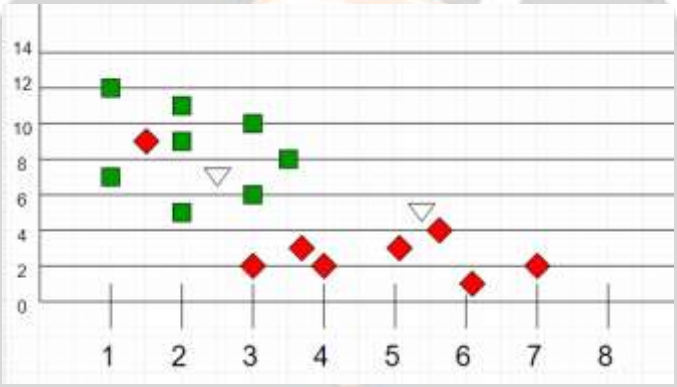
1) KNN Algorithm:

K Nearest Neighbors is a simple algorithm that stores all available cases and classifies new cases based on a similarity measure (e.g., distance functions). K-Nearest Neighbors is one of the essential classification algorithms in Machine Learning. KNN is supervised learning algorithm domain. KNN algorithm used in pattern recognition, data mining and intrusion detection other type of applications. In this algorithm, We are given some prior data (also called training data), which classifies coordinates into groups identified by an attribute.

Consider an example, the following table of data points containing two features:



Now, we have another set of data points (also called testing data), allocate these points a group used for analyzing the training set. Note that the unclassified points are marked as 'White'.



When we plot these points on a graph, we can able to locate some clusters, or groups. Now, given an unclassified point, we can assign it to a group by identifying what group is nearest neighbours belong to. That means, a point close to a cluster of points classified as 'Red' and it has a higher probability of getting classified as 'Red'. Then we can observe the first point is (2.5, 7)and it should be classified as 'Green' and the second point is (5.5, 4.5) and it should be classified as 'Red'.

Algorithm:

consider m be the number of training data samples. And let p be an unknown point.

1. Store the training samples in an array of arr[].this array represents a tuple (x, y) for each element.
2. for i=0 to m:
3. Calculate Euclidean distance d(arr[i], p).
4. Make set S of K smallest distances obtained. Each of these distances correspond to an already classified data point.
5. Return the majority label among S.

2) Working:

Firstly we have to store the database of harmful animals to computer system or cloud. This computer system is connected to IOT model. IOT model connected to various sensors, mobile or web applications. User can view the database of harmful animals via computer system.

Web camera captured image when any moving object occurred in school area. that image send to HDD computer system. computer system compared moving image with stored database and triggered the Arduino Uno for programming process. If animals detected then Arduino Uno gives two notifications simultaneously. It buzz the alarm as well as send SMS on user's mobile phone. Following figure shows working and flow of control of system.

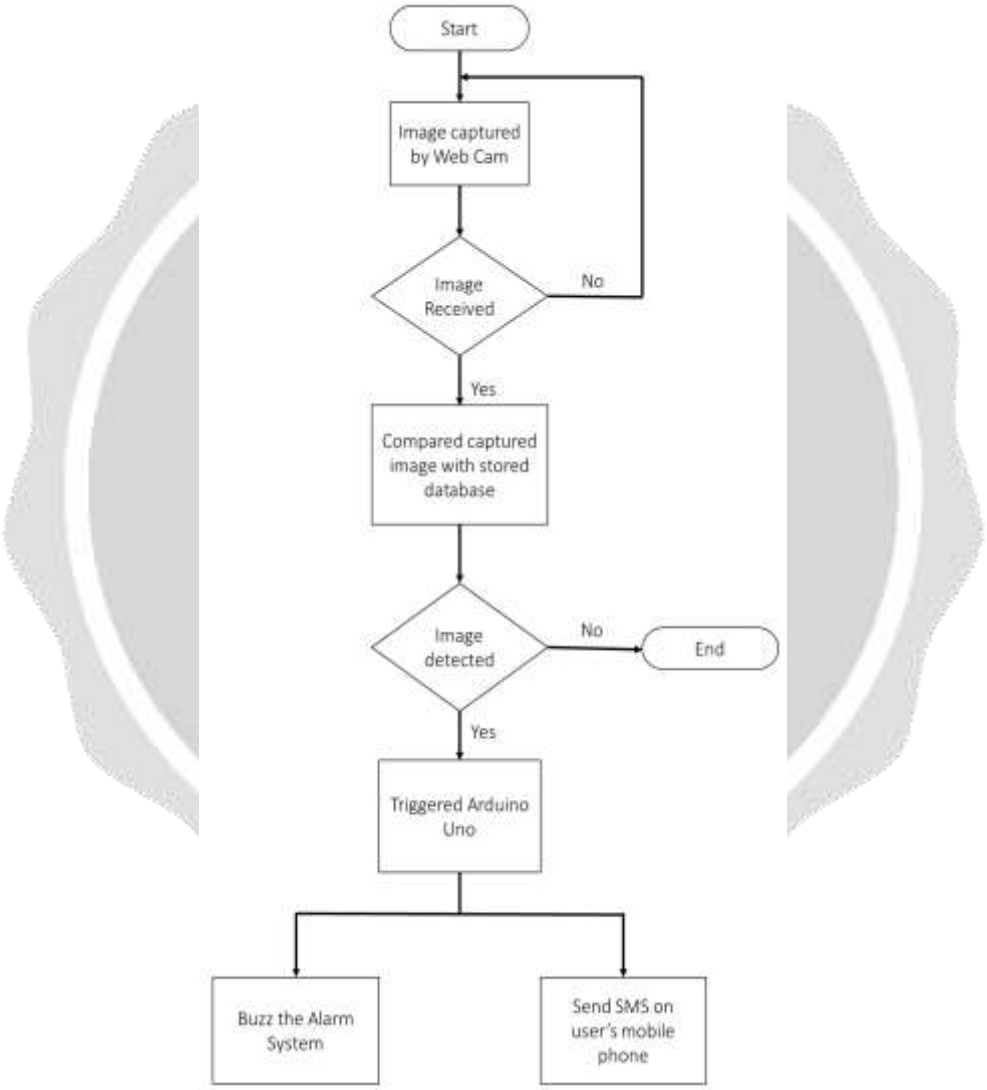


Fig. 3. Flow Chart of the project

3. Acknowledgement

We have great pleasure in developing the project Early warning system for detection of harmful animals using IOT under the guidance of Prof. A. R. Panhalkar. Her valuable suggestions were very helpful. We are truly indebted and grateful to our project co-ordinator Prof. M. B. Vaidya for their valuable guidance and encouragement. We want to take this opportunity to thank all the staff members of our department for their valuable suggestions and solutions.

4. Conclusion

Precaution is better than cure, this system will detect harmful animals in School areas in order to prevent student-animal Collision in school campus. And also provide security for student as well as animals. we have addressed a model for locating animals and keeping track of them. It also takes in account the caring factor. As every animals care is to be taken and also provide security to the student as well as animals life at school campus to provide security.

References

[1] .Dan Valente, Haibin Wang, Peter Andrews, and Partha P. Mitra "Characterizing Animal Behaviour through Audio and Video Signal Processing" , International Journal of Advanced Research in Computer Engineering Technology IEEE Computer Society. (December, 2017).

[2] Liu, Tao Yang, Baoping Yan "Research on the Architecture of Wildlife Observation and Communication System" Computer Network Information Center (CNIC) Chinese Academy of Sciences Beijing, China IEEE 2015.

[3] Slavomir Matuska, Robert Hudec, Miroslav Benco, Patrik Kamencay, Martina Zachariasova –"A novel system for automatic detection and classification of animal" In ELEKTRO, University of Zilina,, IEEE 2014, pp. 76-80.

[4] M., Kumhom, P. and Chamnongthai, K. "Face Recognition Based Dog Breed Classification Using Coarse-to-Fine Concept and PCA" Proceedings of Asia-Pacific Conference on Communications Bangkok, 18-20 October 2015, 25-29.

[5] R.Newlin Shebiah , B.Deeksha., S.Aparna.," Early Warning System From Threat Of Wild Animals Using Raspberry Pi " SSRG International Journal of Electronics and Communication Engineering, PP-132-136, March 2017.

[6] Sheela. S. , Shivaram. K. R. , Chaitra. U. , Kshama. P., Sneha. K.G. , Supriya. K.S.," Low Cost Alert System for Monitoring the Wildlife from Entering the Human Populated Areas Using IOT Devices " International Journal of Innovative Research in Science, Engineering and Technology, PP-128-132,May 2016.

[7] Dr. Kirti Wankhede, Sayali Pedneka," Animal Tracking and Caring using RFID and IOT" International Organization of Scientific Research Journal of Computer Engineering (IOSR-JCE), vol.1/5, PP-24-27, 2017.

[8] Vikhram.B., Revathi.B., Shanmugapriya.R., Sowmiya.S., Pragadeeswaran.G.," Animal Detection System in Farm Areas" International Journal of Advanced Research in Computer and Communication Engineering, vol.6, PP-587-591, March 2017.