

# Automatic Detection of Animals and Warning System using CBIR Algorithm

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**Abstract**— In our everyday life Detection of animals plays an significant role. In the region like an airport animal detection plays a very important role where the existence of any kind of animal presence is strictly restricted. In the view of protection intention in farming areas located near the forest there is a need of system which detects the animal presence and providing warning of animals because the animals destroys the crops or even attack on people. In this project the aim is to detect the animals who crossing their boundary and gives the alert to the control system to take certain action. For this purpose we use the Web cameras that are placed in the detecting areas from where the animal can cross their boundary. These cameras gives us the real time videos to the processing unit and by using image mining algorithm identify the change in set reference background. If there is change in the newly acquired image then apply the CBIR algorithm using MATLAB to identify the animal. If animal is dangerous and which is a desired animal then we activate the alert system.

**Keywords:** Animal Detection, Web Camera, Image Processing, CBIR Algorithm, Alert System

## I. INTRODUCTION

In India 24 % area covered in forest. Forestry industry is source of significant income to over for 400 million people in India, mostly rural. Population in India is increasing at high rate to provide shelter to all of them is great challenge. So most of people live around forest to fulfill their needs. Since people live closer to forest they often encounter wild animals and for safety of human being often wild animals are killed or human beings are attacked by animals. Now safety of both human and animal is equally important. We need to implement some kind of warning system to make sure human and wild animals live safely. This has two parts: one where humans should get notification whenever wild animal comes near residential area and other part is to keep wild animal away from human without harming them. Our project intends to solve these issues. There are number of villages which are situated near the forest area, so there is risk in front of people from wild animal. By using the web camera images are taken and doing process on that, such as image accusation, motion detection etc. if animal crossing the boundary line which is monitored through camera is identified by object detection algorithm used in image processing. Object detection is based on CBRA (i.e. Content Based Retrieval Algorithm), by using that algorithm animal can be differentiate according to size, shape, color, etc. If the animal is wild animal then the system should give alarm.

### A. Problem Statement

With economic development and growth in metro-cities, more and more land is coming under deforestation. Trees are being felled and lands are being utilized for creating houses,

corporate buildings etc. As a result animal dwellings are reducing, due to which they find their way in nearby local areas and cities. This can be risky for human life and property. Wild animals can be harmful to human beings.



Fig. 1: Problems due to Wild Animals

Figure 1.1 shows the actual situation that how the wild animals are entered in residential area and attacked on people. Also the animals like wild pigs are destroying the fields.

### B. Solution

The development of this project prototype can help to track the presence of animals in residential areas and avoid the chance of interference and harm of animal to human life and property.

### C. Objective

The main objective of this project is to detect the animal presence using the web camera, identify whether this animal is dangerous or not and warn the people if the animal is wild using an alert system for the safety.

## II. LITERATURE SURVEY

The detection of animals is required in various fields of real life applications. As an example hundreds of camel-vehicle accidents were reported every year causing numerous deaths and loss of property running into millions of Saudi Riyals. To address this problem, a deployable and intelligent Camel Vehicle Accident Avoidance System (CVAAS) was designed using global positioning system technology [1]. M. S. Zahrani and C. Jiu Wang developed an algorithm for light detection and ranging (LIDAR) data to enable fisherman find the right location of fishes in deep sea[2].

For maintaining human safety and security by detecting possible dangerous animal intrusions into the residential area, D. Tahmouh and J. Silvius used micro-Doppler signals[3]. The tracking of animals is important for monitoring or observing the locomotive behavior of animals and its surroundings. The S. H. Kim and D. H. Kim developed zoological systems for tracing an animal, identification, and anti-theft for the management and security of animal in zoo

with the help of sensor, radio-frequency identification (RFID), and global positioning system (GPS)[4]. By tracking and observing the animal movements, it helps us to have a better understanding on how an animal behaves and interacts with its environment.

The identification of animals is very important in identifying the targeted animal and its behavior. Identification of animals helps human being to monitor and manage animals easier. J. S. L. Ting and W. B. Lee designed and developed RFID-based mobile monitoring system for better management of animals in dynamic information retrieving, location tracking and to help users over a wireless network[5]. The various Animal detection methods using Image and video processing reported in literature are:

#### A. Human Prediction Approach for Animal Detection

Initial researches on animal detection are based on to observe how fast and accurate human eyes can detect the presence of animals in original image. This approach is very good and reliable if the animal detection distance is near and doesn't have lighting problems. This method for animal detection by human eyes is also reliable if seen from the computational point of view. M. F. Thorpe and A. Delomre showed that a human observer is able to make a decision whether a momentarily ashed animal image is having the presence of an animal as fast as 150ms.[6] Even though this approach of human prediction for animal detection is effective and achieves some reasonable result or level, human eyes do have some serious limitations. Human eyes can get tired or exhausted easily causing a limitation in the effectiveness and accuracy of the method (algorithm). Human eyes need some rest and can't work efficiently for 24 hours a day to perform animal detection. These limitations can be restricted by using computer vision in image processing for animal detection.

#### B. Threshold Segmentation Approach for Animal Detection

For extracting the targeted animals details from background, this approach can be used. The basic idea of this approach is simple in which the pixels in the image having intensities or values greater than the threshold are set to white (i.e. intensity 255) and those pixels having intensities or values less than the threshold value are set to black (i.e. intensity 0). There are different types of thresholding like adaptive thresholding or dynamic thresholding and optimal thresholding which are very important topics image processing but in this paper we will restrict to simple concept of thresholding only. The object or animal is found by using background subtraction method after getting the background image[7]. It is very difficult and tedious to choose the threshold value as the background image changes periodically[8].

#### C. Power Spectrum Approach for Animal Detection

Researchers have tried to find out whether the presence of animal in the scene or image will affect the power spectral of the image or not which can be defined as the amplitude of the signal in the frequency domain. The power spectrum can be constructed by transforming images from s (spatial) domain to frequency domain with the help of the transformation function like Fourier transform. This

approach is not suitable if a person wants quick result or wants to detect the animals very quickly as this approach takes more time[9].

#### D. Face Detection Approach for Animal Detection

For monitoring or observing the locomotive behavior of animals and their interaction with the surroundings, T. Burghardt and J. Calic, applied detection and tracking of targeted animal faces using Haar-like feature and Adaboost classifiers. When it is positive that targeted animal has been detected, video recorders turned on to extend battery life time and to ensure that recorded video contains a correct research value. This method is very crucial and important in situation whereby video person is not suitable to present at the recording scene for safety issue or video person might be scared of some timid animal away. The measurement of animal faces is done by utilizing face detection method with different local contrast configuration of luminescence channel to detect the image region of animal faces.

### III. METHODOLOGY

Figure 2 shows the block diagram of proposed system. Here we set the monitoring area as a reference background for image subtraction. We shall be using web camera for real time video capturing of the monitoring area. These videos are splits in the form of frames to compare it with reference set background. Computer or pc is the major part of the system. It is used here to collect the video captured by the web camera. After collecting the images from video, processing of that video in real time is done by the pc using the algorithm in MATLAB software. An image is an array or a matrix of square pixels (picture elements) arranged in columns and rows. Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from the image. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image.

#### A. Steps Involved In Image Mining Process Are

- 1) Step 1: Read image from image database.
- 2) Step 2: Pre-process the image to improve the quality of the image. Preprocessing involves identification and labeling of the objects contained in the images using an image query processing algorithm. The output of the pre-processing step will be a set of records, one for each image, containing the object identifiers for the objects contained in the image. This step is quite intensive since it is a similarity search between images, actually image descriptors.
- 3) Step 3: Perform Transformation of images into database like table. In the table each row stands for a pixel. Thus the cardinality (no of rows) corresponds to the total number of pixels in an image. The columns correspond to the features associated with a pixel. These features can be local variation, grey level, entropy, contrast, mean, etc.
- 4) Step 4: Once the database table has been obtained, perform feature extraction. Features characteristics of the objects of interest, if selected carefully, are representative of the maximum relevant information that

the image has to offer for a complete characterization of the lesion.

- 5) Step 5: Once features have been extracted, perform mining using suitable data mining techniques to identify suitable patterns.
- 6) Step 6: Finally, the resulting patterns are evaluated and interpreted to obtain the final knowledge, which can be applied to applications.

After getting result from the image mining process to identify animal, the proposed algorithm is CBIR (Content Based Image Retrieval). The requirement for development of CBIR is enhanced due to tremendous growth in volume of images as well as the widespread application in multiple fields. Texture, color, shape and spatial layout are the underlying traits to represent and index the images. These peculiar features of images are extracted and implemented for a similarity check among

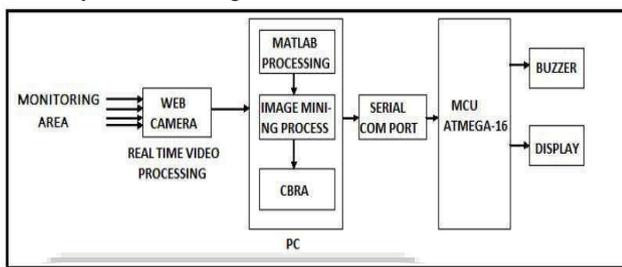


Fig. 2: Block Diagram of Proposed System

images. The problem of content based image retrieval is based on generation of peculiar query. For relevant images that meet their information need, an automated search is initiated by drawing a sketch or with the submission of image having similar features. Similarity between extracted features can be measured by using different algorithms. The use of relevance feedback as a post retrieval step enhances the optimization of the process. The necessity to explore the ever growing volume of image and video is motivating the development of efficient CBIR algorithms.

The objective of this algorithm is to compute the dissimilarity between the two images represented in the form of two matrixes to generate the resultant matrix. Among the two input images, one image is the grey scale of the original image and the other image is the image obtained from the computation of the standard deviation of the input image. Then perform segmentation and extraction on the resultant image by the process of Thresholding.

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For relevant images that meet their information need, an automated search is initiated by drawing a sketch or with the submission of image having similar features. Similarity between extracted features can be measured by using CBIR algorithm.

Visual features as color, shape and texture are implemented for retrieval of images. Traditional methods of image indexing have been proven neither suitable nor

efficient in terms of space and time so it triggered the development of the new technique. It is a 2 step process where image features are extracted in first step to a distinguishable extent. In second step matching of features which are visually similar is done.

When the animal is detected the calculated result is given to the alert system via serial communication port.

#### IV. ALGORITHM

- 1) Step 1: Start
- 2) Step 2: Image acquiring of monitoring area using web camera.
- 3) Step 3: Apply the image mining algorithm to identify change in set reference background.
- 4) Step 4: If there is no change in the newly acquired image and set reference go to step 2.
- 5) Step 5: Apply the CBIR algorithm to identify the animals.
- 6) Step 6: If the animal is not a desired animal which is harmful then go to step 2.
- 7) Step 7: Activate the alert system.
- 8) Step 8: Stop

#### V. CONCLUSION

Hence by implementing this project we are able to avoid the interruption of wild animals in the residential area and provide safety to human being. In our future enhancements we can use Zigbee to transmit the information within 25meter in and around the forest areas with the help of microcontroller.

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